IDAHO STANDARDS for

PUBLIC WORKS CONSTRUCTION

2015 Edition

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2015 Idaho Standards for Public Works Construction

Signature Page

It is the intention of the undersigned that the ISPWC be used only as a guide. Per Idaho Code 54 – 1218, a licensed professional engineer must prepare the plans and specifications for public works projects as well as supervise or conduct construction observation. Therefore, it is the sole responsibility of the Registered Professional Engineer who is referencing or using the ISPWC for a specific project to ensure that the ISPWC specifications and drawings are appropriate for the specific use, used appropriately under all circumstances, and, if appropriate, modified (via Special Technical Provisions or other means) as necessary in order to prepare final specifications, drawings, or plans.

Refer to the ISPWC User Instructions and General Information for limitations and usage guidelines.

Idaho Professional Engineers' Seals

CIVIL STANDARDS – 2015 MANUAL
and QC DIVISION

J-U-B ENGINEERS, Inc.

ORIGINAL STANDARDS AND
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TERRACON, Inc.

ISPWC

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www.deq.state.id.us

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ISPWC

USER INSTRUCTIONS AND GENERAL INFORMATION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

ISPWC - User Instructions and General Information

The ISPWC Document

The ISPWC is comprised of two parts:

1) This binder, which constitutes the revised "2015 ISPWC - Standard Specifications and Drawings". As of January 2015, this manual is completely updated.

2) The "ISPWC – Owners and Specifiers Manual" is a document to assist public agencies or engineers in the preparation of contract documents. This is available in a separate three-ring binder (for a nominal charge) and contains all instructions and forms required for contract document preparation. Forms are also presented in electronic form via computer diskette. Instructions for the use of this separate manual are found in the front of that document.

The remainder of these User Instructions and General Information pertain to the "ISPWC – Standard Specifications and Drawings".

There is one Administrative Divisions and 11 Technical Divisions in the revised ISPWC. The Administrative Division is:

- Division 100 – General Conditions – This is the Standard Form of Agreement prepared by the Engineers Joint Contract Documents Committee (EJCDC). This Division has been amended to reflect Idaho practice and can be changed only by the ISPWC Executive Committee. Supplementary Conditions and Owner's Special Provisions, which amend the General Conditions and Technical Specifications on a project-by-project basis are covered in the ISPWC – Owners and Specifiers Manual.

Each of the 11 Technical Division is broken down into several distinct Sections related to the Division. Each Section is comprised of four major headings, as described below.

PART 1	GENERAL - scope, related sections, references, regulatory requirements, etc.
PART 2	MATERIALS - specifications for construction materials covered in the section.
PART 3	WORKMANSHIP - specifications for construction methods covered in the section.
PART 4	MEASUREMENT AND PAYMENT – description of measurement and payment for each bid item covered in the section.

Each Measurement and Payment heading includes pay items, method of measurement, and manner of payment. Each bid item has a Bid Schedule Payment Reference and Bid Schedule Description that are listed in the Pay Items tables at the front of the manual. Pay item numbers and descriptions are used in preparation of the Bid Schedule found in the ISPWC – Owners and Specifiers Manual.

Each Division is followed by related Standard Drawings in English units.

Metric System Usage

The 2015 ISPWC is presented in English Units only to reflect the consensus opinion on metric usage and current ITD policy.

ISPWC Document Usage

The ISPWC is meant to be a reference document for construction and quality control of public works infrastructure projects. Public agencies are encouraged to adopt and use the ISPWC by resolution, policy or ordinance. A sample Ordinance for adoption of the ISPWC is included at the end of this chapter. Potential users include:

- Cities, Counties and Special Purpose Districts for the following projects:

    1) Capital improvement projects (major projects and small extensions),
    2) Subdivisions,
    3) Projects by private parties to be dedicated to the public after construction, and
    4) When constructing with own forces.

- Consulting Engineers
- Developers
- Architects
- Contractors
- State and Local Agencies

The ISPWC will typically be used as reference within an Owner's "Contract Documents" which include all documentation required for letting a construction contract. Reference is made to the ISPWC – Owners and Specifiers Manual contained in a separate three-ring binder. As an overview, Contract Documents consist of the following items:

- PROJECT MANUAL

    - Bidding Information: Includes Instructions to Bidders, Bid Form including Bid Schedule, and Bid Bond.

    - Contract Information: Includes the Contract, Performance Bond, Payment Bond, and Insurance Requirements.

    - Supplementary Conditions: Consists of amendments to the ISPWC General Conditions.

    - Owner's Special Provisions: Provides for amendments or additions to the ISPWC Technical Specifications for specific project requirements.

    - Plans, Exhibits and Attachments: Includes drawings, sketches, standard plans not included in the ISPWC, geotechnical information, permits or other reports made part of the Contract Documents by attachment of reference.

- MISC. ADMINISTRATIVE FORMS

  - Includes forms required for awarding and proceeding with the work, as follows:

    - Notice of Award
    - Notice to Proceed
    - Application for Payment
    - Change Order
    - Work Change Directive
    - Certificate of Substantial Completion
    - Standard Developer Agreement

Standards and References

All standards and references listed in the ISPWC are to be for the latest official version or update of the reference, regardless of the date or code reference actually shown in the ISPWC. Standards and codes are subject to change at any time. The ISPWC manual may not reference the appropriate or current code or standard for any specific situation.

References that list a specific product are not to be construed as sole source, rather as an acceptable product. Any product referenced may be substituted with an equal product at the sole discretion of the Engineer.

ISPWC Limitations and Waiver

1) The ISPWC cannot include all specifications for use on public works projects due to many specialized applications. They are intended to encompass construction typical to most projects.

2) Although the ISPWC documents and drawings have been prepared and reviewed by Professional Engineers and, as such, should be considered as applicable for most standard construction without further revisions, they are not intended to eliminate the need for the involvement of a Registered Professional Engineer on a specific project. The Registered Professional Engineer, when referencing the ISPWC documents for a specific project is responsible for insuring that the ISPWC specifications and drawings are appropriate for the specific use.

3) A project can be no better than the construction observation provided. The ISPWC does not address construction observation and supplemental or reference material that may be needed.

4) Not all possible requirements are included in the ISPWC. Should additional or revised requirements be desired, the items should be included under the Owner's Special Provisions and Owner's Special Technical Provisions in the Contract Documents for the project.

5) Per Idaho Code Title 54, Section 1218, a licensed professional engineer must design the plans and specifications for public works projects as well as supervise or conduct construction observation.

6) INDEMNIFICATION AND HOLD HARMLESS. Neither the Executive Committee of the ISPWC nor their consultant shall bear liability for any claims, damages, or causes of action stemming from the use, adaptation, reference, or modification of these documents. By purchasing, using, or referencing these documents, User agrees to indemnify and hold the Executive Committee of the ISPWC and their consultant harmless for any claims, damages, or causes of action resulting from said use or reference.

ISPWC Document Availability

The ISPWC document is administered and distributed by the Local Highway Technical Assistance Council (LHTAC) at the following address.

LHTAC
3330 W. Grace Street
Boise, ID 83703
(208) 344-0565
FAX 344-0789
Email: jflatz@lhtac.org

Updating Procedures

Comments and/or corrections to the ISPWC are encouraged. It is the intent of the Executive Committee and Subcommittee Chairmen to annually review and update the ISPWC. Suggested modifications and/or revisions to the ISPWC should be submitted by one of the following methods:

- ✓ By Mail: LHTAC
3330 W. Grace Street
Boise, ID 83703
- ✓ By FAX: (208) 344-0789
- ✓ By Email: lhtac@lhtac.org
- ✓ By Phone: 344-0565 (Boise area)
1-800-259-6841 (outside Boise area)

Sample Ordinance - Adoption of the Idaho Standard for Public Works Construction

ORDINANCE NO. 20XX

AN ORDINANCE OF THE (INSERT ENTITY SUCH AS "CITY OF GRANGEVILLE"), A (INSERT ENTITY TYPE SUCH AS "MUNICIPAL CORPORATION"), OF THE STATE OF IDAHO; PROVIDING FOR THE CREATION OF (INSERT ENTITY) CODE TITLE (X), CHAPTER (X), SECTION (XX) TO ADOPT THE IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC) AND FUTURE UPDATES (WHEN PUBLISHED) AS THE STANDARD CONSTRUCTION DOCUMENTS FOR (INSERT ENTITY); AND PROVIDING FOR THIS ORDINANCE TO BE IN FULL FORCE AND EFFECT FROM THE DATE OF ITS PASSAGE, APPROVAL AND PUBLICATION ACCORDING TO LAW.

WHEREAS, the (INSERT GOVERNING BODY SUCH AS "CITY COUNCIL") desires to adopt a quality construction standard for public works within the jurisdiction of (INSERT ENTITY); and

WHEREAS, the adoption of such a standard would aid in providing consistency and efficiency in the construction of public works improvements in our community, and

WHEREAS, the Idaho Standards for Public Works Construction (ISPWC) is a recognized standard for public works construction in the State of Idaho and is used by many entities as their public works construction standard; and

WHEREAS, the ISPWC is a recognized standard by many of the reviewing agencies that may assist in the timeliness of agency reviews on subject projects, and

WHEREAS, the ISPWC is regularly updated in an attempt to stay current with changing construction technologies,

NOW, THEREFORE, BE IT ORDAINED BY THE (INSERT AUTHORIZING BODY SUCH AS "MAYOR AND COUNCIL") OF (INSERT ENTITY) AS FOLLOWS:

SECTION 1: That (INSERT ENTITY) Code Title (X), Chapter (X), Section (XX) be added as follows:

1. The Idaho Standards for Public Works Construction (ISPWC), along with all current and future published updates, shall be the standard for public works infrastructure construction within the jurisdiction of (INSERT ENTITY).

2. The scope of the projects for which the ISPWC is the standard shall be limited to the scope of the subject matter contained in the ISPWC.

3. All contractors who bid on projects within the scope of the ISPWC and in the jurisdiction of (INSERT ENTITY) shall possess a current version of the ISPWC at the time they submit bids for such projects**…**

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ISPWC

PAY ITEMS

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

PAY ITEMS

REFERENCE	BID ITEM	UNIT
Division 200 – Earthwork		
201.4.1.A.1	Clearing and Grubbing	acre (AC)
201.4.1.B.1	Clearing and Grubbing	lump sum (LS)
201.4.1.C.1	Removal of Obstructions	lump sum (LS)
201.4.1.D.1	Removal of _____	square yard (SY)
201.4.1.E.1	Removal of _____	lineal foot (LF)
201.4.1.F.1	Removal of _____	each (EA)
202.4.1.A.1	Excavation	cubic yard (CY)
202.4.1.B.1	Excavation	ton (TON)
202.4.1.C.1	Excavation	square yard (SY)
202.4.1.D.1	Excavation	lump sum (LS)
202.4.2.A.1	Rock Excavation	cubic yard (CY)
202.4.2.B.1	Rock Excavation	ton (TON)
202.4.2.C.1	Rock Excavation	square yard (SY)
202.4.2.D.1	Rock Excavation	lump sum (LS)
202.4.3.A.1	Excavation Schedule _____	cubic yard (CY)
202.4.3.B.1	Excavation Schedule _____	ton (TON)
202.4.3.C.1	Excavation Schedule _____	square yard (SY)
202.4.3.D.1	Excavation Schedule _____	lump sum (LS)
202.4.4.A.1	Controlled Blasting	linear foot (LF)
202.4.4.B.1	Controlled Blasting	square yard (SY)
202.4.4.C.1	Controlled Blasting	drilled foot (DF)

ISPWC – PAY ITEMS (Continued)

202.4.5.A.1	Unsuitable Material Excavation	cubic yard (CY)
202.4.5.B.1	Unsuitable Material Excavation	square yard (SY)
202.4.5.C.1	Unsuitable Material Repair	cubic yard (CY)
202.4.5.D.1	Unsuitable Material Repair	square yard (SY)
202.4.6.A.1	Borrow	cubic yard (CY)
202.4.6.B.1	Borrow	ton (TON)
202.4.7.A.1	Haul	yard unit (YU)
202.4.7.B.1	Haul	ton unit (TU)
202.4.8.A.1	Dust Abatement Water	1000 gallons (MG)
204.4.1.A.1	Structural Excavation Schedule 1	cubic yard (CY)
204.4.1.B.1	Structural Excavation Schedule 1	lump sum (LS)
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204.4.3.B.1	Compacting Backfill	lump sum (LS)
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205.4.1.B.1	Dewatering	lump sum (LS)
205.4.1.C.1	Dewatering	day (DAY)
205.4.1.D.1	Dewatering	square yard (SY)
206.4.1.A.1	Seedbed Preparation	acre (AC)
206.4.1.B.1	Seeding	acre (AC)
206.4.1.C.1	Mulching	acre (AC)
206.4.1.D.1	Mulch Anchoring (mechanical)	acre (AC)
206.4.1.E.1	Mulch Anchoring (tack)	acre (AC)
206.4.1.F.1	Erosion Blanket	acre (AC)
206.4.1.G.1	Fertilizing	acre (AC)

ISPWC – PAY ITEMS (Continued)

206.4.1.H.1.	Loose Riprap	ton (TON)
206.4.1.H.3.	Loose Riprap	cubic yard (CY)
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206.4.1.I.3.	Hand Placed Riprap	cubic yard (CY)
206.4.1.J.1.	Sack Riprap	ton (TON)
206.4.1.J.3.	Sack Riprap	cubic yard (CY)
206.4.1.K.1.	Concrete Stabilized Riprap	ton (TON)
206.4.1.K.3.	Concrete Stabilized Riprap	cubic yard (CY)
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207.4.1.A.11	Stormwater Filters (Catchbasin Insert)	each (EA)
207.4.1.B.1	Infiltration Facilities (Infiltration Trench)	linear foot (LF)
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207.4.1.C.5	Detention Facilities (Wet Extended Detention)	cubic yard (CY)
207.4.1.C.7	Detention Facilities (Dry Extended Detention)	cubic yard (CY)
207.4.1.C.9	Detention Facilities (Biodetention Basin)	cubic yard (CY)
207.4.1.C.11	Detention Facilities (Presettling/sedimentation)	cubic yard (CY)
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207.4.1.D.3	Other Structural Controls (Level Spreader)	each (EA)

ISPWC – PAY ITEMS (Continued)

Division 300 – Trenching

301.4.1.A.1	Trench Excavation	linear foot (LF)
301.4.1.B.1	Trench Excavation – depth _____	linear foot (LF)
301.4.1.C.1	Trench Excavation	cubic yard (CY)
301.4.1.D.1	Service/Utility Trench Excavation	linear foot (LF)
302.4.1.A.1	Rock Excavation	cubic yard (CY)
302.4.1.B.1	Rock Excavation	linear foot (LF)
302.4.1.C.1	Rock Excavation- depth _____	linear foot (LF)
303.4.1.A.1	Exploratory Excavation (non-groundwater)	hour (HR)
303.4.1.A.3	Exploratory Excavation (groundwater)	hour (HR)
303.4.1.B.1	Exploratory Excavation (LxWxD)(non-groundwater)	each (EA)
303.4.1.B.3	Exploratory Excavation (LxWxD)(groundwater)	each (EA)
304.4.1.A.1	Trench Foundation Stabilization	cubic yard (CY)
304.4.1.B.1	Trench Foundation Stabilization	cubic yard (CY)
305.4.1.A.1	Class A-1 Pipe Bedding for ___ Diameter Pipe	linear foot (LF)
305.4.1.A.3	Class A-2 Pipe Bedding for ___ Diameter Pipe	linear foot (LF)
305.4.1.A.5	Class B-1 Pipe Bedding for ___ Diameter Pipe	linear foot (LF)
305.4.1.A.7	Class B-2 Pipe Bedding for ___ Diameter Pipe	linear foot (LF)
305.4.1.A.9	Class C-1 Pipe Bedding for ___ Diameter Pipe	linear foot (LF)
305.4.1.A.11	Class C-2 Pipe Bedding for ___ Diameter Pipe	linear foot (LF)
305.4.1.A.13	Class C-3 Pipe Bedding for ___ Diameter Pipe	linear foot (LF)
305.4.1.B.1	Pipe Bedding – Placement and Compaction Only for _____ Diameter Pipe	linear foot (LF)
306.4.1.A.1	Type “A” Trench Backfill	linear foot (LF)
306.4.1.A.3	Type “C” Trench Backfill	linear foot (LF)
306.4.1.B.1	Type “A” Trench Backfill ___ Depth	linear foot (LF)

ISPWC – PAY ITEMS (Continued)

306.4.1.B.3 ..... Type “C” Trench Backfill ___ Depth..... linear foot (LF)

306.4.1.C.1 ..... Type “A” Trench Backfill ..... cubic yard (CY)

306.4.1.C.3 ..... Type “C” Trench Backfill ..... cubic yard (CY)

306.4.1.D.1 ..... Imported Trench Backfill.....ton (TON)

306.4.1.E.1 ..... Service/Utility Trench Backfill ..... linear foot (LF)

306.4.1.F.1..... Service/Utility Trench CDF (flowable) Backfill..... linear foot (LF)

306.4.1.G.1 ..... Culvert Crossing CDF (flowable) Backfill ..... cubic yard (CY)

307.4.1.A.1 ..... Miscellaneous Surface Restoration (Landscaping)..... linear foot (LF)

307.4.1.A.3 ..... Miscellaneous Surface Restoration (Sod)..... linear foot (LF)

307.4.1.A.5 ..... Miscellaneous Surface Restoration (Pasture)..... linear foot (LF)

307.4.1.A.7 ..... Miscellaneous Surface Restoration (Natural Ground) ..... linear foot (LF)

307.4.1.B.1 ..... Type “B” Surface Restoration (Concrete Roadway)..... linear foot (LF)

307.4.1.C.1 ..... Type “B” Surface Restoration (Concrete Roadway).....square yard (SY)

307.4.1.D.1 ..... Type “C” Surface Restoration (Gravel Roadway)..... linear foot (LF)

307.4.1.E.1 ..... Type “C” Surface Restoration (Gravel Roadway).....square yard (SY)

307.4.1.F.1..... Main Line Type “P” Surface Restoration (Asphalt Roadway) ..... linear foot (LF)

307.4.1.F.3..... Main Line Type “P” Surface Restoration (Asphalt Roadway with Fabric)..... linear foot (LF)

307.4.1.F.5..... Service Line Type “P” Surface Restoration (Asphalt Roadway) ..... linear foot (LF)

307.4.1.F.7..... Service Line Type “P” Surface Restoration (Asphalt Roadway with Fabric)..... linear foot (LF)

307.4.1.G.1 ..... Type “P” Surface Restoration (Asphalt Roadway) .....square yard (SY)

307.4.1.G.3 ..... Type “P” Surface Restoration (Asphalt Roadway with Pavement Fabric) ..... square yard (SY)

307.4.1.H.1 ..... Full Width Surface Restoration (Asphalt Roadway) ..... square yard (SY)

307.4.1.I.1 ..... Modified Full Width Surface Restoration (Asphalt Roadway) ..... square yard (SY)

307.4.1.J.1 ..... Gravel Access Road – Type ___ ..... linear foot (LF)

307.4.1.K.1 ..... Soft Spot Repair Uncrushed Aggregate Base Material (0 to 10 cu. yds) ..... cubic yards (CY)

307.4.1.K.3 ..... Soft Spot Repair Uncrushed Aggregate Base Material (11 cu. yds and above)..... cubic yards (CY)

307.4.1.K.5 ..... Soft Spot Repair Crushed Aggregate Base Material (0 to 10 cu. yds) ..... cubic yards (CY)

307.4.1.K.7 ..... Soft Spot Repair Crushed Aggregate Base Material (11 cu. yds and above)..... cubic yards (CY)

307.4.1.K.9 ..... Soft Spot Asphalt Surface Restoration ..... square yards (SY)

308.4.1.A.1 ..... Steel Casing Pipe Boring and Jacking, ___ (diameter) ..... linear foot (LF)

308.4.1.B.1 ..... Pipe Boring and Jacking, STA ___ to STA ___, (diameter) ..... lump sum (LS)

309.4.1.A.1 ..... Horizontal Directional Drilling – Size ___, Type ___ ..... linear foot (LF)

Division 400 – Water

401.4.1.A.1 ..... Water Main Pipe – Size ___ - Type ___ ..... linear foot (LF)

401.4.1.B.1 ..... Water Main Fitting – Size ___ - Type ___ ..... each (EA)

402.4.1.A.1 ..... Valve – Size ___ - Type ___ ..... each (EA)

403.4.1.A.1 ..... Hydrant ..... each (EA)

404.4.1.A.1 ..... Water Service Connection, Size ___ ..... each (EA)

ISPWC – PAY ITEMS (Continued)

Division 500 – Sewer

501.4.1.A.1 ..... Gravity Sewer Pipe
Size ___ - Type ___ (pipe only) ..... linear foot (LF)

501.4.1.A.3 ..... Pressure Sewer Pipe
Size ___ - Type ___ (pipe only) ..... linear foot (LF)

501.4.1.B.1 ..... Gravity Sewer Pipe – Size ___ - Type ___
(includes excavation, bedding, backfill, etc.) ..... linear foot (LF)

501.4.1.B.3 ..... Pressure Sewer Pipe – Size ___ - Type ___
(includes excavation, bedding, pipe, backfill, etc.) linear foot (LF)

501.4.1.C.1 ..... CCTV Inspection - Size _____ ..... linear foot (LF)

501.4.1.D.1 ..... Concrete Pipe Anchors ..... each (EA)

502.4.1.A.1 ..... Sanitary Sewer Manhole – Type ___ ..... each (EA)

502.4.1.B.1 ..... Sanitary Sewer Manhole – Type ___,
4 feet through 10 feet Vertical Depth ..... each (EA)

502.4.1.B.3 ..... Sanitary Sewer Manhole – Type ___,
Additional Depth ..... vertical foot (VF)

502.4.1.C.1 ..... Plastic Lined Sanitary Sewer Manhole – Type ___ ..... each (EA)

502.4.1.D.1 ..... Drop Manhole - Type ___ ..... each (EA)

502.4.1.E.1 ..... Shallow Manhole – Type ___ ..... each (EA)

502.4.1.F.1 ..... Connection to Existing Manhole, Size _____ ..... each (EA)

503.4.1.A.1 ..... Main Line Clean-out – Size ___ ..... each (EA)

503.4.1.A.3 ..... Service Line Clean-out – Size ___ ..... each (EA)

503.4.1.A.5 ..... Service Line Clean-out with Backwater Valve ..... each (EA)

504.4.1.A.1 ..... Sewer Service Line – Size ___ ..... linear foot (LF)

504.4.1.A.3 ..... Sewer Service Line (Pressure Pipe) – Size ___ ... linear foot (LF)

504.4.1.B.1 ..... Sewer Service Line – Size ___ ..... each (EA)

504.4.1.C.1 ..... Sewer Service Connection to Manhole – Size ___ ..... each (EA)

504.4.1.D.1 ..... Sewer Service Connection to Main – Size ___ ..... each (EA)

505.4.1.A.1 ..... Pressure Sewer Pipe – Size ___ (pipe only) ..... linear foot (LF)

ISPWC – PAY ITEMS (Continued)

505.4.1.B.1 ..... Pressure Sewer Pipe – Size ___
(includes excavation, bedding, backfill, etc.)..... linear foot (LF)

505.4.1.C.1 ..... Pressure Sewer Cleanout.....each (EA)

507.4.1.A.1 ..... Segment Mobilization .....each (EA)

507.4.1.B.1 ..... Point Excavation (Asphalt Surfacing).....each (EA)

507.4.1.B.3 ..... Point Excavation (Non-Asphalt Surfacing) .....each (EA)

507.4.1.C.1 ..... Trench Excavation (Asphalt Surfacing)..... linear foot (LF)

507.4.1.C.3 ..... Trench Excavation (Non-Asphalt Surfacing) ..... linear foot (LF)

507.4.1.D.1 ..... Install ___ Coupling .....each (EA)

507.4.1.D.3 ..... Install ___ Full Circle Repair Clamp.....each (EA)

507.4.1.E.1 ..... Replace ___ Dia. Pipe ..... linear foot (LF)

507.4.1.F.1..... Repair Service Connection .....each (EA)

507.4.1.F.3..... Core Drill Sewer Main.....each (EA)

507.4.1.G.1 ..... Replace _____ Dia. Service Line
(Asphalt Surfacing)..... linear foot (LF)

507.4.1.G.3 ..... Replace _____ Dia. Service Line
(Non-Asphalt Surfacing) ..... linear foot (LF)

507.4.1.H.1 ..... Remove Manhole .....each (EA)

507.4.1.H.3 ..... Remove Flush Tank .....each (EA)

507.4.1.I.1..... Rechannel Manhole.....each (EA)

507.4.1.I.3..... Rechannel Manhole (New Connection).....each (EA)

507.4.1.J.1 ..... Install 1-Foot Manhole Barrel Section.....each (EA)

507.4.1.K.1 ..... Sewage Flow Control..... lump sum (LS)

508.4.1.A.1 ..... Slipline Segment Mobilization .....each (EA)

508.4.1.B.1 ..... Slipline ___ Pipe into ___ Pipe ..... linear foot (LF)

508.4.1.C.1 ..... Grouting of Annular Space ___ Dia. in___ Dia..... lump sum (LS)

508.4.1.D.1 ..... Install ___ x ___ Service Line Reconnection .....each (EA)

509.4.1.A.1 ..... CIPP Segment Mobilization .....each (EA)

509.4.1.B.1 ..... CIPP Liner ____ ..... linear foot (LF)

509.4.1.C.1 ..... Cut Off Protruding Services .....each (EA)

509.4.1.D.1 ..... Reconnect Service Line .....each (EA)

509.4.1.E.1 ..... Bypass Sewage Pumping ..... lump sum (LS)

509.4.1.F.1..... Residential Accommodations for CIPP Work..... lump sum (LS)

510.4.1.A.1 ..... Pipe Bursting Segment Mobilization .....each (EA)

510.4.1.B.1 ..... Pipe Burst ____ Pipe through ____ Pipe ..... linear foot (LF)

510.4.1.C.1 ..... Install ____ x ____ Service Line Reconnection .....each (EA)

511.4.1.A.1 ..... Fold-N-Form Segment Mobilization .....each (EA)

511.4.1.B.1 ..... Fold-N-Form ____ Pipe into ____ Pipe..... linear foot (LF)

511.4.1.C.1 ..... Install ____ x ____ Service Line Reconnection .....each (EA)

511.4.1.D.1 ..... Install ____ x ____ Service Line Replacement .....each (EA)

Division 600 – Culverts and Storm Drains

601.4.1.A.1. ..... ___ Storm Drain/Culvert/Gravity Irrigation Pipe, Class ___ Reinforced Concrete (RCP)..... linear foot (LF)

601.4.1.A.3 ..... ___Storm Drain/Culvert/Gravity Irrigation Pipe, Class ___ Non-Reinforced Concrete (NRCP)..... linear foot (LF)

601.4.1.A.5. ..... ___ Storm Drain/Culvert/Gravity Irrigation Pipe, Class ___ PVC ..... linear foot (LF)

601.4.1.A.7. ..... ___ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Ribbed PVC ..... linear foot (LF)

601.4.1.A.9. ..... ___ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Closed Profile PVC ..... linear foot (LF)

601.4.1.A.11. ..... ___ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Corrugated Galvanized Steel (CGSP) ..... linear foot (LF)

601.4.1.A.13 ..... ___ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Corrugated Aluminum (CAP) ..... linear foot (LF)

ISPWC – PAY ITEMS (Continued)

601.4.1.A.15 ..... ___ Storm Drain/Culvert/Gravity Irrigation Pipe, Class ___
Corrugated Aluminized Steel (CASP) ..... linear foot (LF)

601.4.1.A.17 ..... ___ Storm Drain/Culvert/Gravity Irrigation Pipe, Class ___
Corrugated Polyethylene (CPP)..... linear foot (LF)

601.4.1.A.19 ..... ___ x ___ Pipe Arch, Class ___
Corrugated Galvanized Steel (CGSPA) ..... linear foot (LF)

601.4.1.A.21 ..... ___ x ___ Pipe Arch, Class ___
Corrugated Aluminum (CAPA)..... linear foot (LF)

601.4.1.A.23 ..... ___ x ___ Pipe Arch, Class ___
Corrugated Aluminized Steel Pipe Arch (CASPA) linear foot (LF)

602.4.1.A.1 ..... Storm Drain or Gravity Irrigation
Manhole – Type ___.....each (EA)

602.4.1.B.1 ..... Storm Drain or Gravity Irrigation Extra Depth
Manhole – Type ____ (4 feet through 10 feet)
Vertical Depth .....each (EA)

602.4.1.B.3 ..... Storm Drain or Gravity Irrigation Manhole – Type ___
Additional Depth .....vertical foot (VF)

602.4.1.C.1 ..... Shallow Storm Drain or Gravity Irrigation
Manhole – Type ___.....each (EA)

602.4.1.D.1 ..... Stormwater
Structure Core Drilling ___ (Size) .....each (EA)

602.4.1.E.1 ..... Storm Drain or Gravity Irrigation
Catch Manhole .....each (EA)

602.4.1.F.1..... Catch Basin – Type ___ .....each (EA)

602.4.1.G.1..... Inlet – Type ___.....each (EA)

602.4.1.H.1 ..... Precast Sediment Box – Size _____.....each (EA)

602.4.1.I.1..... Sediment Box/Catch Basin – Type _____ .....each (EA)

602.4.1.J.1..... Inlet Catch Basin – Type V .....each (EA)

602.4.1.K.1 ..... ___ Dia. Gravity Irrigation Slide & Gate
Type _____ .....each (EA)

602.4.1.L.1..... ___ Dia. Gravity Irrigation Valves – Type _____.....each (EA)

602.4.1.M.1..... Concrete Irrigation Box – Size _____ .....each (EA)

602.4.1.N.1 ..... Precast Concrete Irrigation Structure – Size _____ ..... each (EA)

602.4.1.O.1 ..... Irrigation Ditch Size _____ wide x ____ deep ..... each (EA)

602.4.1.P.1 ..... Curb Opening Inlet ..... each (EA)

602.4.1.Q.1 ..... Groundwater Observation Well ..... each (EA)

602.4.1.R.1 ..... Anti-Seep Collar ..... each (EA)

Division 700 – Concrete

702.4.2.A.1 ..... Reinforcing Steel ..... pound (LB)

702.4.2.A.3 ..... Epoxy Coated Metal Reinforcement ..... pound (LB)

702.4.2.B.1 ..... Welded Wire Fabric ..... square foot (SF)

702.4.2.C.1 ..... Smooth Dowels ..... pound (LB)

703.4.1.A.1 ..... Concrete (Cast-In-Place) – Class ___ ..... cubic yard (CY)

704.4.1.A.1 ..... Bridge/Stiffleg Box Culvert (3 sided) ___ span x ___ rise ..... linear foot (LF)

704.4.1.A.3 ..... Bridge/Stiffleg Box Culvert (3 sided) ___ span x ___ rise ..... lump sum (LS)

704.4.1.B.1 ..... Box Culvert (4 sides) ___ span x ___ rise ..... linear foot (LF)

704.4.1.B.3 ..... Box Culvert (4 sides) ___ span x ___ rise ..... lump sum (LS)

704.4.1.C.1 ..... Vault, width____, height ____ length ____ ..... each (EA)

704.4.1.D.1 ..... Miscellaneous Precast Structure (Type) ____ ..... each (EA)

705.4.1.A.1 ..... Portland Cement Concrete Pavement – Class ___ Thickness ..... square yard (SY)

705.4.1.B.1 ..... Portland Cement Concrete Pavement – Class ___ Thickness ..... ton (TON)

706.4.1.A.1 ..... Standard 3-inch Rolled Curb & Gutter ..... linear foot (LF)

706.4.1.A.3 ..... ___Vertical Curb (No Gutter) ..... linear foot (LF)

706.4.1.A.5 ..... Standard 6-inch Vertical Curb & Gutter ..... linear foot (LF)

706.4.1.A.7 ..... Curb and Gutter, Type ___ ..... linear foot (LF)

706.4.1.A.9 ..... Mountable Roundabout Curb (no Gutter)..... linear foot (LF)

706.4.1.A.11 ..... Mountable Roundabout Curb and Gutter..... linear foot (LF)

706.4.1.B.1 ..... Concrete Valley Gutters..... linear foot (LF)

706.4.1.B.3 ..... Concrete Valley Gutters.....square foot (SF)

706.4.1.C.1 ..... Curb Turn Fillets and Backfill.....each (EA)

706.4.1.C.3 ..... Curb Turn Fillets and Backfill.....square foot (SF)

706.4.1.D.1 ..... Concrete Steps.....square foot (SF)

706.4.1.E.1 ..... Concrete Sidewalks, thickness_____ .....square yard (SY)

706.4.1.F.1..... Concrete Driveway Approach .....square yard (SY)

706.4.1.G.1..... Concrete Repair .....square yard (SY)

706.4.1.H.1 ..... Pedestrian Ramp w/Detectable Warning Domes, Type___ .....each (EA)

Division 800 – Aggregates and Asphalt

801.4.1.A.1 ..... ___Minus Uncrushed Aggregate Base ..... cubic yard (CY)

801.4.1.B.1 ..... ___Minus Uncrushed Aggregate Base .....ton (TON)

802.4.1.A.1 ..... Crushed Aggregate for Base Type ___ ..... cubic yard (CY)

802.4.1.B.1 ..... Crushed Aggregate for Base Type ___ .....ton (TON)

802.4.1.C.1 ..... Crushed Aggregate in Stockpile, Type ___ ..... cubic yard (CY)

802.4.1.D.1 ..... Crushed Aggregate in Stockpile, Type ___ .....ton (TON)

803.4.1.A.1 ..... Plant Mix Aggregate ___ .....ton (TON)

803.4.1.B.1 ..... Plant Mix Aggregate_____ ..... cubic yard (CY)

804.4.1.A.1 ..... Sand Choker ..... cubic yard (CY)

806.4.1.A.1 ..... Asphalt for Tack Coat.....ton (TON)

806.4.1.B.1 ..... Diluted Emulsifed Asphalt for Tack Coat .....gallon (GAL)

807.4.1.A.1 ..... Asphalt for Prime Coat .....ton (TON)

807.4.1.B.1 ..... Blotter.....ton (TON)

808.4.1.A.1 ..... Seal Coat.....square yard (SY)

809.4.1.A.1 ..... Surface Treatment.....square yard (SY)

810.4.1.A.1 ..... Plant Mix Pavement.....ton (TON)

810.4.1.A.3 ..... Plant Mix Pavement.....square yard (SY)

810.4.1.B.1 ..... Recycled Plant Mix Pavement .....ton (TON)

810.4.1.B.3 ..... Recycled Plant Mix Pavement .....square yard (SY)

811.4.1.A.1 ..... Road Mix Pavement .....ton (TON)

811.4.1.B.1 ..... Road Mix Pavement ..... cubic yard (CY)

812.4.1.A.1 ..... Scrub Coat .....ton (TON)

813.4.1.A.1 ..... Fog Coat .....ton (TON)

Division 900 – Pressure Irrigation

901.4.1.A.1 ..... ___ Diameter Pressure Irrigation Main
Type ___ ..... linear foot (LF)

901.4.1.B.1 ..... Pressure Irrigation Main Fitting – Size ___
Type ___ .....each (EA)

902.4.1.A.1 ..... ___ Diameter Pressure Irrigation
Valve – Type ___.....each (EA)

903.4.1.A.1 ..... ___ Diameter Pressure Irrigation Pipe
Service Type ___.....each (EA)

Division 1000 – Construction Stormwater BMP's

1001.4.1.A.1 ..... Sediment Control..... lump sum (LS)

1001.4.2.A.1 ..... Staging Area.....each (EA)

1001.4.2.B.1 ..... Stabilized Construction Entrance.....each (EA)

1001.4.2.C.1 ..... Erosion Prevention of Temporary Roads..... lump sum (LS)

1003.4.1.A.1 ..... Straw Bales ..... linear foot (LF)

1003.4.1.B.1 ..... Biofilter Bags ..... linear foot (LF)

1003.4.1.C.1 ..... Silt Fence ..... linear foot (LF)

1003.4.1.D.1 ..... Vegetation Buffer Strip ..... linear foot (LF)

ISPWC – PAY ITEMS (Continued)

1003.4.1.E.1 ..... Sediment Trap Basin ..... each (EA)

1003.4.1.F.1 ..... Portable Sediment Tank ..... each (EA)

1004.4.1.A.1 ..... Temporary Swale ..... linear foot (LF)

1004.4.1.B.1 ..... Earth Dike, Type _____ ..... linear foot (LF)

1004.4.1.C.1 ..... Perimeter Dike/Swale ..... linear foot (LF)

1004.4.1.D.1 ..... Temporary Berm (Sandbags) ..... each (EA)

1004.4.1.E.1 ..... Temporary Storm Drain Diversion ..... linear foot (LF)

1005.4.1.A.1 ..... Temporary Mulching, Type ____ ..... square yard (SY)

1005.4.1.B.1 ..... Temporary Hydromulching ..... square yard (SY)

1005.4.1.C.1 ..... Temporary Geotextile ..... square yard (SY)

1005.4.1.D.1 ..... Temporary Matting ..... square yard (SY)

1005.4.1.E.1 ..... Pipe Slope Drain ..... linear foot (LF)

1005.4.1.F.1 ..... Slope Roughening ..... square yard (SY)

1005.4.1.G.1 ..... Gradient Terracing ..... square yard (SY)

1005.4.1.H.1 ..... Retaining Walls ..... linear foot (LF)

1006.4.1.A.1 ..... Gabions ..... cubic yard (CY)

1006.4.1.B.1 ..... Riprap Slope and Outlet Protection ..... square yard (SY)

1006.4.1.C.1 ..... Inlet Protection ..... per each (EA)

1006.4.1.D.1 ..... Check Dams, Type ____ ..... each (EA)

1006.4.1.E.1 ..... Temporary Stream Crossing ..... linear foot (LF)

1007.4.1.A.1 ..... Topsoiling ..... square yard (SY)

1007.4.1.B.1 ..... Seeding ..... square yard (SY)

1007.4.1.C.1 ..... Sodding ..... square yard (SY)

1007.4.1.D.1 ..... Erosion Control Planting, Type ____, Size ____ ..... per each (EA)

Division 1100 – Traffic Signals and Street Lighting

1101.4.1.A.1	Traffic Signal	lump sum (LS)
1102.4.1.A.1	Street Light, Type_____	each (EA)
1102.4.1.B.1	Relocate Street Light, Type _____	each (EA)
1102.4.1.C.1	Intermediate Pole, Type_____	each (EA)
1102.4.1.D.1	Wire Conductor, Type _____	linear foot (LF)
1102.4.1.E.1	Conduit, Size _____	linear foot (LF)
1102.4.1.F.1	Junction Box	each (EA)
1102.4.1.G.1	Service Pedestal	each (EA)
1103.4.1.A.1	Construction Traffic Control	lump sum (LS)
1103.4.1.B.1	Traffic Control Signs	square foot (SF)
1103.4.1.C.1	Traffic Control Barricades, Type _____	each (EA)
1103.4.1.D.1	Traffic Control Drums	each (EA)
1103.4.1.E.1	Advance Warning Arrow Panel	each (EA)
1103.4.1.F.1	Temporary Flexible Raised Pavement Markers	each (EA)
1103.4.1.G.1	Traffic Control Maintenance	day (DAY)
1103.4.1.H.1	Portable Tubular Markers	each (EA)
1103.4.1.I.1	Traffic Control Flaggers	man hours (MH)
1103.4.1.J.1	Traffic Control Maintenance	man hours (MH)
1103.4.1.K.1	Temporary Striping Tape	linear foot (LF)
1104.4.1.A.1	Pavement Line Paint or Painted Pavement Markings	square foot (SF)
1104.4.1.B.1	Thermoplastic Pavement Markings	square foot (SF)
1105.4.1.A.1	Permanent Signing	square foot (SF)
1105.4.1.B.1	Wood Sign Post	cubic foot (CF)
1105.4.1.C.1	Steel Sign Posts	pound (LB)

1105.4.1.D.1 ..... Anchor Assembly.....each (EA)

Division 2000 - Miscellaneous

2010.4.1.A.1 ..... Mobilization..... lump sum (LS)

2010.4.1.B.1 ..... Sanitary Facilities ..... lump sum (LS)

2020.4.1.A.1 ..... Precast Concrete Monument .....each (EA)

2020.4.1.B.1 ..... Cast-in-Place Monument, Type _____.....each (EA)

2020.4.1.C.1 ..... Furnishing and Placing Monument Frame & Cover .....each (EA)

2020.4.1.D.1 ..... Adjusting Existing Monument to Grade.....each (EA)

2020.4.1.E.1 ..... Reference and Reset Monuments ..... lump sum (LS)

2020.4.1.F.1..... Reference and Reset Monuments .....each (EA)

2020.4.1.G.1 ..... Standard Rebar Monument .....each (EA)

2030.4.1.A.1. ..... Manhole, Type ___, Adjust to Grade .....each (EA)

2030.4.1.B.1 ..... Storm Water Structure, Type _____ Adjust to Grade .....each (EA)

2030.4.1.C.1 ..... Valve Box, Type ____, Adjust to Grade.....each (EA)

2030.4.1.D.1 ..... Miscellaneous Utility, Adjust to Grade Type _____ .....each (EA)

2040.4.1.A.1 ..... Fence, Type _____..... linear foot (LF)

2040.4.1.B.1 ..... Gates, Type _____.....each (EA)

2040.4.1.C.1 ..... Braces.....each (EA)

2050.4.1.A.1 ..... Drainage Geotextile.....square yard (SY)

2050.4.1.B.1 ..... Riprap/Erosion Control Geotextile .....square yard (SY)

2050.4.1.C.1 ..... Subgrade Preparation Geotextile.....square yard (SY)

2050.4.1.D.1 ..... Pavement Overlay Geotextile .....square yard (SY)

ISPWC – DIVISION 100

General Conditions

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

ISPWC DIVISION 100 – STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Modified From

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

2015 IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC)

NOTE: The base document is the 2007 EJCDC version. Items added to EJCDC to form the 2015 ISPWC are underlined. Items deleted from the EJCDC to form the 2015 ISPWC are shown in strikeout format.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

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CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

6. *Bidder*—The individual or entity who submits a Bid directly to Owner.

7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).

8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.

9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.

11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.

16. *Cost of the Work*—See Paragraph 11.01 for definition.

17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

19. *Engineer*—The individual or entity named as such in the Agreement.

20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

21. *General Requirements*—Sections of Division 1 of the Specifications.

22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.

26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.

29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. *PCBs*—Polychlorinated biphenyls.

31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.

37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

42.a *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

42.b. *Standard Specifications*–Wherever in these Contract Documents reference is made to the Standard Specifications, said reference shall be understood as referring to the Idaho Standards for Public Works Construction which applicable parts are incorporated herein and made a part of these Documents by specific reference thereto. If requirements contained in the Standard Specifications are modified by or are in conflict with supplemental information in these Contract Documents, the requirements of these Contract Documents shall prevail.

43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.

46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.

47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.

48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

49. *Unit Price Work*—Work to be paid for on the basis of unit prices.

50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

2. <u>"Command" type language is used in the Contract Documents. This command language refers to, and is directed to the Contractor.</u>

C. *Day:*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work*: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. *Contractor's Review of Contract Documents During Performance of Work*: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if

any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review*: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

   a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

   b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.

2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:

   a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or

   b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

   a. reviewing and checking all such information and data;

   b. locating all Underground Facilities shown or indicated in the Contract Documents;

   c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or

2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or

3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be

within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

1. The Contractor's scope of work shall include implementation of necessary safety, public health and environmental procedures and requirements relating to sanitary sewage encountered during the work.

2. The Contractor's scope of work shall include necessary safety and environmental requirements for handling and disposal of asbestos pipe removed from service or excavated during the course of the work.

D. If Contractor encounters a Hazardous Environmental Condition not indicated in the Drawings or Specifications or identified in the Contract Documents or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligent acts or omissions ~~negligence~~.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions. Surety and insurance companies from which the bonds and insurance for this Project are purchased shall have a Best's rating of no less than A:VII, in addition to the other requirements specified herein.

5.03 *Certificates of Insurance*

A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or

   b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07;

6. include completed operations coverage:

   a. Such insurance shall remain in effect for two years after final payment.

b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuing coverage during the two year period ~~of continuation of such insurance at final payment and one year thereafter~~.

5.05 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

NOTES TO USER

The Owner, in consultation with their attorney and risk manager, should choose which party shall provide property insurance. In accordance with the Owner's direction, use the appropriate Section A below.

A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.

A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners,

employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and

7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

B. ~~Owner~~Contractor shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

~~D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.~~

D. Contractor shall be responsible for any deductible or self-insured retention.

~~E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.~~

E. If Owner requests in writing that other special perils be included in the property insurance policies provided under paragraphs 5.06.A or 5.06.B of the General Conditions, Contractor shall, if possible, include such insurance, and the cost thereof will be charged to Owner by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the site, Contractor shall in writing advise Owner whether or not such other insurance has been procured by Contractor.

5.07 *Waiver of Rights*

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing

within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit ~~overtime work or~~ the performance of Work outside the regular working hours or on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties, special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment Engineer determines that:

1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and,

3) it has a proven record of performance and availability of responsive service.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable

substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:

1) shall certify that the proposed substitute item will:

a) perform adequately the functions and achieve the results called for by the general design,

b) be similar in substance to that specified, and

c) be suited to the same use as that specified;

2) will state:

a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,

b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;

3) will identify:

a) all variations of the proposed substitute item from that specified, and

b) available engineering, sales, maintenance, repair, and replacement services; and

4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.

D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier ~~who is listed as a loss payee~~ <u>whose interests are included</u> on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the

Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents..

6.08 *Permits*

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

D. While not intended to be inclusive of all Laws or Regulations for which Contractor may be responsible under paragraph 6.09, the following Laws or Regulations are included as mandated by statute or for the convenience of the Contractor;

Idaho Code Section 63-1501. Definitions. As used in this act, the following terms shall have the following meanings:

"Contracting units" shall include the state or any officer or department thereof, the counties or other subdivisions of the state, and all municipal and quasi-municipal corporations therein.

"Contractor" shall mean any person, firm, co-partnership, association, or corporation, foreign or domestic, entering into a contract for the construction, erection, repair, or improvement of any kind or character of public works in this state.

"Taxes" shall mean all taxes, assessments, excises, and license fees authorized to be levied, assessed, and collected under the laws of this state, other than taxes on real property.

"Taxing unit" shall mean the state or any officer or department thereof, the counties or other subdivisions of the state, and all municipal and quasi-municipal corporations therein authorized by law to assess, levy and collect taxes.

Idaho Code Section 63-1502. Conditions precedent to contract for public works. Before entering into a contract for the construction of any public works in this state, the contracting unit shall require as conditions precedent that the contractor be authorized to do business in this state and that he furnish satisfactory evidence that he has paid or secured to the satisfaction of the respective taxing units all taxes for which he or his property is liable then due or delinquent.

Idaho Code Section 63-1503. Contractor for public works to pay or secure taxes—Agreement. Every contract for the construction of public works by a contracting unit of this state shall contain substantially the following provisions:

The contractor, in consideration of securing the business of erecting or constructing public works in this state, recognizing that the business in which he is engaged is of a transitory character, and that in the pursuit thereof, his property used therein may be without the state when taxes, excises, or license fees to which he is liable become payable, agrees:

1. To pay promptly when due all taxes (other than on real property), excises and license fees due to the state, its subdivisions, and municipal and quasi-municipal corporations therein accrued or accruing during the term of this contract, whether or not the same shall be payable at the end of such term;

2. That if the said taxes, excises, and license fees are not payable at the end of said term, but liability for the payment thereof exists, even though the same constitute liens upon his property, to secure the same to the satisfaction of the respective officers charged with the collection thereof; and

3. That in the event of his default in the payment or securing of such taxes, excises, and license fees, to consent that the department, officer, board, or taxing unit entering into this contract may withhold from any payment due him hereunder the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing units to which said contractor is liable.

Idaho Code Section 44-1002 requires the following: The Contractor must employ ninety-five percent (95%) bona fide Idaho residents as employees on any job under any such contract except where under such contracts fifty (50) or less persons are employed, the Contractor may employ ten percent (10%) nonresidents, provided, however, in all cases employers must give preference to the employment of bona fide residents in the performance of said work, and no contract shall be let to any person, firm, association, or corporation refusing to execute an agreement with the above mentioned provisions in it; provided, that, in contracts involving the expenditure of federal aid funds this act shall not be enforced in such a manner as to conflict with or be contrary to the federal statutes prescribing a labor preference to honorably discharged soldiers, sailors, and marines, prohibiting as unlawful any other preference or discrimination among citizens of the United States.

Idaho Code Chapter 19 of Title 54 requires proper licensing of Public Works Contractors.

6.10 *Taxes*

A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

B. In the event of the Contractor's default on the payment of taxes, excises, and license fees as set forth in Idaho Code 63-1503 , the Owner shall have the authority to withhold from any payment due the Contractor under this contract, the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing authorities to which said Contractor is liable.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work. Contractor shall not enter upon nor use property not under Owner control until appropriate easements have been executed and a copy is on file at the site.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work*: During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 Shop Drawings and Samples

A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

a. Submit number of copies specified in the General Requirements.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

a. Submit number of Samples specified in the Specifications.

b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.

B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;

6. any inspection, test, or approval by others; or

7. any correction of defective Work by Owner.

6.20 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.

B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

6.22 *Quality Control*

A. Contractor shall provide quality control, which shall include the initial and subsequent inspections of Contractor's Work to ensure that the Work conforms to the Contract Documents.

B. Contractor shall designate the person responsible for Contractor's quality control while Work is in progress, and shall notify Engineer, in writing, prior to any change in quality control representative assignment.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

A. Owner may perform other work related to the Project at the Site with employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a

reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful actions or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

F. Contractors, Subcontractors, Suppliers and others on the Project, or their sureties, shall maintain no direct action against the Engineer, its officers, employees, affiliated corporations, and subcontractors, for any claim arising out of, in connection with, or resulting from the engineering services performed. Only the Owner will be the beneficiary of any undertaking by the Engineer.

9.10 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

A. *Engineer's Decision Required*: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than ~~30~~ 10 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within ~~60~~ 20 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within ~~30~~ 10 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

C. *Engineer's Action*: Engineer will review each Claim and, within ~~30~~ 20 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part;

2. approve the Claim; or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said ~~30~~ 21 days, the Claim shall be deemed denied.

E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality

of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in

accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

g. The cost of utilities, fuel, and sanitary facilities at the Site.

h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 *Allowances*

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;

b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the claim to the Engineer and the other party to the Contract in accordance with the provisions of paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. ~~Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:~~ Contractor shall employ an independent testing laboratory or testing agency and shall be responsible for arranging and shall pay for all specified tests, inspections, and approvals (including tests, inspections, and approvals to be paid for on a cash allowance basis) required for Owner's and Engineer's acceptance of the Work at the site except:

1. ~~for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below;~~ costs incurred in connection with tests or inspections pursuant to paragraph 13.04.B of the General Conditions shall be paid for as provided in said paragraph; and as otherwise specifically provided in the Contract Documents.

2. ~~that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.C; and~~.

~~3. as otherwise specifically provided in the Contract Documents.~~

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

F. Uncovering Work as provided in paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not

limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's warranty, special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be

entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 7 ~~10~~ days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

   b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

   a. to supervise, direct, or control the Work, or

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

   c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

   d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

   e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner referred to in Paragraph 14.02.B.2. Engineer may also

refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

1. ~~Ten~~ Twenty-one days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

c. there are other items including, but not limited to, liquidated damages entitling Owner to a set-off against the amount recommended; or

d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars

in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

   b. consent of the surety, if any, to final payment;

   c. a list of all Claims against Owner that Contractor believes are unsettled; and

   d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if, within 7 days of receipt of notice of intent to terminate, Contractor begins to correct its failure to perform and proceeds diligently to cure such failure and become in compliance with the contract requirements. Such cure must occur within no more than 30 days of said notice unless otherwise extended by the Engineer. ~~Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.~~

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process; or

3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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ISPWC – DIVISION 200

Earthwork

Section 201 – Clearing and Grubbing and Removal of Obstructions
Section 202 – Excavation and Embankment
Section 203 – Soil Materials
Section 204 – Structural Excavation and Compacting Backfill
Section 205 – Dewatering
Section 206 – Permanent Erosion Control
Section 207 – Permanent Stormwater Best Management Practices

SECTION 201

CLEARING AND GRUBBING AND REMOVAL OF OBSTRUCTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Clearing and Grubbing

1. Removing and disposing of existing features.

2. Removing and disposing of trees, stumps, brush, roots, shrubs, logs and windfalls.

3. Stripping and disposing of the top layer of plants and grasses down past the root zone. 4-inch minimum depth or as recommended in the geotechnical report, or directed by Engineer.

4. Removing and disposing of all miscellaneous debris and other objectionable matter.

B. Removal of Obstructions

1. Removal of buildings, irrigation boxes, pipes, bridges, abandoned utilities, fences, drop inlets, culverts, and any other structures designated for removal on the Plans or by the Owner.

1.2 RELATED SECTIONS

A. Section 202 – Excavation and Embankment.

1.3 REGULATORY REQUIREMENTS

A. Conform to applicable code for disposal of debris.

B. Coordinate clearing work with utility companies.

1.4 SUBMITTALS

A. Submit for Engineers Review When Required: Damaged tree replacement/repair (per 3.1.5.C).

B. Property Owner Disposal Agreements if required by the Engineer (per 3.2.B.5).

PART 2 MATERIALS

NOT USED

PART 3 WORKMANSHIP

3.1 CLEARING AND GRUBBING

A. Protection.

1. Locate and protect all aboveground and belowground utilities or relocate as directed by the Contract.

2. Protect benchmarks and survey monuments from damage and displacement.

3. Protect adjacent private and public land and crops in adjacent fields from damage.

4. Protect existing roads, railroad and irrigation canals from damage.

5. Retain, protect and water any desirable trees or vegetation on or adjacent to the site using the following procedures.

a. Existing trees not designated for removal should be protected before site demolition begins.

1 Protection should consist of a highly visible, barrier to be placed at or outside the drip line of the tree(s).

2 Unless approved by the Engineer, no equipment, vehicles, building materials, chemicals, stockpiles or debris shall be placed inside the protection barriers.

b. Unless otherwise approved by the Engineer, disruption of the irrigation facilities serving trees will not be allowed.

c. Before the Contractor leaves the site, all existing trees which have been significantly damaged due to construction activities shall be replaced or repaired per Engineers approval by a certified arborist at the expense of the Contractor.

d. No changes in grade should be made within the protection area around trees.

e. Should excavation damage or break roots greater than 1 inch in diameter, make a clean saw cut through the undamaged portion of the root behind the break perpendicular to the root.

f. If required by the property Owner or Engineer, hire an approved tree service to trim trees, prior to beginning excavation.

6. The Contractor is responsible for damage resulting from construction operations.

7. Take reasonable care to avoid damage by construction operations to streams and lakes adjacent to the construction area.

8. Preserve and protect all vegetation and ground cover not within the construction area, including areas not requiring grading, as directed.

B. Removal and Disposal

1. Complete clearing and grubbing to the limits defined by a line drawn 5 feet outside the grading area, unless shown on the Contract Documents or as directed.

2. Preserve and protect trees within the construction area not designated for removal in an approved manner as directed. Paint cut and scarred areas of retained trees or shrubs with an asphaltum base paint prepared especially for tree surgery.

3. Unless otherwise provided, all merchantable timber in the clearing area not removed from the right-of-way prior to the beginning of construction becomes the property of the Contractor.

4. Remove all brush and shrubs from the site including the roots. Dispose of the shrubs and brush off-site at a location provided by the Contractor. Do not dispose of brush and shrubs by burning or burial in backfill or trenches.

5. Strip all soils, heavy growths of grass, and sod that comprise the organic root-zone. Complete stripping 4 inches deep or as recommended by the Engineer. Berm the stripped material to line and grade as depicted on the Contract Documents. Do not use the stripped material as backfill or trench backfill.

6. Unless otherwise directed remove all stumps within the clearing limits.

7. Dispose of materials at locations that comply with all Federal, State, and Local Regulations.

C. Cleanup

1. Upon completion of the site work and project, clean the entire work area. Remove all excess excavated material, rocks, boulders, brush, trees, pipe, or debris of any type from the site and dispose at a site acceptable to Federal, State, and Local Regulations.

3.2 REMOVAL OF OBSTRUCTIONS

A. Protection

1. Locate and protect all live Utilities from damage.

2. Protect benchmarks and survey monuments from damage and displacement.

3. Exercise care to ensure areas outside the construction limits remain undisturbed.

4. Satisfactorily restore any damage to existing facilities or structures resulting from activities by the Contractor to their original condition at the Contractor's expense.

B. Removal and Disposal

1. Complete the Removal of Obstructions to the limits shown on the Plans and Specifications or as directed by the Engineer.

2. Unless otherwise specified, all removed material shall become the responsibility and property of the Contractor.

3. Dispose of unusable material outside the construction limits in an approved location in accordance with all local, state and federal regulations.

4. Dispose unusable material in such a manner that no unsightly appearance will result.

5. Copies of the disposal agreements with property owners are to be furnished to the Owner upon request.

C. Salvage

1. Carefully remove all items specified to be salvaged in one piece and take to a place identified in the Plans or Special Provisions; salvage shall become the property of the person or organization identified on the Plans or in the Special Provisions.

D. Preparations After Removal

1. Fill basements or cavities left by structure removal to the level of the surrounding ground and, if within the prism of the construction, compacted as described in the Plans and Special Provisions or as directed by the Engineer.

E. Traffic Control

1. Do not remove bridges, culverts and other drainage structures under the existing roadway until satisfactory arrangements have been made for the detouring of traffic.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Clearing and Grubbing: By the acre in accordance with stakes set by the Engineer. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 201.4.1.A.1.
2. Bid Schedule Description: Clearing and Grubbing…acre (AC).

B. Clearing and Grubbing: By the lump sum. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 201.4.1.B.1.
2. Bid Schedule Description: Clearing and Grubbing…lump sum (LS).

C. Removal of Obstructions: By the lump sum (LS). Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment References: 201.4.1.C.1.
2. Bid Schedule Description: Removal of Obstructions...lump sum (LS).

D. Removal of _____: By the horizontal square yard. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment References: 201.4.1.D.1
2. Bid Schedule Description: Removal of _____... square yard (SY).

E. Removal of _____: By the horizontal lineal foot. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment References: 201.4.1.E.1.
2. Bid Schedule Description: Removal of _____ ..lineal foot (LF).

F. Removal of _____: By the each. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment References: 201.4.1.F.1.
2. Bid Schedule Description: Removal of _____...each (EA).

END OF SECTION

SECTION 202

EXCAVATION AND EMBANKMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation.

B. Controlled Blasting.

C. Cut Slope Finishing.

D. Subgrade.

E. Maintenance of Subgrade and Drainage.

F. Excavation of Unsuitable Materials.

G. Embankment Construction.

H. Borrow.

I. Classes of Compaction and Density Requirements.

J. Haul.

K. Dust Abatement.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 203 – Soil Materials.

C. Section 204 – Structural Excavation and Compacting Backfill.

D. Section 205 – Dewatering.

E. Section 206 – Permanent Erosion Control.

F. Section 2040 - Fencing.

1.3 REFERENCES

A. AASHTO T 27: Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.

B. AASHTO T 88: Standard Method of Test for Particle Size Analysis of Soils.

C. AASHTO T 89: Standard Method of Test for Determining the Liquid Limits of Soils.

D. AASHTO T 90: Standard Method of Test for Determining the Plastic Limit and Plasticity Index of Soils.

E. AASHTO T 99: Standard Method of Test for Moisture-Density Relations of Soils using a 5.5 pound Rammer with a 12-inch Drop.

F. AASHTO T 176: Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.

G. AASHTO T 191: Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method.

H. AASHTO T 205: Standard Method of Test for Density of Soil In-Place by the Rubber-Balloon Method.

I. AASHTO T 265: Standard Method of Test for Laboratory Determination of Moisture Content of Soils.

J. AASHTO T 272: Standard Method of Test for Family of Curves, One point method.

K. ASTM D 2487: Standard Practice for Classification of Soils for Engineering Purposes.

L. Idaho IT-74: Idaho Standard Method of Test for Compaction Standard for Coarse Granular Materials by Use of the Vibratory Spring-Load Compactor.

M. AASHTO T 310: Standard Method of Test for In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

N. Occupational Safety and Health Administration Standards for Excavations.

O. AASHTO T 255: Standard Method of Test for Total Moisture Content of Aggregate by Drying.

P. AASHTO T 224: Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test.

Q. WAQTC Western Alliance for Quality Transportation Construction

1.4 SUBMITTALS

A. Submit Blasting Plan for Engineer's review.

PART 2 MATERIALS

NOT USED

PART 3 WORKMANSHIP

3.1 PREPARATION

A. Verify that survey benchmarks and intended elevations for the work are as indicated.

B. Identify required lines, levels, contours, and datum.

C. Locate, identify, and protect utilities that remain, from damage.

D. Notify utility company to remove and relocate utilities.

E. Protect benchmarks, existing structures, and fences, from excavation equipment and vehicular traffic.

3.2 EXCAVATION

A. Description.

1. The work consists of excavation, disposal, (or compaction) of all material not being removed under another bid item, which is encountered within the limits of the work necessary for the construction in accordance with the specifications and in reasonably close conformity with the lines, grades, and typical cross sections shown on the Contract Documents or as otherwise specified.

2. Unless a separate bid item is provided, excavation includes all required clearing and grubbing; the removal and disposal of structures or other obstructions which are visible or are indicated on the Contract Documents which obstruct the work; compaction; shaping and sloping of cuts, embankments, subgrades, shoulders, gutters, ditches, intersections, approaches and driveway entrances; backfilling ditches, depressions and areas behind sidewalks, curbs and/or curbs and gutters; satisfactory disposal of all unsuitable and surplus materials; and construction of approaches to structures.

3. Excavation includes all excavation performed under this item regardless of the material encountered. Complete excavation as “Excavation, Schedule No. 1,” or “Excavation, Schedule No. 2,” etc., when it is divided into appropriate schedules on the Contract Documents. Rock excavation, when anticipated, may be included in the Bid Schedule. Refer to Section 302.2.2 for definition of Rock Excavation.

4. For Structural Excavation refer to Section 204 – Structural Excavation and Backfill.

B. Construction Requirements.

1. Complete clearing and grubbing within the excavation area. Use all suitable materials removed from excavation in the formation of the embankment, subgrade, shoulders, and as designated or directed.

2. Remove all stumps, roots, logs or other timber more than 3 inches in diameter, and all brush, matted roots and other debris within the grubbing limits not suitable for embankment or backfill to a depth of not less than 6 inches below the original ground or 12 inches below subgrade, whichever is greater.

3. Dispose of all material resulting from the clearing and grubbing operations as specified in Section 201 – Clearing and Grubbing. Backfill and compact with suitable material, all depressions below subgrade or below the final surface of the ground resulting from the clearing and grubbing operations, as directed.

4. Remove and satisfactorily dispose of unsuitable, unstable materials from the foundation for embankments to the depth shown on the Contract Documents or as directed.

5. Waste and dispose of any excavated material not suitable for use on the project. Unless otherwise specified, the Contractor is responsible for locating, placing waste materials in, and final leveling and clean-up of disposal areas in compliance with Federal, State, and local rules for disposal.

6. Temporary excavations shall be sloped or shored in accordance with all State, local and Federal requirements.

7. Grade top perimeter of excavation to prevent surface water from draining into excavation.

8. Remove and properly dispose of lumped subsoil, boulders, and rock.

9. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work. Proceed with unaffected work.

10. Correct areas over-excavated by error in accordance with Section 202.3.8.

11. Categorize material into one of the five material classifications as set forth in Section 203 – Soil Materials and reuse or stockpile these materials in the areas designated and as depicted on the Contract Documents.

12. Provide dewatering as required per Section 205 – Dewatering.

C. Protection.

1. Locate, identify and protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

2. Protect all above-ground and below-ground utilities from damage.

3. Protect benchmarks and survey monuments from damage and displacement.

4. Protect all private and public property both within and adjacent to project limits.

5. Protect existing roads, railroad and irrigation canals from damage.

3.3 CONTROLLED BLASTING

A. General.

1. Controlled blasting consists of drilling and shooting a series of line holes for controlling the neat line of the back slope along the excavation line of the construction.

2. Controlled blasting is required in the excavation of rock or cemented materials where cut slopes, shown on the Contract Documents, are steeper than 3/4 horizontal to 1 vertical (3/4:1), regardless of the rippability of the material.

3. All blasting shall conform to the requirements of Section 302.

B. Blasting Techniques.

1. Presplitting involves drilling a single row of line holes along the neat excavation line of the slope; properly load to minimize overbreak, and fire simultaneously in advance of the production round blasting. When line holes for presplitting are simultaneously detonated with the production round, use suitable millisecond delays in the production round blasting.

2. Cushion blasting involves leaving in place an undisturbed buffer section approximately 10 feet thick, between the neat excavation line of the slope and the production round blasting or ripping. After removal of the materials composing the production zone, trim the undisturbed section off the slope by firing simultaneously a single row of line holes drilled on the neat excavation line.

C. Controlled Blasting Provisions.

1. Line holes for controlled blasting are a minimum of 2 inches and a maximum of 3 inches in diameter with a 40-foot, maximum depth, and slope measurement. They are loaded with sufficient explosive charges to effect clean splitting of the materials between adjacent drill holes and a minimum of shattering or overbreak. Explosive charges include properly spaced cartridges, securely fastened to detonating cord with holes completely stemmed with free flowing sand or other approved material.

2. Presplit or cushion blast a short test line of holes, as changes in conditions warrant, to determine the loading, spacing, and depth of lift required to obtain the desired result. Space drill holes as nearly parallel one to another as possible.

3. If drill holes do not remain open full depth or deviate more than 1 foot from a line formed by the intersection of the plane of the staked slope and a vertical perpendicular plane through the collar of a slope drill hole, reduce the lift until an open hole can be maintained or the deviation can be controlled within the 1-foot tolerance.

4. Successive sets of line holes may have their collars offset up to 1 foot, but be so inclined that all sets closely approximate the staked slopes.

5. Do not use lifters or springing of line holes in controlled blasting operations.

6. The end result of these specifications is intended to produce a cut face sheared along the staked slope line with a minimum of overbreak and little or no material shattered or loosened back of the finished slope. The amount and type of explosives, methods of loading, delay patterns, and other features not otherwise specified, are to meet the above requirements.

7. Furnish a blasting plan showing pattern and depth of drill holes, type and amount of explosives used, loading pattern, and sequence of firing to the Engineer prior to drilling.

3.4 CUT SLOPE FINISHING

A. Remove loosened or shattered rocks that are not expected to remain in their natural position from the slopes.

B. Do not proceed beyond the dimensions and elevations established, and do not remove material prior to staking and cross-sectioning the site.

C. When necessary to remove fencing, replace it in an equal to or better than condition as it was originally and confine livestock and other domestic animals in conformance to Section 2040 – Fencing.

3.5 SUBGRADE

A. After the earthwork has been substantially completed, and after all underground utilities and manholes have been installed or adjusted to grade; bring the subgrade to the lines, grades, and cross sections shown on the Contract Documents and compact to the required density.

B. Remove all soft and unstable material and other portions of the subgrade that cannot be compacted satisfactorily, as directed.

C. Remove boulders appearing in the excavation to a depth of at least 4 inches below subgrade.

D. Backfill all holes created by removal of unsuitable material in accordance with Section 202.3.8.

E. When the surface of an existing roadbed conforms approximately to the surface of the finished subgrade, scarify it for the full width of the subgrade to a sufficient depth to eliminate all depressions and to permit uniform reshaping and compaction.

F. Maintain ditches and drains along the subgrade to drain effectively. Reshape and reroll subgrade if rutting of 2 inches or more in depth occurs. Do not place fill or pavement section materials on frozen or muddy subgrade.

G. Compact the top 12 inches of the subgrade to the minimum compacted density specified for “Embankment in Section 202.3.8”. The finished grade not to deviate more than 0.10 foot at any point from the staked elevation and the algebraic sum of the deviations from true grade of any 2 points not more than 30 feet apart, not to exceed 0.10 foot.

H. Obtain Engineer approval of the subgrade.

3.6 MAINTENANCE OF SUBGRADE AND DRAINAGE

A. Maintain drainage, including drainage ditches and gutters, for the subgrade during the construction of street improvements to avoid damage to embankments by erosion.

B. Provide and maintain temporary drainage, sewer, and underdrainage facilities until permanent facilities are completed.

C. Protect and preserve all existing water mains and appendages, drains, sewers, or other subsurface drains, conduits, gas mains, and other underground structures affected by the work.

D. The Contractor is responsible to satisfactorily repair, at his expense, all damage to facilities or structures resulting from the work or from his activities during the period the contract is in force.

3.7 EXCAVATION OF UNSUITABLE MATERIAL

A. Remove and properly dispose of unsuitable material exposed after completion of the excavation to the subgrade or line and grade shown on the Contract Documents or as directed.

B. Dispose of unsuitable material that cannot be compacted in embankments in contractor furnished waste site as directed.

C. Repair material suitable for construction, except for excessive moisture, to meet the compaction and density requirements of Section 202.3.9.B.1 “Class A Compaction”, at no additional cost to the Owner. The repair is to consist of excavation, drying, replacement and compaction of the in-place soils or, at the Contractors option, other approved material that may be substituted for in-place soils.

D. The Engineer will identify the limits of the areas requiring subgrade repair or removal of unsuitable material.

3.8 EMBANKMENT CONSTRUCTION

A. General.

1. Embankment construction consists of the construction of fills and placement of backfills within the project limits to the lines, grades, dimensions and the typical sections shown on the Contract Documents or as designated.

2. Place embankment material after approval of the foundation. Do not use frozen material in embankments. Do not construct embankments on snow covered or frozen foundations, or other such surfaces within the embankment structure.

3. Key all embankments constructed on slopes steeper than 5 horizontal to 1 vertical (5:1) into the undisturbed ground with horizontal benches of sufficient width to allow for proper operation of compaction equipment. Slope each bench to drain. Incorporate in the embankment or waste material excavated from the benches, as directed.

4. Drain any seepage encountered in the embankment as shown on the Contract Documents or as directed.

5. If approved by the Engineer, construct the first lift of embankment across swampy ground by end-dumping with a thickness capable of providing a stable surface. Then construct the remainder of the embankment in accordance with Section 3.8.B.8 or as directed.

6. Dry material containing excessive moisture to a moisture content that will permit the required compaction prior to placing in the embankment.

7. Place material that is not too granular to test in layers with a maximum loose thickness of 8 inches.

B. Construction Requirements.

1. Construct embankments to the lines, grades, and cross sections shown on the Contract Documents. Also, to such heights above grades and such increased widths as necessary to allow for foundation settlement or consolidation. Eliminate stumps, trees, rubbish, vegetation, frozen lumps, or other unsuitable material from placement in embankments. The Engineer may designate as unsuitable materials that cannot be properly compacted into embankments. All unsuitable material shall be disposed of as directed.

2. Bench or step embankments on sloping ground by cutting a minimum horizontal distance of 24 inches for secure bonding. Cut each bench as close to the one below as the slope of the ground will permit. Incorporating material cut out of the benches into the new fill will be incidental to constructing the embankment.

3. Grade and crown all embankment areas to prevent water from collecting or ponding prior to suspending grading operations.

4. Construct embankments adjacent to structures in equal layers on all sides of the structures to prevent distortion. Compact areas inaccessible to tamping rollers or power rollers by hand, mechanical tampers or other means until achieving the specified density.

5. Place embankment material in uniform layers for the entire width of the embankment. Complete, level and compact each layer of embankment before proceeding to the succeeding layer.

6. Keep leveling equipment in continuous operation during embankment construction for spreading, manipulating, blending and leveling the material.

7. Route hauling equipment and distribute travel over the entire area of each layer of material and over the entire width of the embankment without following in the immediate tracks of preceding equipment.

8. Keep the embankment surface level and uniform at all times. Construct the sides of the embankment first, and then bring the center up level with the shoulders.

9. Do not place embankment material when the moisture content in any layer causes excessive rutting or precludes proper compaction. Dry embankments rendered unstable by excessive amounts of moisture from any cause by scarifying and balding before placing succeeding layers.

10. Embankments constructed on frozen ground are to be re-excavated and re-compacted to grade and cross section after complete thawing of the ground and the soils can be suitably worked.

11. Provide the water and the compactive effort necessary to obtain the specified density. Watering and compaction is incidental to embankment construction and will have no separate payment.

12. The minimum field compaction shall be as follows:

    a. 95 percent of the maximum laboratory density as determined by AASHTO T-99, including Correction of Coarse Particles in the Soil per AASHTO T-224. The Family of Curves-One Point Method per AASHTO T-272 may also be used (when applicable) for soils with an established moisture density relationship test result (AASHTO T-99).

    b. 95 percent of the maximum laboratory density as determined by Compaction Standard for Coarse Granular Materials by Use of the Vibratory Spring Loaded Compactor per Idaho IT-74 for soils too coarse to test using the AASHTO T-99 method.

C. Compaction Control Tests.

1. Determination of in-place density and percent compaction of standard density shall be by: In-place Density and Moisture Content of Soil and Soil-aggregate by Nuclear Methods (Shallow Depth) per AASHTO T-310. The testing frequency for materials placed in a roadway section shall be 1 test per each 300 linear feet of roadway and 1 test per 10,000 square feet of general fill and embankment areas for each lift.

2. The applicable standard method will be determined in accordance with the following table. Requirements for materials too granular to test by the standard methods are outlined in Section 202.3.8.C.3.

Test Method	AASHTO T-99 Method A	AASHTO T-99 Method D	Idaho IT-74
Applicable Particle Size	≤ 10% retained on the No. 4	>10% retained on No. 4 and ≤ 30% retained on 3/4" inch	> 30% retained on ¾ inch and < 10% retained on 3 inch.

3. Material Too Granular to Test.

a. Construct embankments with material too granular to test by AASHTO T-99 or Idaho Method IT-74 in horizontal layers no thicker than outlined below unless otherwise permitted. Distribute large rocks evenly and fill the voids between them with smaller rock and/or earth. Also, provide adequate water to facilitate compaction.

b. Compaction 18 inches or less below roadbed: Place material in lift thicknesses of 9 inches or less and uniformly compact each layer with a minimum of 12 full coverages using a vibratory roller meeting the requirements outlined below. Vibratory rolling requirements may be reduced 1 coverage for each increase of 5,000 pounds per impact above the specified minimum. In no case shall less than 6 full coverages for each 9 inch lift, or fraction thereof, be allowed.

c. Compaction more than 18 inches below roadbed: Place material in lift thicknesses of 18 inches or less and uniformly compact each layer with a minimum of 3 full coverages for each 6 inches of lift thickness or fraction thereof using rollers meeting the requirements outlined below. Rolling requirements may be reduced 1 coverage for each increase of 5,000 pounds per impact for vibratory rollers or 1,000 pounds/foot of drum width for grid rollers. In no case shall less than 1 full coverage for each 6 inches of lift, or fraction thereof, be allowed.

d. Vibratory rollers having a rated dynamic force of 30,000 pounds per impact and at least 1000 vibrations/minute.

e. Grid rollers having a static weight of at least 20,000 pounds and 4000 pounds/foot of drum width.

f. Limit the speed of grid rollers to no more than 4 mph and the speed of vibratory rollers to no more than 1.5 mph.

g. Include the cost for this work under other earthwork items, since all work described in this Subsection is considered incidental.

D. Borrow.

1. Borrow.

a. Borrow consists of material taken from areas within the project limits for the completion of embankments.

b. The areas within the project limits from which the borrow may be obtained will be designated on the Contract Documents.

c. Take borrow only from designated locations and within the horizontal and vertical limits stated or directed. Upon completion of operations, adequately drain and finish the surface of the borrow area to a neat and uniform grade.

2. Imported Borrow.

a. Imported borrow consists of material taken from areas outside the project limits for the completion of the embankments.

b. Imported borrow sources will generally be obtained by the Contractor, subject to approval by the Engineer.

3.9 CLASSES OF COMPACTION AND DENSITY REQUIREMENTS

A. Compact embankments including backfill and embankment foundations to meet the requirements of one of the following classes as specified in the Contract Documents.

B. If the class of compaction is not specified use Class A compaction.

1. Class A Compaction: Class A compaction consists of compacting the top 8 inches in cuts and embankment and backfill material within slopes extending outward at a 2 Horizontal to 1 vertical slope from the finished subgrade to 95% of standard density as per the table in Section 202.3.8.C.2. Compact materials too granular to test as outlined in Section 202.3.8.C.3.

2. Class B Compaction: Class B compaction consists of compacting embankment and backfill material within 12 inches of subgrade to the density standards for Class A compaction. Compact other material below subgrade by routing all construction equipment uniformly over the entire surface of each layer. Additional rolling may be directed if routing of equipment provides unsatisfactory compaction.

3. Class C Compaction: Class C compaction consists of compacting selected areas under embankments to the density standards for Class A compaction to a depth of 8 inches. The station limits of Class C compaction, will be shown on the plans or as directed. The width will be between subgrade shoulders.

4. Class D Compaction: Class D compaction consists of compacting designated areas shown on plans. The compaction consists of not less than one complete coverage with approved track type or rubber tired earth moving equipment. Place the embankment in lifts not to exceed 12 inches in depth of material before compaction. Adjust moisture content to optimum.

C. Place material above subgrade that is too granular to test in layers no more than 9 inches thick and compact as required in Section 202.3.8.C.3.

3.10 HAUL

A. Haul consists of the authorized hauling of excavated material beyond the specified free haul distance.

1. Haul applies to excavation, borrow and granular borrow.

2. The free haul distance for excavation is 2000 feet.

3. No free haul will be required for borrow or granular borrow.

B. Measurement.

1. Calculating Excavation Haul.

a. Determine 2 points, 2000 feet apart, one on each side of the neutral grade point as indicated on the final construction haul diagram, located so that the included quantities of excavation and the included quantities of embankment measured by the average end area method areas balances.

b. The haul distance remains after subtracting the free haul from the distance measured between the center of volume of the remaining excavation and the center of volume of the resulting embankment.

c. The pay quantity is the length of haul multiplied by the accepted quantities hauled in excess of the free haul distance converted to the nearest whole haul unit.

2. Calculating Borrow Haul.

a. The length of haul for borrow and granular borrow is the distance between the center of volume of the source and the center of volume of the deposited material measured along the shortest practicable route.

b. The pay quantity is the length of haul multiplied by the accepted quantities hauled converted to the nearest whole haul unit.

c. Free Haul does not apply to Borrow or Granular Borrow Haul.

3. Compute haul quantities from a haul diagram prepared by the Engineer.

4. Haul may be computed with other analytical methods if approved by the Engineer.

5. In case the Contractor, for his own convenience, elects to use a haul plan differing from that proposed in the contract, the actual haul resulting from use of the Contractor’s source or haul plan will be paid for, except that haul in excess of that which would have resulted from use of the contract proposal will not be allowed.

6. When there is no separate contract item in the proposal for haul, its cost will be considered incidental to the contract item for which it applies.

3.11 DUST ABATEMENT (See Division 1000)

A. Provide sufficient equipment to apply water as directed for suppressing dust caused by construction activities.

B. Suspend operations if dusty conditions continue to exist, due to insufficient or inadequate dust abatement practices, or lack of watering equipment.

C. Apply water uniformly as directed to suppress dust formation, without creating muddy conditions or ponding.

D. Apply water at the same frequency as workdays when applying on Saturdays, Sundays and holidays.

E. Watering equipment consists of watertight tanks mounted on trucks, adequately powered, and capable of applying water, as required.

F. Apply water under pressure from the tank through a spray apparatus capable of providing a uniform unbroken spread of water over the watered surface.

G. Locate a suitable device in the cab allowing positive shut-off, drive control and regulation of the water flow.

H. Prevent dust abatement water from conveying silt to storm drains. Refer to Division 1000.

3.12 EROSION CONTROL AND FENCING

A. Provide complete and approved erosion control and fencing plans prior to starting excavation and backfill operations.

B. Place per Section 206 – Permanent Erosion Control, Section 2040 – Fencing and Division 1000 – Construction Stormwater Best Management Practices (BMPs).

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price options as designated in the Bid Schedule for Excavation. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Excavation: By the cubic yard measured in its original position from field cross sections, using the average end area method with no correction for curvature. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.1.A.1.
   Bid Schedule Description: Excavation…cubic yard (CY).

B. Excavation: By the ton measured by weight tickets from certified scales submitted to and approved by the Engineer. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.1.B.1.
2. Bid Schedule Description: Excavation…ton (TON).

C. Excavation: By the square yard measured within the limits of the work or designated on the Contract Documents. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.1.C.1.
2. Bid Schedule Description: Excavation…square yard (SY).

D. Excavation: By the lump sum. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.1.D.1.
2. Bid Schedule Description: Excavation…lump sum (LS).

4.2 Use the following unit price options as designated in the Bid Schedule for Rock Excavation. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Rock Excavation: By the cubic yard measured in its original position from field cross sections, using the average end area method with no correction for curvature. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.2.A.1.
2. Bid Schedule Description: Rock Excavation…cubic yard (CY).

B. Rock Excavation: By the ton measured by weight tickets from certified scales submitted to and approved by the Engineer. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.2.B.1.
2. Bid Schedule Description: Rock Excavation…ton (TON).

C. Rock Excavation: By the square yard measured within the limits of the work or designated on the Contract Documents. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.2.C.1.
2. Bid Schedule Description: Rock Excavation…square yard (SY).

D. Rock Excavation: By the lump sum. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.2.D.1.
2. Bid Schedule Description: Rock Excavation…lump sum (LS).

4.3 Use the following unit price options as designated in the Bid Schedule for Excavation Schedule _____.

A. Excavation Schedule _____: By the cubic yard measured in its original position from field cross sections, using the average end area method with no correction for curvature. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.3.A.1.
2. Bid Schedule Description: Excavation Schedule _____…cubic yard (CY).

B. Excavation Schedule _____: By the ton measured by weight tickets from certified scales submitted to and approved by the Engineer. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.3.B.1.
2. Bid Schedule Description: Excavation Schedule _____…ton (TON).

C. Excavation Schedule _____: By the square yard measured within the limits of the work or designated on the Contract Documents. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.3.C.1.
2. Bid Schedule Description: Excavation Schedule _____…square yard (SY).

D. Excavation Schedule _____: By the lump sum. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.3.D.1.
2. Bid Schedule Description: Excavation Schedule _____…lump sum (LS).

4.4 Use the following unit price options as designated in the Bid Schedule for Controlled Blasting.

A. Controlled Blasting: By the linear foot measured horizontally along the finished slope parallel within the blasting limits or as designated on the Contract Documents. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.4.A.1.
2. Bid Schedule Description: Controlled Blasting…linear foot (LF).

B. Controlled Blasting: By the square yard measured horizontally along the finished surface parallel within the blasting limits or as designated on the Contract Documents. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.4.B.1.
2. Bid Schedule Description: Controlled Blasting…square yard (SY).

C. Controlled Blasting: By the drilled foot measured parallel to the line holes and includes all holes drilled whether loaded or not. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.4.C.1.
2. Bid Schedule Description: Controlled Blasting…drilled foot (DF).

4.5 Use the following unit price options as designated on the Bid Schedule for Unsuitable Material Excavation and Repair.

A. Unsuitable Material Excavation: By the cubic yard measured in its original position within the limits designated by the Engineer, from field cross section using the Average End Area Method with no correction for curvature. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.5.A.1.
2. Bid Schedule Description: Unsuitable Material Excavation…cubic yard (CY).

B. Unsuitable Material Excavation: By the square yard measured within the limits designated by the Engineer. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.5.B.1.
2. Bid Schedule Description: Unsuitable Material Excavation…square yard (SY).

NOTE: Unsuitable Material Repair is incidental to Unsuitable Material Excavation unless a Separate Item is established as listed below.

C. Unsuitable Material Repair: By the cubic yard measured within the limits designated by the Engineer, on its final compacted position from field cross section using the Average End Area Method with no correction for curvature. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.5.C.1.
2. Bid Schedule Description: Unsuitable Material Repair…cubic yard (CY).

D. Unsuitable Material Repair: By the square yard measured within the limits designated by the Engineer. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.5.D.1.
2. Bid Schedule Description: Unsuitable Material Repair…square yard (SY).

4.6 Using the following unit price options as designated on the Bid Schedule for Borrow.

A. Borrow: By the cubic yard as measured in final compacted position from field cross section using the Average End Area Method with no correction for curvature. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.6.A.1.
2. Bid Schedule Description: Borrow…cubic yard (CY).

B. Borrow: By the ton as measured by weight ticket from certified scales submitted to and approved by the Engineer. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.6.B.1.
2. Bid Schedule Description: Borrow…ton (TON).

4.7 Use the following unit price option as designated on the Bid Schedule for Haul.

A. Haul: By the yard unit defined as ten cubic yards of material hauled 1,000 feet. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.7.A.1.
2. Bid Schedule Description: Haul…yard unit (YU).

B. Haul: By the ton unit defined as ten tons of material hauled 1000 feet. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.7.B.1.

2. Bid Schedule Description: Haul…ton unit (TU).

4.8 Use the following unit price options as designated on the Bid Schedule for Dust Abatement Water.

A. Dust Abatement Water: By the 1,000 gallons measured through calibrated tanks, distributors or accurate water meters. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 202.4.8.A.1.
2. Bid Schedule Description: Dust Abatement Water…1,000 gallons (MG).

END OF SECTION

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SECTION 203

SOIL MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Subsoil Materials.

B. Topsoil Materials.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 204 – Structural Excavation and Backfill.

C. Section 206 – Permanent Erosion Control.

1.3 REFERENCES

A. ASTM D 2487: Classification of Soils for Engineering Purposes.

B. AASHTO T 99: Moisture-Density Relations of Soils using 5.5-pound Rammer with a 12-inch Drop.

C. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

PART 2 MATERIALS

2.1 SOIL MATERIALS

A. Topsoil Type S1: Excavated material, up to 18 inches below stripped surface, free of rocks larger than 3 inches, roots, refuse, brush or other debris.

B. Subsoil Type S2: Excavated material below Topsoil Type S1 which fits the U.S.C.S. soil texture Class “SP”, free of rocks larger than 3 inches, roots, refuse, brush or other debris.

C. Subsoil Type S3: Excavated material below Topsoil Type S1 which fits the U.S.C.S. soil texture Class “SM” or “ML”, uncemented, free of rocks larger than 3 inches, roots, refuse, brush or other debris.

D. Subsoil Type S4: Excavated material below Topsoil Type S1 which fits the U.S.C.S. soil texture Class “CL” with a liquid limit between 26% and 40% and a plasticity index between 4 and 22, free of rocks larger than 3 inches, roots, refuse, brush or other debris.

E. Subsoil Type S5: Excavated material below Topsoil Type S1 which does not meet the requirements established for Subsoil Type S2, S3 or S4 classification (e.g. cemented soil), free of rocks larger than 3 inches, roots, refuse, brush or other debris. For other Uncrushed Aggregates, refer to Section 801 - Uncrushed Aggregates.

PART 3 WORKMANSHIP

NOT USED

PART 4 MEASUREMENT AND PAYMENT

NOT USED

END OF SECTION

SECTION 204

STRUCTURAL EXCAVATION AND COMPACTING BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation for Structures.

B. Backfilling for Structures.

C. Fill Quality Control.

1.2 RELATED SECTIONS

A. Section 203 - Soil Materials.

B. Section 205 - Dewatering.

C. Section 802 - Crushed Aggregate.

1.3 REFERENCES

A. AASHTO T 27: Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.

B. AASHTO T 88: Standard Method of Test for Particle Size Analysis of Soils.

C. AASHTO T 89: Standard Method of Test for Determining the Liquid Limits of Soils.

D. AASHTO T 90: Standard Method of Test for Determining the Plastic Limit and Plasticity Index of Soils.

E. AASHTO T 99: Standard Method of Test for Moisture Density Relations of Soils using a 5.5-pound Rammer with a 12-inch Drop.

F. AASHTO T 176: Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.

G. AASHTO T 191: Standard Method of Test for Density of Soil In-Place by the Sand-Cone Method.

H. AASHTO T 205: Standard Method of Test for Density of Soil In-Place by the Rubber-Balloon Method.

I. AASHTO T 265: Standard Method of Test for Laboratory Determination of Moisture Content of Soils.

J. ASTM D 422: Standard Test Method for Particle Size Analysis of Soils.

K. ASTM D 2216: Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.

L. ASTM D 2487: Standard Practice For Classification of Soils for Engineering Purposes.

M. ITD IT-74: Compaction Standard for Coarse Granular Materials by Use of the Vibratory Spring-Load Compactor.

N. AASHTO T 310: Standard Method of Test for In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

O. Occupational Safety and Health Standards for Excavations.

PART 2 MATERIALS

2.1 BACKFILL MATERIALS

A. Subsoil Type S2 specified in Section 203 – Soil Materials.

B. Subsoil Type S3 specified in Section 203 – Soil Materials.

C. Aggregate Type I and Type II as specified in Section 802 – Crushed Aggregate.

D. Uncrushed Aggregate as specified in Section 801 – (If Used).

PART 3 WORKMANSHIP

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Locate, identify, and protect utilities that remain, from damage.

C. Notify utility company to remove and relocate utilities.

D. Protect benchmarks, existing structures, and fences, from excavation equipment and vehicular traffic.

E. Verify fill materials to be used are acceptable.

F. Dewater in accordance with Section 205 - Dewatering.

G. Compact subgrade to density requirements for subsequent backfill materials. Scarify, adjust moisture content, and recompact, if necessary, to achieve densities.

H. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with Type II Aggregate as necessary and compact to density equal to or greater than requirements for subsequent backfill material. Refer to Section 802 - Crushed Aggregate.

I. Prior to placement of any fill material, compact subgrade to the requirements outlined in Section 202.3.8.

3.2 EXCAVATION FOR STRUCTURE

A. Description.

1. Provide excavation and disposal of all materials required for the construction of structures and unless otherwise specified include all necessary drainage, pumping, bailing, sheeting, shoring; the construction of cribs and cofferdams and their subsequent removal; removing old structures or parts thereof as required.

B. Construction Requirements.

1. Remove unstable foundation material as directed below the designed elevation. Use suitable surplus excavated material in the construction of embankments, and waste unsuitable material.

2. Sheet and brace trenches if necessary. Do not remove such sheeting until backfill has progressed to such a stage that no damage to pipe lines or structures will result from its removal.

3. Where rock, hardpan, or other unyielding material is encountered, and a yielding material is required as indicated by the Contract Documents, remove the unyielding material below the design grade and backfill, as directed.

4. Grade top perimeter of excavation to prevent surface water from draining into excavation.

5. All other backfill shall consist of suitable materials compacted to the density standards for Class A compaction before successive layers are placed.

6. Take special care to avoid disturbing bearing materials below the footing. Notify Engineer if materials are disturbed.

7. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work. Proceed with unaffected work.

8. Correct areas over-excavated by error in accordance with Section 202 – Excavation and Embankment.

9. Pump from the interior of any foundation enclosure in such a manner as to preclude the possibility of any portion of the concrete materials being carried away. Do not pump during the placing of concrete or for a period of at least 24 hours thereafter, unless it is done from a suitable sump or well point separated from the concrete work.

10. Excavated material is categorized into one of the five material classifications as set forth in Section 203 – Soil Materials. These materials will be stockpiled in the areas designated and to the line and grade as depicted on the Contract Documents.

    a. Conduit: As shown on the plans.

    b. Other Structures:

        1) Below the original ground surface: A volume equal to the volume of structure excavation less the volume of the permanent structure including opening, contained within the limits of measurement for structure excavation.

        2) Above the original ground surface: The volume contained between the outside walls of the structure and vertical planes 4 feet outside thereof; the original ground surface; and a horizontal plane 1 foot above the top of the structure or of the subgrade, whichever is the lesser.

        3) Volumes of backfill placed through water around abutments, wing walls and piers, will not be included in the measurement of quantities for compacting backfill.

3.3 BACKFILLING FOR STRUCTURES

A. Description: Compacting backfill includes the work of placing backfill material, compacting, sloping and cleaning up the sites. Replace material removed below design elevation with approved material.

    1. Fill solid rock excavation below the established footing elevation with Class 3000 psi concrete for bridge and box culvert foundations.

B. Construction Requirements.

    1. Place no structure until the foundation has been approved.

    2. Backfill placed in areas not requiring a higher degree of compaction for some other purpose is to be compacted to approximately the same density as the adjacent undisturbed soil or gravel. Compaction may be obtained by any effective means.

3. Backfill areas to contours and elevations with Type S5 subsoil.

4. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

5. Remove disturbed material from the excavation and the footing excavation. Backfill to the plan elevation with approved material.

6. Place backfill in a manner that does not disturb or damage existing structures or utilities.

7. Backfill placed through water around abutments, wing walls and piers to consist of suitable material placed in layers. Compaction of the backfill will not be required.

8. Backfill pipe culverts and other conduits per the section of the ISPWC corresponding to the type of pipe being installed.

9. Do not place backfill against newly constructed masonry or concrete structures without fulfilling the requirements of Section 701 – Concrete Formwork.

10. Unless otherwise indicated in the plans or directed, remove all sheeting and bracing used in making structure excavation.

11. Maintain optimum moisture content of backfill materials to attain required compaction density.

12. Top surface of backfilling under access roads: Plus or minus 1 inch from required elevations.

13. Top surface of general backfilling: Plus or minus 1 inch from required elevations.

3.4 FIELD QUALITY CONTROL

A. Field testing will be performed by an approved testing laboratory suitable to the Engineer.

B. Tests and analysis of fill material will be performed in accordance with Section 202 – Excavation and Embankment.

C. Compaction testing will be performed in accordance with Section 202 - Excavation and Embankment.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to the Owner.

E. Perform compaction testing at the frequencies outlined below. Additional testing shall be performed when materials or procedures change.

1. Trenches:

   a. Horizontal Location: Test at start of trench with subsequent tests a maximum of every 500 feet. Test a minimum of 2 locations in trenches greater than 100 feet but less than 500 feet in length.

   b. Vertical Location: At every horizontal location, test the first lift of fill and every 18 vertical inches of fill. Also test the fill at the top of the trench.

2. Linear Foundations.

   a. Horizontal Location: Test at start of foundation with subsequent tests a maximum of every 250 feet. Test a minimum of two locations for foundations longer than 100 feet in length.

   b. Vertical Location: At every horizontal location, test the subgrade and every 18 vertical inches of fill. Also test the top lift of fill.

3. Area Foundations.

   a. Horizontal Location: Perform one test for every 2,500 square feet of backfill surface area.

   b. Vertical Location: At every horizontal location, test the subgrade and every 18 vertical inches of fill. Also test the top lift of fill.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price options as designed on the Bid Schedule for Structural Excavation Schedule 1. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Structural Excavation Schedule 1: By the cubic yard for bridges and box culverts and stiffleg culverts measured in its original position using the Average End Area Method within the limiting planes in Part C. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

   1. Bid Schedule Payment Reference: 204.4.1.A.1.
   2. Bid Schedule Structural Excavation Schedule 1...cubic yard (CY).

B. Structural Excavation Schedule 1: By the lump sum for bridges and box culverts and stiffleg culverts measured in its original position using the Average End Area Method within the limiting planes in Part C. Includes full

compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 204.4.1.B.1.
2. Bid Schedule Structural Excavation Schedule 1...lump sum (LS).

C. The volume of material actually removed for Structural Excavation, Schedule 1 will be measured within a prism with limiting planes as follows:

1. Conduit and Structural Plate Pipe: As shown on the Contract Documents.

2. Other Structures:

a) The bottom of the foundation.

b) The vertical planes 2 feet outside of and parallel to the outside lines of the structure, in the case of bents with individual column footings, the entire bent shall be considered as one structure.

c) With upper limits as follows:

1) In embankment sections, the existing ground surface as cross-sectioned.
2) In roadway cut sections or channel changes, the planes of the roadway cut or channel changes as excavated.

4.2 Use the following unit price options as designed on the Bid Schedule for Structural Excavation Schedule 2.

A. Structural Excavation Schedule 2: By the cubic yard for all other structures measured in its original position using the Average End Area Method within the limiting planes in Part C. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 204.4.2.A.1.
2. Bid Schedule Structural Excavation Schedule 2...cubic yard (CY).

B. Structural Excavation Schedule 2: By the lump sum for all other structures measured in its original position using the Average End Area Method within the limiting planes in Part C. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 204.4.2.B.1.
2. Bid Schedule Structural Excavation Schedule 2...lump sum (LS).

C. The volume of material actually removed for Structural Excavation, Schedule 2 measured within a prism with limiting planes as follows:

1. Conduit and Structural Plate Pipe: As shown on the plans.
2. Other Structures:
   a) The bottom of the foundation.
   b) The vertical planes 2 feet outside of and parallel to the outside lines of the structure, in the case of bents with individual column footings, the entire bent shall be considered as one structure.

   c) With upper limits as follows:

      1) In embankment sections, the existing ground surface as cross-sectioned.

      2) In roadway cut sections or channel changes, the planes of the roadway cut or channel changes as excavated.

4.3 Use the following unit price options as designed on the Bid Schedule for Compacting Backfill.

A. Compacting Backfill: By the cubic yard for bridges and box culverts and stiffleg culverts measured in its original position using the Average End Area Method within the limiting planes in Part C. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 204.4.3.A.1.
2. Bid Schedule Compacting Backfill...cubic yard (CY).

B. Compacting Backfill: By the lump sum for bridges and box culverts and stiffleg culverts measured in its original position using the Average End Area Method within the limiting planes in Part C. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 204.4.3.B.1.
2. Bid Schedule Compacting Backfill...lump sum (LS).

C. The volume for compacting backfill will be determined as follows:

1. Conduit: As shown on the plans.

2. Other Structures:

   a) Below the original ground surface: A volume equal to the volume of structure excavation less the volume of the permanent structure including opening, contained within the limits of measurement for structure excavation.

b) Above the original ground surface: The volume contained between the outside walls of the structure and vertical planes 4 feet outside thereof; the original ground surface; and a horizontal plane 1 foot above the top of the structure or of the subgrade, whichever is the lesser.

c) Volumes of backfill placed through water around abutments, wingwalls and piers, will not be included in the measurement of quantities for compacting backfill.

END OF SECTION

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SECTION 205

DEWATERING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Trench Dewatering.

B. Dewatering for Structures.

1.2 RELATED SECTIONS

A. Section 202 – Excavation and Embankment.

B. Section 204 – Structural Excavation and Backfill.

C. Section 301 – Trench Excavation.

D. Section 303 – Exploratory Excavation.

E. Section 308 – Boring and Jacking.

1.3 REFERENCE

A. Idaho Department of Environmental Quality, Water Quality Standards, and Special Provisions.

B. All local erosion and sediment control policies and permit requirements.

1.4 SUBMITTALS

A. Prior to the preconstruction conference or Notice to Proceed, the Contractor shall submit a dewatering plan, sealed by a licensed Idaho Professional Engineer, to the Idaho DEQ. Submittal of a dewatering plan shall not be interpreted as acceptance or approval by the Owner or Engineer and shall include at a minimum:

1. Major components of the dewatering system including size, location and spacing and details. Include a description of a program that will be employed to verify dewatering performance before excavation and continued monitoring protocol during construction.
2. Location of dewatering disposal or discharge locations, jurisdictional acceptance of discharge and capacity of receiving facilities to accommodate flows.
3. Prepare contingency plans for equipment or power failure, and higher than expected flows when capacity of planned discharge and disposal location may conceivably be exceeded.

4. Location and details of Best Management Practices (BMP's).
5. All permits obtained by the Contractor for the construction and operation of the dewatering system and permit conditions for approval to discharge.

B. Dewatering plans and copies of submittals to and approvals from IDEQ are required to be provided and part of the SWPPP prior to NOI filing and EPA waiting period begins.

1.5 PERMITS

A. Obtain all necessary local erosion and sediment control permits.

Submit a short-term activity exemption application to IDEQ (401 Certification) and the dewatering plan. Contact IDEQ Water Quality Division for details or visit http://www.deq.idaho.gov/media/753831-short-term-activity-exemption-request-form-5.pdf

B. Dewatering discharge to adjacent canals or drains shall not be allowed unless the Contractor has obtained written approval from the agency having jurisdiction. Secure any necessary permits and approvals based on the dewatering system used. Coordinate and secure required permits from the proper governing agency if discharging to storm drain facilities.

C. Dewatering discharge locations must be approved prior to construction. Fines incurred due to Contractor's failure to comply with all requirements of this section will be paid at no cost to the Owner.

PART 2 MATERIALS

NOT USED

PART 3 WORKMANSHIP

3.1 PREPARATION

A. Furnish, install and operate all necessary machinery, appliances and equipment to maintain all excavations and trenches free from water during construction.

B. Construction dewatering shall be in accordance with the approved Dewatering Plan and the dewatering recommendations provided in the Geotechnical Report.

C. Contractor shall provide temporary power sources for all dewatering equipment that requires a power source.

D. Perform investigations, analysis, evaluations, and design as necessary to determine the soils ability to dewater, well-point spacing and locations, and discharge points.

E. Prior to excavation or trenching, verify groundwater level is below the minimum intended excavation depth as specified herein.

3.2 TRENCH AND STRUCTURE

A. Dewater and dispose of water in such a manner that it does not cause damage to public or private property or to cause a nuisance or menace to the general public. Operate dewatering system such that adjacent structures or property are not endangered by the reduction in the groundwater level.

B. Portable power generation equipment shall incorporate noise suppression devices to reduce noise during non-work periods to a level of not more than 60 decibels as measured at the adjoining private property lines.

C. Draw static water level to at least two feet (2') below the bottom of and prior to excavation in accordance with the dewatering recommendations provided in the Geotechnical Report.

D. Comply with Idaho Water Quality Standards, latest edition, for discharge of water to surface waters and local requirements.

E. The Contractor will be responsible for devising a system to achieve the required level of dewatering. It is anticipated that this system may incorporate wells, well points, interception trenches, sumps, etc. The Contractor shall submit details of this plan as previously described in Part 1.4 of this Section.

F. Perform necessary dewatering activities so that the hydrostatic pressure in the trench or structure excavations is reduced to or near zero in the immediate vicinity of the bottom of the excavation as necessary to maintain the undisturbed nature of the native soils.

G. Remove all groundwater, seepage, stormwater and other water that accumulates in the excavation during construction. All excavations shall be kept free of water during construction or until otherwise requested by the Contractor and approved by the Engineer.

H. Prevent softening of the bottom of the excavation and the formation of "quick" conditions or "boils" during excavation. The occurrence of such conditions will require over-excavation and subsequent backfilling with bedding foundation stabilization materials meeting the requirements of Type I per Section 304.

I. Additional costs for bottom stabilization, resulting from inadequate dewatering and non-compliance with the performance specifications included herein, as determined by the Engineer, will be incidental to the work.

J. Install and operate the dewatering system so that adjacent structures or property are not endangered by the reduction in the groundwater level. Continue to operate the dewatering system to meet the requirements of these specifications until the impacted area is backfilled and compacted.

K. Maintain hydrostatic pressures in the excavation at or near zero during installation of the bedding and pipes or structures and continue dewatering operations until backfill is placed to finished grade or as necessary to prevent floatation of constructed improvements.

L. Control surface runoff to prevent entry or collection of water in excavations.

M. Monitor discharge from dewatering operations for changes in visual or odor components indicating the presence of contaminants including, but not limited to, gasoline and pesticides and other hazardous materials and toxins.

N. Cease dewatering operations and notify Engineer and regulatory agencies immediately upon observation of conditions that may indicate the presence of hazardous contaminants in the dewatering discharge or excavation.

O. Contractor's superintendent shall routinely observe conditions in excavations where dewatering is being performed on a daily basis to verify performance requirements are being met and that conditions in the excavation are in accordance with the Contract Documents.

P. Notify the Engineer of any observations that may jeopardize the Work or is not in accordance with the Contract Documents.

Q. Based on the verification performed by the Contractor and observations made by the Engineer in accordance with the General Conditions, the Engineer will determine if the performance requirements of the specifications as they relate to dewatering and construction of the improvements are generally being met. If the Engineer determines that the dewatering related Work is not being performed in accordance with the Contract Documents, the Contractor will be notified in accordance with the General Conditions and required to cease construction of the affected Work and revise and resubmit the described dewatering plan with appropriate adjustments to meet the requirements of the Contract Documents and implement any necessary changes to Contractor's dewatering approach and activities at no additional cost to the Owner.

3.3 TERMINATION

A. Allow groundwater to return to static level after excavations are backfilled as necessary to prevent floatation of constructed improvements.

B. Prevent disturbance of the compacted backfill and prevent flotation or movement of installed pipelines and structures.

C. Remove or abandon all temporary improvements associated with the dewatering system in accordance with these specifications and any applicable state and federal rules and regulations.

D. Provide surface restoration as required to repair/replace any surface impacted by dewatering activities to a condition as good as or better than preconstruction conditions at no additional cost to the Owner. Surface rehabilitation performed as a result of dewatering activities is considered incidental and no additional payment will be made.

E. Comply with any dewatering termination requirements of the local, State and Federal permits.

3.4 MONITORING

A. At least once per day during dewatering activities, monitor wastewater from dewatering operations for changes in visual or odor components indicating the presence of contaminants including, but not limited to, gasoline and pesticides and other hazardous materials and toxins.

B. Cease dewatering operations and notify Engineer and regulatory agencies immediately upon encountering contaminants in water.

C. Maintain explosive atmosphere-detection device on-site. Measure atmosphere explosivity continuously at mid-height of excavation.

3.5 DEWATERING DISCHARGE

A. Comply with all Local, State and Federal requirements, including (at a minimum):

1. Dewatering discharge water quality and quantity.
2. Dewatering discharge monitoring and sampling daily, weekly, continuous as stipulated in the permits, at any locations required therein.
3. Submit monitoring and sampling report to the appropriate agencies.

B. The Contractor shall be fully responsible for complying with City, State and Federal water quality requirements. Contractor shall devise dewatering system to achieve such requirements. It is anticipated that wells, well point methods, stilling basins, geotextile dams, straw bales, silt fences, or siltation channels may be required to meet performance stipulations of the reference permits. Such temporary facilities may be constructed on-site, as approved by the landowner and Engineer, and will be required to be removed after completion. Captured sediment must be retained and disposed of at a site furnished by the Contractor. Discharging directly into adjacent surface waters without treatment shall not be permitted.

C. The Contractor shall provide sediment removal from dewatering discharges necessary to meet the state water quality requirements of this Section and as required by local permits. Water quality treatment facilities shall be removed and the disturbed area restored to original condition in accordance with the surface restoration requirements in Section 307 and the Contract Documents. The cost for construction, operation, maintenance, removal, and restoration of water quality treatment facilities, sediment basins or other methods utilized by the Contractor, shall be considered incidental to dewatering.

D. Dewatering discharge locations must be approved prior to construction. Fines incurred due to Contractor's failure to comply with all requirements of this section will be paid at no cost to the Owner.

E. Install silt fences around soil or aggregate material stockpile areas to contain silts and prevent siltation of surface waters or runoff to adjacent properties.

F. Erosion and siltation control necessary to complete the work and conform to these Specifications shall be considered incidental to the work unless specifically listed on the Bid Form.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price options as designated in the Bid Schedule for Dewatering. Includes all labor, materials, and equipment required to dewater construction areas. If not listed in the Bid Schedule, Dewatering is considered incidental to other Bid Items.

A. Dewatering: By the linear foot measured along the horizontal centerline of the dewatered area.

1. Bid Schedule Payment Reference: 205.4.1.A.1.
2. Bid Schedule Description: Dewatering…linear foot (LF).

B. Dewatering: By the lump sum for all dewatering required.

1. Bid Schedule Payment Reference: 205.4.1.B.1.
2. Bid Schedule Description: Dewatering…lump sum (LS).

C. Dewatering: By the day measured on a 24-hour basis for all dewatering required on the project.

1. Bid Schedule Payment Reference: 205.4.1.C.1.
2. Bid Schedule Description: Dewatering…day (DAY).

D. Dewatering: By the square yard measured on a horizontal basis for the area that is dewatered.

1. Bid Schedule Payment Reference: 205.4.1.D.1.
2. Bid Schedule Description: Dewatering…square yard (SY).

END OF SECTION

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SECTION 206

PERMANENT EROSION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Class of Seeds.

B. Season of Work.

C. Seedbed Preparation.

D. Fertilizing.

E. Seeding.

F. Mulching.

G. Erosion Blanket.

H. Riprap.

1.2 RELATED SECTIONS

A. Section 203 - Soil Materials.

B. Section 805 - Asphalt.

C. Division 1000 – Construction Stormwater Best Management Practices.

1.3 SUBMITTALS

A. Submit Plan and Schedule for Permanent Erosion Control for review by Engineer.

PART 2 MATERIALS

2.1 EMULSIFIED ASPHALT

A. In accordance with Section 805 – Asphalt.

2.2 COMMERCIAL FERTILIZER

A. Furnish commercial fertilizer in containers marked with the weight and/or volume with the manufacturer's guaranteed analysis of the contents. Dry fertilizers must be free from lumps or cakes.

2.3 SOIL CONDITIONER

A. Soil conditioner may consist of peat moss, sedge peat, aged manure, compost or bark (that is reasonably free from wood substances). Material to contain a minimum of 50% organic matter by weight. The source must be reviewed by the Engineer before shipping to the project.

2.4 TOPSOIL

A. In accordance with Section 203 – Soil Materials.

2.5 MULCH

A. The sources of all types of mulch must be reviewed by the Engineer before shipping to the project.

1. Bark mulch (granular and ornamental type): Reasonably free of strips and splinters.

2. Straw: Reasonably weed-free grain straw other than rye.

3. Grass Hay: Reasonably weed-free and where it is to be anchored by crimping must have approximately 50% of the stems exceeding 10 inches in length.

4. Shredded Bark: Shredded or stringy texture.

5. Wood and Paper Fiber: Form a blotter-like ground cover when applied.

2.6 EROSION BLANKETS

A. Erosion blankets must be of material and construction that will remain in place, without deterioration, for at least three years or until 70 percent revegetation is established. The type and structure is to be reviewed by the Engineer prior to installation.

2.7 RIPRAP

A. Riprap will be classified as loose riprap, hand placed riprap, and concrete stabilized riprap. Material to be durable, angular field or quarry stones of approved quality, sound, hard, free from seams and other structural defects from an approved source, suitable salvaged concrete or concrete in sacks. Material to be uniformly graded such that smaller material will fill the voids in larger material and the larger material will still be in contact with each other, producing a well graded compacted mass. Grading will be determined by visual inspection prior to placement.

B. Loose Riprap.

1. Stone to be nearly rectangular, approximately 50% having a volume greater than 1 cubic foot.

2. Maximum size not to exceed minimum depth of riprap as specified on the Contract Documents.

C. Hand Placed Riprap.

1. Stone to be nearly rectangular, approximately 40% having a volume greater than 1 cubic foot.

2. No stone to be less than 6 inches thick.

D. Concrete Stabilized Riprap.

1. Stone to conform to B or C above.

2. Concrete to conform to Division 700, concrete class 1500.

3. To be used only when pre-approved by the Engineer.

2.8 TEMPORARY SLOPE PROTECTION

A. Refer to Section 1000 – Construction Stormwater BMPs.

PART 3 WORKMANSHIP

3.1 SEEDING AND MULCHING

A. This work is to consist of seedbed preparation and sowing seed on prescribed areas in accordance with these specifications and Contract Documents.

B. Use the drill seeding method on all areas with slopes of 3:1 or flatter and where there is not excessive rock, gravel, or hardpan. Apply fertilizer, seed and mulch in separate operations, one following the other and in that order, except that fertilizer may be applied with fertilizer attachment at time of seeding or with irrigation water when establishment water is specified. Perform tillage and drilling so that cross-slope furrows remain.

C. Class of Seeding

1. Seeding is to be of the class as designated in Table 1.

Table 1
SEED CLASS

OPERATION	CLASS						
	A	B	C	D	E	F	G
Seedbed Preparation	X	X	X	X	-	-	X
Seeding	X	X	X	X	X	X	X
Mulching	X	-	X	-	X	-	X
Anchoring (Mechanical)	X	-	-	-	-	-	-
Anchoring (Tack)	-	-	X	-	X	-	-
Erosion Blanket	-	-	-	X	-	-	-

X = Required.
- = Not Required.

2. Seed mixture will be identified in the Special Provisions.

D. Season of Work

1. Perform seeding during the season(s) designated in the Contract Documents.

2. When a portion of an area to be seeded is ready during a designated seeding season, complete that portion during that season for partial acceptance.

3. Perform no seeding operations when soil is too wet or dry, frozen, or otherwise untillable.

4. If seeding of the work area is the only remaining work to be done on the contract and a time frame for seeding is provided for in the proposal, contract time for completion will be considered the latest date shown in the seeding time frame.

E. Construction Requirements

1. Seedbed Preparation.

a. Maintain areas to be seeded reasonably free of weeds by mechanical means or application of appropriate chemicals until seeding time. Keep weeds from going to seed.

b. Cultivate areas to be seeded by drilling to a minimum depth of 3 inches. Work the soil to obtain a surface that will permit proper operation of seeding equipment.

c. On areas to be seeded by broadcasting, till the seedbed immediately prior to seeding to a roughened condition and make the soil loose to an approximate 2 inches depth. Soil condition similar to that obtained by walking a cleated crawler tractor up and down the slopes is required. Where slopes are benched, no additional preparation will be required.

d. Roughly finish slopes to be topsoiled. After topsoil has been spread, prepare the surface for seeding as specified above.

e. On areas subject to severe erosion, the extent of seedbed preparation is not to exceed the area on which the entire seeding and mulching can be applied within one day's operation. If conditions occur which prevent seeding in a proper furrow, or if the roughened condition is destroyed, prepare the seedbed again.

2. Fertilizing (Commercial).

a. The type and application rate of fertilizer is identified in the Contract Documents. Apply the fertilizer by the most appropriate of the following methods:

1. Fertilizer drill.

2. Broadcast.

3. Water applied.

b. Wherever possible, place fertilizer with the seed at time of drilling by use of a fertilizer attachment. Fertilizer may be broadcast (wet or dry) or drilled. Fertilizer may be applied with irrigation water as directed. When fertilizing established stands, apply fertilizer when average noontime temperatures are 60^{o}F or under.

3. Seeding.

a. The mix and rate of seeding is designated in the Contract Documents.

b. Apply the seed uniformly over the area by the most appropriate of the following methods.

1. Drill seeding (double disc with agitator).

2. Broadcast seeding.

a. Hydro-seeder.

b. Dry (whirlwind).

c. Where mulch is not to be used after drilling, plant seed at the bottom of approximately 2 inch depth furrows shaped by the double disc openers. Regulate the speed and spring pressure so that not over 1/2 inch of soil covers the seed and the furrows are left open. Drag chains will not be allowed. Where mulch is to be used after drilling, place seed as shallow in the soil as possible and still be well covered. Do not seed when wind interferes with seed placement. Drill spacing must not exceed 9 inches. Seed legume seed through a separate box from the grass seed, with seed spouts out, or broadcast ahead of the drill. Broadcast native seeds in the mix immediately ahead of the drill.

d. Thoroughly mix seed before placing in the drill or seeder box.

e. Where it is not practical to drill, broadcast the seed by use of a hydro-seeder or dry broadcast equipment. Do not mix fertilizer with the seed in the hydro-seeder. Do not agitate seed in the hydro-seeder over 30 minutes.

f. Do not drive trucks or equipment over the area after seed is in place.

4. Mulching.

a. Apply straw, grass hay, shredded bark, or wood fiber mulch as directed. Use the type of mulch as specified and spread uniformly at the following rates:

1. Straw or Grass Hay (air dry): 2 ton/acre.

2. Wood Fiber: 1 ton/acre.

3. Shredded Bark: per Contract Documents.

4. Process Grass Straw: 1 ton/acre.

b. Unless otherwise directed, anchor straw, grass hay, or shredded bark into the soil by use of a heavy disc with flat scalloped discs approximately 1/4-inch thick, having dull edges and spaced no more than 9 inches apart. Anchoring to a depth of at least 2 inches, and with no more than one pass of the equipment on the same surface. When straw, grass hay, or shredded bark is not anchored mechanically, tie it down with tack applied at the rate of approximately 200 gallons/ton of mulch. Apply wood fiber by hydro-seeder.

c. Do not mulch when wind interferes with mulch placement.

3.2. EROSION BLANKET

A. The type of blanket is as identified in the Contract Documents.

1. Place the blanket with fibers in contact with the soil over the entire area covered. On slopes the blanket may be unrolled either horizontally or vertically to the slope and lapped 4 inches over the adjoining blanket in the direction of flow and stapled. In ditches, the minimum width of blankets is to be 3 feet and lapped 4 inches. Staple blanket at joints, corners and at approximate 5-foot intervals with approved staples. Bury the ends and edges.

3.3 RIPRAP

A. Excavation

1. Excavate toe trench for riprap below probable scour elevation or to the elevation shown on the Contract Documents.

2. Where scour elevation can not be determined and no elevation is shown on the Contract Documents, excavate trench 2 feet below channel grade.

3. Do not place any stones or concrete until toe trench and slopes have been approved.

B. Loose Riprap

1. Place so that larger stones are in contact with each other and voids are filled with the finer materials, producing a well-graded compact mass.

2. Place the stone on the slope in a manner to ensure the specified thickness in one operation.

3. When placing riprap, do not disturb the underlying material.

4. Do not place in layers parallel to the slope.

C. Hand Placed Riprap

1. Place stones by hand on prepared slopes to the thickness specified or directed.

2. Start by placing a course of the largest stones in the toe trench.

3. Place each stone so that it is partly on the prepared slope and not completely on the stone below and thoroughly tamp or drive into place.

4. Make the exposed face as smooth as the shape and size of the stones will permit. Face not to vary more than 3 inches from a plane surface on the required slope.

D. Concrete Stabilized Riprap

1. Place riprap in accordance with 3.3 or 3.4 above, then cover with concrete.

a. Clean surface of stones to be concrete of adhering dirt and clay and then moisten prior to placement of concrete.
b. Place concrete on rock surface by use of chutes, tubes, buckets, pneumatic equipment or any other approved method that will prevent segregation of the materials.

c. Immediately after placement, spade or rod the concrete into the rock voids to the depth shown on the Contract Documents.

d. After placing concrete, thoroughly brush the rocks so that their top surfaces are exposed.

e. Expose the outer rocks 33% to 25% of their diameter above the concrete surface.

f. Do not allow any workmen or equipment on the finished area for at least 24 hours, or longer if ordered.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated in the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Seedbed Preparation: By the acre based on plan quantities except for authorized additives or deletions. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 206.4.1.A.1.
2. Bid Schedule Description: Seedbed Preparation...acre (AC).

B. Seeding: By the acre based on plan quantities except for authorized additives or deletions. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 206.4.1.B.1.
2. Bid Schedule Description: Seeding...acre (AC).

C. Mulching: By the acre based on plan quantities except for authorized additives or deletions. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 206.4.1.C.1.
2. Bid Schedule Description: Mulching...acre (AC).

D. Mulch Anchoring (mechanical): By the acre based on plan quantities except for authorized additives or deletions. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 206.4.1.D.1.
2. Bid Schedule Description: Mulch Anchoring (mechanical)...acre (AC).

E. Mulch Anchoring (tack): By the acre based on plan quantities except for authorized additives or deletions. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 206.4.1.E.1.
2. Bid Schedule Description: Mulch Anchoring (tack)...acre (AC)..

F. Erosion Blanket: By the acre based on plan quantities except for authorized additives or deletions. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 206.4.1.F.1.
2. Bid Schedule Description: Erosion Blanket...acre (AC).

G. Fertilizing: By the acre based on plan quantities except for authorized additives or deletions. Includes full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 206.4.1.G.1.
2. Bid Schedule Description: Fertilizing...acre (AC).

H. Loose Riprap: By the ton, cubic yards based on neat line dimensions in place.

1. Bid Schedule Payment Reference: 206.4.1.H.1.
2. Bid Schedule Description: Loose Riprap…ton (TON)

3. Bid Schedule Payment Reference: 206.4.1.H.3.
4. Bid Schedule Description: Loose Riprap…cubic yard (CY)

I. Hand Placed Riprap: By the ton, cubic yards based on neat line dimensions in place.

1. Bid Schedule Payment Reference: 206.4.1.I.1.
2. Bid Schedule Description: Hand Placed Riprap… ton (TON)

3. Bid Schedule Payment Reference: 206.4.1.I.3
4. Bid Schedule Description: Hand Placed Riprap… cubic yard (CY)

J. Concrete Stabilized Riprap: By the ton, cubic yards based on neat line dimensions in place.

1. Bid Schedule Payment Reference: 206.4.1.K.1.
2. Bid Schedule Description: Concrete Stabilized Riprap…ton (TON)

3. Bid Schedule Payment Reference: 206.4.1.K.3.
4. Bid Schedule Description: Concrete Stabilized Riprap…cubic yard (CY)

END OF SECTION

SECTION 207

PERMANENT STORMWATER BEST MANAGEMENT PRACTICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Stormwater Filters.

1. Biofiltration Swale (Vegetated Swale).
2. Bioinfiltration Swale (Bioretention Swale).
3. Vegetative Filter Strip.
4. Sand Filter.
5. Compost Stormwater Filter.
6. Catch Basin Insert.

B. Infiltration Facilities.

1. Infiltration Trench.
2. Bioretention Basin.

C. Detention Facilities.

1. Wet Pond (Conventional Pollutants).
2. Wet Pond (Nutrient Control).
3. Wet Extended Detention Pond.
4. Dry Extended Detention Pond.
5. Biodetention Basin.
6. Presettling/Sedimentation Basin.
7. Wet Vault/Tank.

D. Other Structural Controls.

1. Oil/Water Separator.
2. Level Spreader.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 202 – Excavation and Embankment.

C. Section 205 – Dewatering.

D. Section 206 – Permanent Erosion Control.

E. Section 301 – Trench Excavation.

F. Section 305 – Pipe Bedding.

G. Section 306 – Trench Backfill.

H. Division 1000 – Construction Stormwater Best Management Practices.

1.3 REFERENCES

A. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices for Idaho Cities and Counties.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable code for disposal of debris.

B. Coordinate with utility companies before excavating.

1.5 SUBMITTALS

A. Submit manufacturer's certification that materials meet or exceed specified requirements.

B. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.6 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load construction site management materials in a manner which prevents damage.

PART 2 MATERIALS

2.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

PART 3 WORKMANSHIP

3.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

B. Unless otherwise specified in the Contract Documents, monitor, maintain, and remove BMPs in accordance with the Stormwater Pollution Prevention Plan and NOI.

PART 4 MEASUREMENT AND PAYMENT

4.1 Unless specifically indicated in the Bid Schedule, all labor, materials and equipment required for construction site management will be considered incidental to other Bid Items.

A. Stormwater Filters: By the linear foot. Includes all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 207.4.1.A.1.
2. Bid Schedule Description: Biofiltration Swale (Vegetated Swale)…linear foot (LF).

3. Bid Schedule Payment Reference: 207.4.1.A.3.
4. Bid Schedule Description: Bioinfiltration Swale (Bioretention Swale)…linear foot (LF).

5. Bid Schedule Payment Reference: 207.4.1.A.5.
6. Bid Schedule Description: Vegetative Filter Strip…linear foot (LF).

7. Bid Schedule Payment Reference: 207.4.1.A.7.
8. Bid Schedule Description: Sand Filter…square foot (SF).

9. Bid Schedule Payment Reference: 207.4.1.A.9.
10. Bid Schedule Description: Compost Stormwater Filter…each (EA).

11. Bid Schedule Payment Reference: 207.4.1.A.11.
12. Bid Schedule Description: Catchbasin Insert…each (EA).

B. Infiltration Facilities: By the linear foot. Includes all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 207.4.1.B.1.
2. Bid Schedule Description: Infiltration Trench…linear foot (LF).

3. Bid Schedule Payment Reference: 207.4.1.B.3.
4. Bid Schedule Description: Bioretention Basin…square foot (SF).

C. Detention Facilities: By the cubic yard. Includes all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 207.4.1.C.1.
2. Bid Schedule Description: Wet Pond (Conventional Pollutants)…cubic yard (CY).

3. Bid Schedule Payment Reference: 207.4.1.C.3.
4. Bid Schedule Description: Wet Pond (Nutrient Control)…cubic yard (CY).

5. Bid Schedule Payment Reference: 207.4.1.C.5.
6. Bid Schedule Description: Wet Extended Detention Pond…cubic yard (CY).

7. Bid Schedule Payment Reference: 207.4.1.C.7.
8. Bid Schedule Description: Dry Extended Detention Pond…cubic yard (CY).

9. Bid Schedule Payment Reference: 207.4.1.C.9.
10. Bid Schedule Description: Biodetention Basin…cubic yard (CY).

11. Bid Schedule Payment Reference: 207.4.1.C.11.
12. Bid Schedule Description: Presettling/Sedimentation Basin…cubic yard (CY).

13. Bid Schedule Payment Reference: 207.4.1.C.13.
14. Bid Schedule Description: Wet Vault/Tank…each (EA).

D. Other Structural Controls: By the per-each basis. Includes all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 207.4.1.D.1.
2. Bid Schedule Description: Oil/Water Separator…each (EA).

3. Bid Schedule Payment Reference: 207.4.1.D.3.
4. Bid Schedule Description: Level Spreader…each (EA).

END OF SECTION

ISPWC – DIVISION 300

Trenching

Section 301 – Trench Excavation
Section 302 – Rock Excavation
Section 303 – Exploratory Excavation
Section 304 – Trench Foundation Stabilization
Section 305 – Pipe Bedding
Section 306 – Trench Backfill
Section 307 – Street Cuts and Surface Repairs
Section 308 – Boring and Jacking
Section 309 – Horizontal Directional Drilling

SECTION 301

TRENCH EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Site preparation and dewatering.

B. Trench excavation for pipelines, services, and appurtenances including shoring, bracing and trench safety system.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 205 – Dewatering.

C. Section 302 – Rock Excavation.

D. Section 303 – Exploratory Excavation

E. Section 304 – Trench Foundation Stabilization.

F. Section 306 – Trench Backfill.

G. Section 307 – Street Cuts and Surface Repairs.

H. Section 401 – Water Pipe and Fittings.

I. Section 404 – Water Service Line and Meters.

J. Section 501 – Gravity Sewers.

K. Section 504 – Sewer Service Lines.

L. Section 505 – Pressure Sewers.

M. Section 601 – Culvert, Storm Drain and Gravity Irrigation Pipe.

N. Section 901 – Pressure Irrigation Pipe and Fittings.

O. Section 903 – Pressure Irrigation Service Lines and Appurtenances.

P. Section 1103 – Construction Traffic Control.

Q. Section 2020 – Survey Monuments.

1.3 REFERENCES

A. AASHTO T 99: Moisture-Density Relations of Soils Using a 5.5 pound Rammer and a 12-inch Drop.

B. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

C. Manual on Uniform Traffic Control Devices, Latest Edition.

1.4 SUBMITTALS

A. Prior to construction, submit a traffic control plan to local road authority and Engineer if excavation will disrupt the normal flow of traffic in the work area. Refer to Section 1103 – Construction Traffic Control.

B. Submit a dewatering plan if surface or groundwaters are encountered per Section 205 – Dewatering.

C. Storm drainage discharge permit, as applicable to project.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

1.6 PROJECT RECORD DOCUMENTS

A. If encountered utilities are not positioned as shown on the plans, notify the Engineer. Note revised locations in relation to known references on the record drawings.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

PART 2 MATERIALS

2.1 GENERAL REQUIREMENTS

A. Construction materials and equipment used for the work to meet all requirements of the Contract Documents.

B. Use, handle and store material in such a manner as to preserve quality and fitness for the work.

C. Immediately remove materials from the site of work that do not conform to the requirements of the Contract Documents as determined by the Engineer.

D. For Rock Excavation and Exploratory Excavation, refer to Section 302 – Rock Excavation, and Section 303 – Exploratory Excavation.

PART 3 WORKMANSHIP

3.1 GENERAL REQUIREMENTS

A. Excavate, as necessary, at the locations indicated in the Contract Documents and staked in the field for the installation of pipelines, services, utilities and ancillary items. Excavate trenches per Standard Drawing SD-301 – Typical Trench or, if applicable, Standard Drawing SD-306 – Utility Trench.

B. Accurately grade bottom of trenches to the lines and grade indicated in the Contract Documents.

C. Confine the construction operations to within the easement limits or right-of-way limits or obtain written permission from the affected property owners for additional work area required.

D. If the trench bottom is over excavated, compact replacement fill to 95% maximum density as measured by AASHTO T99 or in accordance with method required by the Engineer prior to placement of the bedding or foundation stabilization material, per Section 304.

3.2 CONSTRUCTION SAFETY

A. Meet or exceed OSHA requirements at all times for all trench excavation and associated work.

3.3 UTILITY NOTIFICATION

A. Utilities shown in the Contract Documents are for general information only. Verify locations of all utilities. Notify local One Number Locator Service, and all utilities not covered by the One Number Locator Service at least two (2) working days in advance of performing excavation work or any other construction operations that may involve the utility's facilities. These may include, but not be limited to: sewer, irrigation, water, telephone, electric, oil, gas and cable television. If there are areas where the One Number Locator Service will not mark utilities, such as on private property, retain the services of a private utility locating company to locate and mark the utilities. Protect utility markings during construction.

B. For projects with a duration in excess of 14 calendar days, contact One Number Locator Service and any utilities not covered by the One Number Locator Service for each segment of the project.

C. If the One Number Locator Service and other utility notifications are not kept up to date, the excavation may be stopped by the Engineer and a new two (2) working day notice will be required before continuing the excavation. No contract time extension will be given for utility re-notification.

D. Determine by hand digging, in the area 24 inches or less from the facilities, the precise actual locations of underground facilities that have been marked.

E. Comply with Section 55-2201 of Idaho Code entitled “Underground Facilities Damage Prevention.”

3.4 PROTECTION OF PROPERTY AND UTILITIES

A. Locate and expose all existing underground structures and utilities as part of the trench excavation.

B. Protect all adjoining private and public property and existing structures, utilities, and facilities from vertical or lateral movement so that damage will not occur as a result of the work.

C. If damage occurs to structures or utilities during excavation, immediately stop work in the impacted area and notify the Engineer and the Utility Company.

D. Pay for repair work conducted by the utility company. Otherwise, repair or replace structures, utilities, or facilities damaged by the work in a condition equal to or better than the condition prior to the damage to the satisfaction of the Engineer and Utility Company. No additional payment will be made for these repairs.

E. If, as a result of excavation, there is a disturbance of the adjacent ground that endangers property or a facility, take immediate remedial action to correct the problem. Stop work in the impacted area and notify the Engineer and Utility Company.

F. Bear all costs associated with any utility relocations requested to accommodate the construction sequence.

G. Notify local fire authority and verify continued service prior to undertaking work that may impact fire hydrants.

H. Retain, protect any desirable trees or vegetation on or adjacent to the site using the following procedures:

1. Existing trees not designated for removal should be protected <u>before</u> excavation begins.

    a. Protection should consist of a highly visible, barrier to be placed at or outside the drip line of the tree(s).

    b. Unless approved by the Engineer, no equipment, vehicles, building materials, chemicals, stockpiles or debris shall be placed inside these barriers.

    c. All trees that are subject to damage by construction equipment shall be pruned by a licensed arborist.

2. Unless otherwise approved by the Engineer, disruption of the irrigation facilities serving trees will not be allowed.

3. Before the Contractor leaves the site, all existing trees which have been significantly damaged due to construction activities shall be replaced or repaired by a qualified arborist at the expense of the Contractor.

4. No changes in grade should be made within the protection area around trees.

3.5 SURVEY LINE AND GRADE

A. Survey line and grade control hubs will be provided by the Engineer in a manner consistent with accepted practices. Normal stationing is considered 50 foot intervals and at changes in directions or grade.

B. Provide Engineer 2 working days notice of the time and place that will require the laying-out and staking of any portion of the work.

C. Preserve all stakes, markers, etc. Stakes and markers damaged by Contractor will be replaced by Engineer at Contractor's expense.

D. Survey Monuments: Refer to Section 2020 – Survey Monuments.

3.6 IRRIGATION DITCHES

A. Schedule work so that construction across cultivated or pastured lands will not interfere with the delivery of irrigation water. Coordinate work with Irrigation Utility and affected property owners.

B. Construct temporary irrigation ditches, turnouts, or other miscellaneous structures or facilities as may be required so that the lands can be continuously irrigated without interruption by others during the course of the construction work. Unless otherwise indicated in the Contract Documents, no additional payment will be made for this work.

C. Repair and re-grade all existing drainage ditches, natural drainage courses and all other drainage facilities damaged or affected during the course of work. No additional payment will be made for these repairs.

D. Store, segregate and replace excavated material from unlined irrigation ditches so that the upper 1 foot of material contained in the reconstructed ditch cross section consists of topsoil, loam, or clay. Do not use sand, gravel, or other pervious materials in the reconstruction of irrigation ditches or banks. If material removed during trenching does not meet the approval of the Engineer, import necessary material for ditch reconstruction to be paid for by the Owner.

E. Import necessary material for ditch reconstruction. Replace concrete-lined irrigation ditches to match conditions prior to construction.

3.7 TRAFFIC CONTROL AND ACCESS

A. All work to be in accordance with Section 1103 – Construction Traffic Control.

3.8 CONSTRUCTION WITHIN EASEMENTS

A. Notify the property owner or tenant, the adjacent easement property owner, and all affected properties 48 hours in advance of the time when construction work will be started within the property.

B. Utilize the property only for the purposes as described in the easement documents. Obtain copies of these easement documents and permits from the Engineer.

C. Confine the construction operations to within the easement limits or street and alley right-of-way limits or prior to construction. Obtain written permission from the affected property owners for additional work area required.

D. Repair damage to private property, either inside or outside the limits of the easements, equal to or better than prior to construction at no additional cost to the contract.

E. Obtain a written release from the easement or permit grantors indicating that the work of restoration has been satisfactorily completed in accordance with the terms of the permit or easement. Final payment will be authorized only after these releases have been secured, unless otherwise determined by the Engineer.

F. Remove topsoil to existing depth or to a maximum of 36 inches. Stockpile for use as Miscellaneous Surface Restoration.

3.9 CLEARING, GRUBBING AND STRIPPING

A. All work to be performed per Section 201 – Clearing and Grubbing.

3.10 MISCELLANEOUS STRUCTURE REMOVAL AND REPLACEMENT

A. Remove and replace miscellaneous structures impacted by excavation such as catch basins, drain pipe, culverts, sidewalks, curbs, gutters, mailboxes, fences, gates, other obstructions, and signposts without additional compensation from the Owner unless otherwise specified in the Contract Documents.

B. Replace these structures in a condition equal to or better than their original conditions, and to the satisfaction of the affected property owner.

C. Assume full responsibility for all risk, damage, utility disruption, and subsequent down time when a conflicting structure or utility is encountered and work continues without the Engineer being properly notified.

3.11 PAVEMENT REMOVAL

A. Prior to removal of any pavement, note any pavement deficiencies, locations of all striping and markings within the work area. Remove and replace pavement per Section 307 – Street Cuts and Surface Repair.

B. Cut pavement to full depth. Provide neat straight cut lines parallel and equidistant from the trench centerline. Protect traffic from abrupt edge.

C. Remove pavement such that the trenching operation does not damage the edges of the pavement left in place, including provisions of local cutback requirements.

D. Prior to cutting more than 50 feet of pavement, excavate and expose existing stub-outs and notify the Engineer. Allow 24 hours for the Engineer to determine how to proceed if stub-outs need adjustment. This work is considered incidental to the Contract.

E. Keep removal of existing pavement along trench alignment to a maximum length of one day ahead of trenching work unless otherwise directed by the Engineer.

F. Keep pavement cutting to a maximum of two (2) working days trenching distance ahead of the construction operation, unless otherwise directed by the Engineer.

G. If, in the opinion of the Engineer, the road base outside the trench area becomes unstable due to Contractor's operation, remove unstable material, and replace with base material and surfacing at no expense to the Owner.

3.12 TRENCH DIMENSIONS

A. Trench Length.

1. Maximum During Construction Hours: 50 feet of open trench, or as otherwise shown in the Contract Documents, except by permission of the Engineer. Open trench is defined as any portion of the trench which has not been backfilled to finish grade, or which is not passable to local traffic.

2. Maximum After Construction Hours: Backfill to within the last section of pipe installed up to 25' maximum, except by permission of the Engineer. Barricade per local agency requirements and the Manual on Uniform Traffic Control Devices. Minimum requirements to include surrounding entire open trench with construction safety netting.

3. Special Circumstances: Refer to Special Provisions regarding backfilling of certain sections of trench prior to normal daily, weekend or holiday shutdown.

4. Failure by the Contractor to comply with the limitations specified herein may result in an order to cease further excavation until such time as compliance has been achieved.

B. Trench Width.

1. Minimum Width: 24 inches plus the outside diameter of the pipe barrel and sufficient to install and join pipe and properly place and compact the bedding material. Trench is measured from trench wall to trench wall inside of shoring.

2. Appurtenances: 24 inches clearance from trench walls on all sides for excavation of manholes, hydrants, structures and other appurtenances and sufficient to install appurtenances.

3. Maximum Width at the Top of Pipe: As indicated in the Contract Documents for the designated type bedding or as directed by the Engineer.

C. Trench Depth.

1. Minimum Depth: Required for invert grade of the pipe indicated in the Contract Documents, plus pipe wall thickness including bells, plus the specified bedding thickness, plus additional depth for foundation stabilization.

2. Trench Bottom: Hand trim to allow for pipe bells, valves and appurtenances in a manner which does not disturb subgrade compaction. Provide uniform bearing area.

3. Replace unauthorized over-excavation with foundation material in accordance with Section 304 – Trench Foundation Stabilization, at no additional cost to the Owner.

3.13 STORAGE OF BACKFILL MATERIAL

A. Place materials suitable for backfilling at a sufficient distance from the banks of the trench and in accordance with OSHA to avoid overloading and to prevent slides or cave-ins.

B. Place excavated material to allow ready access to existing fire alarm boxes, fire hydrants, valves, manholes and other appurtenances as well as emergency services. Do not obstruct surface drainage of adjoining areas.

C. Remove and dispose of all excavated materials not required, or unsuitable for backfill including lumped subsoil, boulders and rock. Disposal cost incidental to the Contract.

D. For placement of materials on private property, obtain a written agreement providing for permission from the property owner before any materials are deposited. The Agreement shall contain provisions to relieve the Owner of

any obligation to the property owner for any injury or damage to persons or property. Furnish a copy of the agreement to the Engineer at a minimum of 2 working days prior to placing the material.

3.14 TUNNELING

A. Make crossings under sidewalks, driveways, or curbs by tunneling if subgrade remains bridged and undisturbed for a depth of at least 4 feet below the structure. Demonstrate to Engineer a suitable method for recompacting the excavated tunneling area or fill annular space with flowable fill in accordance with Section 703.

3.15 TRENCH DEWATERING AND SURFACE WATER CONTROL

A. Submit a Dewatering Plan for Engineer approval where groundwater or surface run-off is encountered. Comply with regulatory agency requirements for discharge. Dewater per Section 205 – Dewatering.

B. Furnish, install, maintain, and operate all necessary machinery, appliances, and equipment to keep excavation reasonably free from water and to keep the groundwater level 1 foot below the trench bottom until the placing of the bedding material, laying and jointing of the pipe, placing of concrete, and placing of the initial backfill material has been completed, inspected, and approved, and all danger of flotation and other damage is removed.

C. Dewater and dispose of water in accordance with applicable ordinances, State water quality standards, and agreements and in such a manner that it does not cause injury to public or private property, or to cause a nuisance or a menace to the general public. Water will not be discharged to the street right-of-way without prior approval from the governing agency. Disposal method to be pre-approved by the Engineer, as a part of the dewatering plan.

D. Do not allow groundwater, construction water, storm water, water from broken pipes, or other source to enter the existing downstream pipeline system. Prior to construction, install a removable plug in the downstream pipeline system and ensure that no water enters the downstream pipe.

E. Grade the work area to prevent surface water from entering the trench. Immediately remove water accumulating in the trench.

F. Prevent water from rising in unbackfilled trenches.

G. Pay for repair work conducted by the utility company for all utilities damaged or having alignment or grade changed as a result of a flooded trench, or as a result of groundwater being improperly handled. Otherwise, repair damaged utilities to the satisfaction of the utility company at no additional cost to the Contract.

3.16 WATERING FOR DUST CONTROL

A. Provide dust control 7 days a week, 24 hours per day.

B. Correct deficient dust control within 4 hours after notification by the Engineer. If not corrected within 4 hours, the Owner may hire other parties to correct the deficiency at the Contractor's expense.

3.17 SILTATION CONTROL

A. Prevent siltation of the downstream drainage system by methods approved by the Engineer and other applicable agencies.

B. Obtain written approval from applicable agencies for discharging pumped water into canals or drainage systems and from property owners on whose property the discharged water may flow over, on, or through.

C. Comply with all local, state and federal regulations, rules and ordinances which apply to water discharge and pollution.

D. Clean and repair, at no cost to the Owner, siltation or damage to property or downstream drainage systems resulting from discharged water including all storm and runoff water passing through the construction site or from trench dewatering.

E. Comply with Division 1000 and the DEQ Manual of Construction Stormwater Best Management Practices.

3.18 SHORING, SHEETING AND BRACING

A. Provide all shoring, bracing, tight sheeting, and trench boxes required to prevent caving and to protect workers and adjacent property and structures. Cost is incidental to Contract.

B. Meet Occupational Safety and Health (OSHA) regulations and requirements.

3.19 SERVICE/UTILITY TRENCH

A. For cable, conduit, or pipe 6 inch or less in diameter only, prepare and excavate service trenches to an even grade and to a width and depth in accordance with this section and as indicated in the Contract Documents. Construct per Standard Drawing SD-306 – Utility Trench.

B. Excavate smooth trench wall and floor that are free of jagged rubble or sharp objects that will cause abrupt bending stress and uneven weight distribution during backfilling operation.

C. Remove and dispose of all rock, pavement, and other debris and unsuitable materials encountered during trenching operation that does not meet Section 306 – Trench Backfill. Cost is incidental to the Contract.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. As an alternate, trench excavation may be paid as part of other bid items. Payment to be full compensation for providing all materials, labor, tools and equipment necessary to complete the work. All measurements to the nearest foot. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Trench Excavation: By the linear foot measured on a horizontal basis along the center of the pipe through and including all manholes, tees, connections, and fittings.

1. Bid Schedule Payment Reference: 301.4.1.A.1.
2. Bid Schedule Description: Trench Excavation…linear foot (LF).

B. Trench Excavation: By the linear foot measured on a horizontal basis along the center of the pipe through and including all manholes, tees, connections, and fittings for each of the trench depth ranges listed in the Bid Schedule. Trench depth measured from the pipe invert to the original ground elevation.

1. Bid Schedule Payment Reference: 301.4.1.B.1.
2. Bid Schedule Description: Trench Excavation – depth _____ … linear foot (LF).

C. Trench Excavation: By the cubic yard measured by the average end method with cross-sections at 50-foot intervals, unless otherwise specified. Payment for typical trench excavation will be a bottom width of 2 feet plus the outside diameter of the pipe to a vertical height not to exceed 5 feet above the bottom of the pipe bedding with 1:1 side slopes above the vertical trench depth.

1. Bid Schedule Payment Reference: 301.4.1.C.1.
2. Bid Schedule Description: Trench Excavation…cubic yard (CY).

D. Service/Utility Trench Excavation: By the linear foot measured on a horizontal basis along the center of the pipe from centerline of mainline to the termination of public service line.

1. Bid Schedule Payment Reference: 301.4.1.D.1.
2. Bid Schedule Description: Service/Utility Trench Excavation…linear foot (LF).

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SECTION 302

ROCK EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rock excavation including drilling, blasting, rock trenching, hammering and other methods of rock removal, and related work.

1.2 RELATED SECTIONS

A. Section 202 – Excavation and Embankment.

B. Section 204 – Structural Excavation and Compacting Backfill.

C. Section 301 – Trench Excavation.

D. Section 303 – Exploratory Excavation.

E. Section 308 – Boring and Jacking.

F. Section 1103 – Construction Traffic Control.

1.3 REFERENCES

A. Manual on Uniform Traffic Control Devices, Latest Edition.

B. NFPA 495: Code for Explosive Materials.

1.4 SUBMITTALS

A. Shop Drawings: Indicate the proposed rock removal method.

B. Pre- and Post-Removal Site Condition Survey Report: Submit survey reports on conditions of structures and utilities near locations of rock removal.

C. Seismic Survey: Submit a report documenting the pre-removal seismic survey, recommended ground vibration limits, and peak particle velocities to avoid damage to adjacent buildings, structures, or utilities.

D. Qualifications of seismic survey company (Category B Bidding only).

E. Submit copy of Blasting Permit.

F. Blasting plan including qualifications (Category B Bidding only) of blasting companies.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

B. Notify Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match those contemplated by the Contract Documents. Allow 4 hours for Engineer to modify the design, if necessary, unless otherwise specified.

C. Notify Resident Project Representative (RPR) or Engineer when rock is encountered in the field. The RPR or Engineer shall verify that rock excavation is necessary prior to proceeding with excavation operations.

1.6 QUALIFICATIONS (Category B Bidding only)

A. Seismic Survey Consultant:

1. When specified in the Contract Documents, retain the services of a recognized and licensed Seismic Survey Consultant who has successfully provided seismic consulting services on a minimum of three (3) other projects of equal or greater complexity within the past seven (7) years.
2. The Seismic Survey Consultant shall consult concurrently with both the Engineer and Contractor.
3. The Seismic Survey Consultant shall be in good standing with all explosive and blasting regulatory agencies.
4. The Seismic Survey Consultant shall determine ground vibration and peak particle velocity limits to avoid damage to adjacent buildings, structures, or utilities, conduct pre- and post-removal inspections of any threatened structures or utilities, and perform continuous vibration monitoring during rock removal.
5. Seismic Survey Consultant and monitoring surveys are required unless noted differently in the Contract Documents.

B. Licensed Explosives Firm: Company specializing in explosives for disintegration of rock with a minimum of 5 years documented experience.

1.7 PROJECT RECORD DOCUMENTS

A. If encountered utilities are not positioned as shown on the plans, notify the Engineer. Note revised locations in relation to known references on the record drawings.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.8 SCHEDULING

A. Schedule work to avoid disruption to occupied buildings, residences, or businesses nearby.

B. Rock excavation operations shall only be permitted in the acceptable hours stipulated by the permitting authorities generally limited between the hours of 8:00 a.m. and 5:00 p.m. during any weekday, Monday through Friday, unless special circumstances warrant another time of day and special approval is granted by the Owner and Engineer.

1.9 COORDINATION

A. Coordinate with agencies and utilities to determine specific ground vibration, peak particle velocity, and seismic monitoring requirements near utilities and other infrastructure facilities. If requirements conflict with those specified herein or the seismic survey, the more stringent shall apply.

PART 2 MATERIALS

2.1 GENERAL REQUIREMENTS

A. Construction materials and equipment used for the work to meet all requirements of the Contract Documents.

B. Use, handle and store material in such a manner as to preserve quality and fitness for the work.

C. Immediately remove materials from the site of work that do not conform to the requirements of the Contract Documents as determined by the Engineer.

2.2 ROCK EXCAVATION

A. Classified as material which by actual demonstration cannot be reasonably excavated, in the opinion of the Engineer, by a 55,000 lb. track hoe equipped with 33-foot ground level reach, 3/4 cubic yard general duty bucket with rock points.

B. "Rock" is solid sandstone, limestone, granite, basalt, or other solid rock of equal hardness, in ledges, bedded deposits, or unstratified masses that, in the opinion of the Engineer, will require the use of systematic drilling and blasting, splitting with a chemical, hydraulic or pneumatic rock splitter or other means of fracturing for removal.

C. Rock excavation includes removal of boulders within the neatline dimensions of the trench which have a volume in excess of 3/4 cubic yard.

D. Cemented gravel (conglomerate), shale, clay, and other sedimentary materials are classified as rock only when, in the opinion of the Engineer, systematic drilling and blasting or other similar methods are required for removal.

E. Loam, sand, gravel, clay, caliche, or other such material stratified between layers of rock will not be classified as rock.

F. Rock shall be excavated to the depths indicated on the plans and shall include sufficient depth for pipe bedding materials.

PART 3 WORKMANSHIP

3.1 GENERAL

A. Perform rock excavation, as necessary, at the locations indicated in the Contract Documents and staked in the field for the installation of pipelines, services, utilities and ancillary items.

B. Accurately grade bottom of trenches to the lines and grade indicated in the Contract Documents.

C. Unless otherwise specified, remove all loam, sand, gravel, clay, or other such materials above the rock and clean off the exposed rock surface in a satisfactory manner so that the Engineer may examine the surface and obtain pay quantity measurements prior to blasting.

D. Comply with all requirements of Section 202 – Excavation and Embankment, and Section 301 – Trench Excavation.

3.2 EXAMINATIONS

A. Conduct a site condition survey documenting conditions of buildings in proximity to the anticipated rock excavation locations, which could be affected by trenching, hammering, blasting, or other excavation methods, photograph existing conditions, and identify irregularities.

B. Conduct a seismic survey to determine maximum particle velocities, ground vibration limits, and blasting charges (if applicable) that can be used at different locations without damaging adjacent properties or other work.

C. Provide for seismographic monitoring during progress of rock excavation operations. Submit data bi-weekly to the Engineer.

3.3 BLASTING GENERAL SAFETY

A. Comply with NFPA 495 – Code for Explosive Materials, and federal, state and local rules and regulations regarding transporting, handling and use of explosives.

B. Assume all liability and responsibility connected with or accruing from blasting, or the use of explosives including, but not be limited to, damage to work or adjacent property, injuries, lawsuits, complaints, and all other adverse results, actual, alleged, inferred, or implied.

C. Secure required permits prior to blasting. Submit a blasting plan for review by the Engineer indicating amounts of rock to be removed, schedule, and methods used to mitigate impacts to surrounding structures, utilities, private residences, and traffic.

D. Do not blast during weekends, holidays or outside normal working hours, unless otherwise approved by the Engineer.

E. Use utmost care to protect life and property. Safely and securely store explosives in compliance with State, Federal and local laws and ordinances, clearly marking such storage places "Dangerous Explosives." Do not leave explosives unprotected in areas where persons or property could be endangered.

F. If blasting within a populated area, at the discretion of the Engineer, provide 24 hours advance notice via newspapers, radio announcements, etc., prior to blasting.

3.4 BLASTING TRAFFIC CONTROL

A. Furnish and erect special signs and provide traffic and pedestrian control to warn the public of the blasting operations. Comply with Section 1103 - Construction Traffic Control.

B. Place signs at appropriate points within and near the project limits, and maintain them so as to be clearly evident to the public during all critical periods of the blasting operation.

C. If blasting is by means of electric detonators, include a warning statement to have radio transmitters turned off.

D. Prior to blasting, station workers and provide signals and traffic control, to alert people of dangerous conditions.

E. Notify the local public agency responsible for fire protection in the area of the blasting and comply with all regulations pertaining to blasting.

F. In advance of doing blasting work within 200 feet of railroad tracks or structures, notify the railway company of the location, date, time and approximate duration of blasting operations.

G. If blasting within a populated area, at the discretion of the Engineer, provide 24 hours advance notice via newspapers, radio announcements, etc., prior to blasting.

3.5 BLASTING SHOT-ROCK AND OVERSHOOTING

A. Cover the area to be shot with earth backfill or approved blasting mats that will prevent the scattering of rock fragments outside the excavation.

B. Excessive blasting (overshooting) will not be permitted. Remove, at Contractor’s expense, shattered or loosened material beyond the authorized trench limits.

C. Discontinue blasting method that leads to overshooting, is hazardous to the public, or is destructive to property or natural features.

D. Replace at Contractor's expense, unauthorized over-excavation with foundation material in accordance with Section 304 – Trench Foundation Stabilization at no additional cost to the Contract.

3.6 ROCK REMOVAL BY MECHANICAL METHODS

A. Excavate and remove rock by mechanical method including but not limited to, drilling holes and use of expansive tools, wedges, or chemical grouts to fracture rock, rock trenching or sawing, or rock hammering.

B. Cut away rock at bottom or exaction to form level bearing and the neat area to achieve the nominal dimensions and clearances shown on the typical trench sections.

C. Remove shaled layers to provide sound and unshattered base for footings, foundations, or pipe bedding.

3.7 SITE CONDITION AND SEISMIC MONITORING SURVEYS

A. General

1. The Seismic Survey Consultant shall perform pre- and post-removal site condition surveys of any threatened structures or any site in proximity to the rock excavation site as directed by the Engineer. The Seismic Survey Consultant shall determine which structures may be threatened by mechanical rock removal methods.

2. The pre- and post-removal surveys shall document the structural and cosmetic status of each monitored location or threatened structure identifying existing conditions and irregularities. Surveys shall include photographs and written descriptions.

    a. Pre-removal survey shall be submitted to Engineer ten working days prior to beginning rock removal.

    b. Post-removal survey shall be completed within ten working days of completion of rock removal.

    Provide copies of the pre- and post-removal site condition survey records to the Engineer and owner(s) of the surveyed or monitored structures.

3. Obtain written permission from property owners to perform survey or monitoring work prior to survey or monitoring work. Provide a copy of the written permission to the Engineer prior to the survey or monitoring work.

4. Seismographic Survey, Vibration Control and Monitoring

a. Ground vibrations shall be controlled by the use of properly sized equipment so as not to cause damage to adjacent structures or utilities from ground vibrations. The Seismic Survey Consultant shall conduct a seismic survey prior to rock removal to determine the maximum particle velocity and vibration limits that can be used at different locations in the area of rock removal to avoid damage to adjacent structures or utilities. The maximum allowable particle velocity will be the lesser of 1.0 inch per second or that recommended by the seismic survey.

b. The Seismic Survey Consultant shall conduct a seismographic survey to monitor ground vibrations during all rock removal operations with a continuously recording seismograph appropriate for the wok. At a minimum, the seismograph shall have a frequency range of 2 Hz to 100 Hz, particle velocity range of 0.02 to 4.0 inches per second, and an internal dynamic calibration system. The location of the seismograph shall be between the construction area and the two closest structures subject to potential vibration damage. The location of the seismograph shall be submitted to the Engineer for review. The results of the monitoring should be used to adjust the construction activities, if necessary, to reduce ground vibrations to acceptable levels. If the monitoring indicates the construction method used is adversely impacting manmade features, other methods of construction should be immediately implemented, and provisions for repairing the impacts shall be made by the Contractor and will be considered incidental to the water main pay item.

c. Advise owners of adjacent buildings or structures in writing prior to executing seismographic survey. Explain planned rock excavation methods and seismic operations.

3.8 DISPOSAL OF EXCAVATED ROCK

A. Rock may be reprocessed to meet backfill specifications with Engineer's pre-approval. Haul away and dispose of all excavated rock that is unsuitable for trench backfill to areas approved by the Engineer.

B. If the removal of excavated rock causes a deficiency in the amount of material available to complete the backfilling of any portion of the trench, import suitable backfill material in such quantity as may be required to complete the backfilling of the trench at no additional cost of the Contract, unless otherwise provided for in the contract.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Rock excavation to be in addition to payment for trench excavation. Includes full compensation for providing all materials, labor, tools and equipment necessary to complete the work. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Rock Excavation: By the cubic yard measured on neat line trench dimensions based on the following: (1) the trench rock width to be 24 inches wider than the outside barrel diameter of the pipe to be laid; and (2) the trench rock depth to be from the exposed surface or top of the rock formation to a point 4 inches below the bottom of pipe, and 6 inches for 30 inches pipe and larger, including pipe bell holes. Measurement to also include boulders in excess of 3/4 cubic yard which are removed from the area within the neat line dimensions of the trench. The quantity of rock for payment to be based on the product of the approved rock depth, width, and length computed to cubic yards.

1. Bid Schedule Payment Reference: 302.4.1.A.1.
2. Bid Schedule Description: Rock Excavation…cubic yard (CY).

B. Rock Excavation: By the linear foot on a horizontal basis along the centerline of the pipe through and including all manholes, tees, connections, and fittings regardless of the actual rock depth or quantity required for removal.

1. Bid Schedule Payment Reference: 302.4.1.B.1.
2. Bid Schedule Description: Rock Excavation…linear foot (LF).

C. Rock Excavation: By the linear foot on a horizontal basis along the centerline of the pipe for the depth of trench indicated in the Bid Schedule through and including all manholes, tees, connections, and fittings regardless of the actual rock depth or quantity required for removal.

1. Bid Schedule Payment Reference: 302.4.1.C.1.
2. Bid Schedule Description: Rock Excavation – depth _____ …linear foot (LF).

END OF SECTION

SECTION 303

EXPLORATORY EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Exploratory excavation for determining utility locations, groundwater depths, soil conditions, etc.

1.2 RELATED SECTIONS

A. Section 202 – Excavation and Embankment.

B. Section 205 – Dewatering.

C. Section 302 – Rock Excavation.

D. Section 1103 – Construction Traffic Control.

1.3 REFERENCES

A. Manual on Uniform Traffic Control Devices, Latest Edition.

1.4 SUBMITTALS

A. Submit shop drawings of trench safety system for informational purposes only if exploratory excavation is over 4 feet.

B. Submit a traffic control plan if excavation will disrupt the normal flow of traffic in the work area. Refer to Section 1103 – Construction Traffic Control.

C. Submit a dewatering plan if surface or groundwater is encountered per Section 205 – Dewatering.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

B. Notify Engineer if installation conditions such as exploratory excavation location, size, or conditions do not match those contemplated by the Contract Documents. Allow 4 hours for Engineer to modify the design, if necessary, unless otherwise specified.

1.6 PROJECT RECORD DOCUMENTS

A. If encountered utilities are not positioned as shown on the plans, notify the Engineer. Note revised locations in relation to known references on the record drawings.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

PART 2 MATERIALS

2.1 GENERAL REQUIREMENTS

A. Construction materials and equipment used for the work to meet all requirements of the Contract Documents.

B. Use, handle and store material in such a manner as to preserve quality and fitness for the work.

C. Immediately remove materials from the site of work that do not conform to the requirements of the Contract Documents as determined by the Engineer.

2.2 EQUIPMENT

A. Supply a suitably sized backhoe with a 24-inch wide bucket having the capacity of 1/4 cubic yard, based upon manufacturer's rated capacity of the unit.

B. Provide trench boxes or trench shields to allow for safe trench entry.

C. In areas with groundwater, provide submersible pumps and piping to provide continuous pumping sufficient to keep water out of the trench and to convey water to an approved discharge point.

D. Vacuum trucks or other Owner approved methods may be used for exploratory excavation.

PART 3 WORKMANSHIP

3.1 GENERAL

A. At the locations shown on the Contract Documents or as requested by the Engineer, provide the fueled and operated backhoe, laborer, and trench shoring to perform the exploratory excavation.

B. Provide traffic control, if necessary in accordance with the Manual on Uniform Traffic Control.

C. Provide for dewatering of the exploratory excavation and disposal of the pumped water at an approved discharge point.

D. Perform exploratory excavation to the utility or item requiring location at which time the Engineer will obtain field measurements. If necessary, conduct rock excavation per Section 302 – Rock Excavation.

E. Excavate, backfill, and restore surfacing in accordance with applicable sections of the ISPWC.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Payment to be full compensation for providing all materials, labor, tools and equipment necessary to complete the work. Work includes, but is not be limited to, excavation, dewatering, backfill, final cleanup, restoration of site, permits, fees and right of entries and encroachment permits. Unless otherwise listed in the Bid Schedule, surface restoration is included in the price for Exploratory Excavation. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Exploratory Excavation: By the hour to the nearest 1/2 hour measured during actual excavation and backfilling of the excavation standby time for the Engineer to survey the exploration.

1. Bid Schedule Payment Reference: 303.4.1.A.1.
2. Bid Schedule Description: Exploratory Excavation (non-groundwater)…hour (HR).
3. Bid Schedule Payment Reference: 303.4.1.A.3.
4. Bid Schedule Description: Exploratory Excavation (groundwater)…hour (HR).

B. Exploratory Excavation: Per each for the size of excavation indicated in the Bid Schedule including a maximum of one hour standby time prior to backfilling.

1. Bid Schedule Payment Reference: 303.4.1.B.1.
2. Bid Schedule Description: Exploratory Excavation (non-groundwater) (L_____, W_____, D_____)…each (EA).
3. Bid Schedule Payment Reference: 303.4.1.B.3.
4. Bid Schedule Description: Exploratory Excavation (groundwater) (L_____, W_____, D_____)…each (EA).

END OF SECTION

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SECTION 304

TRENCH FOUNDATION STABILIZATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Foundation stabilization material and placement.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 302 – Rock Excavation.

C. Section 303 – Exploratory Excavation.

D. Section 801 – Uncrushed Aggregates.

1.3 REFERENCES

A. AASHTO T 11: Materials Finer Than No. 200 Sieve in Mineral Aggregated by Washing.

B. AASHTO T 27: Sieve Analysis of Fine and Course Aggregates.

C. AASHTO T 99: Moisture-Density Relations of Soils Using a 5.5 pound Rammer and a 12-inch Drop.

D. AASHTO T 310: In Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

E. ASTM D 2487: Classification of Soils for Engineering Purposes.

1.4 SUBMITTALS

A. Samples: Submit one 45-pound sample of specified foundation material in airtight containers to testing laboratory.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

B. Notify Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match those contemplated by the Contract Documents. Allow 4 hours for Engineer to modify the design, if necessary, unless otherwise specified.

1.6 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of foundation stabilization in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

PART 2 MATERIALS

2.1 GENERAL REQUIREMENTS

A. Construction materials and equipment used for the work to meet all requirements of the Contract Documents.

B. Use, handle and store material in such a manner as to preserve quality and fitness for the work.

C. Immediately remove materials from the site of work that do not conform to the requirements of the Contract Documents as determined by the Engineer.

2.2 TYPE II BEDDING

A. Type II Aggregate Material: Use for Foundation Stabilization meeting the following gradation and as otherwise specified in Section 801 – Uncrushed Aggregates.

Sieve Size	Percent Passing
3 inch	100
No. 4	25-60
No. 200	0-12

2.3 SOURCE AND FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by the Engineer, unless otherwise specified.

B. Lab analysis and field testing of Type II Bedding will be performed in accordance with ASTM D 2487, AASHTO T 99 and T 310 as determined by the Engineer.

C. If tests indicate materials do not meet specified requirements, change material and retest at no cost to Owner.

PART 3 WORKMANSHIP

3.1 PREPARATION

A. Contact the Engineer upon discovery of soft, unsuitable, or unstable material that will not uniformly support the pipe or when excavation is beyond the neat line excavation limits as described in Section 301 – Trench Excavation, Section 302 – Rock Excavation, and Section 303 – Exploratory Excavation. The Engineer will determine limits of unsuitable soil.

B. Excavate unsuitable material to a depth that will allow adequate support of the pipe as directed by the Engineer.

C. Dispose of unsuitable material in a location acceptable to Engineer. Disposal costs incidental to the Contract.

D. If the trench bottom is overexcavated, compact replacement fill to 95% maximum density as measured by AASHTO T 99, or in accordance with other method required by the Engineer prior to placement of the Type II material.

E. Allow Engineer to make field measurements prior to placement of bedding material.

3.2 PLACEMENT

A. Place Type II bedding material in lifts no greater than 6 inches.

B. Compact each lift to 95% of standard maximum density. See Table in Section 202 Part 3.8.C.2 for definition of standard maximum density.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit prices as designated on the Bid Schedule. Payment to be full compensation for providing all materials, labor, tools and equipment necessary to complete the work. No payment will be made due to unnecessary over-excavation or as a result of inadequately controlling water from entering the trench. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Trench Foundation Stabilization: By the cubic yard as determined by length, width, and depth of foundation stabilized measured in the field using neat line trench dimensions.

1. Bid Schedule Payment Reference: 304.4.1.A.1.
2. Bid Schedule Description: Trench Foundation Stabilization…cubic yard (CY).

B. Trench Foundation Stabilization: By the cubic yard as delivered to the site, documented by truck load tickets.

1. Bid Schedule Payment Reference: 304.4.1.B.1.
2. Bid Schedule Description: Trench Foundation Stabilization…cubic yard (CY).

END OF SECTION

SECTION 305

PIPE BEDDING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe bedding placement and compaction.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 302 – Rock Excavation.

C. Section 304 – Trench Foundation Stabilization.

D. Section 703 – Cast-in-Place Concrete.

E. Section 802 – Crushed Aggregates.

1.3 REFERENCES

A. AASHTO T 11: Materials Finer Than No. 200 Sieve in Mineral Aggregated by Washing.

B. AASHTO T 27: Sieve Analysis of Fine and Course Aggregates.

C. AASHTO T 99: Moisture-Density Relations of Soils Using a 5.5 pound Rammer and a 12-inch Drop.

D. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

E. AASHTO T 335: Determining The Percentage of Fracture in Cover Aggregate

F. ASTM D 2487: Classification of Soils for Engineering Purposes.

1.4 SUBMITTALS

A. Samples: Submit one 45-pound sample of each specified bedding material in air tight containers to testing laboratory.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

B. Notify Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match those contemplated by the Contract Documents. Allow 4 hours for Engineer to modify the design, if necessary, unless otherwise specified.

1.6 PROJECT RECORD DOCUMENTS

A. If encountered utilities are not positioned as shown on the plans, notify the Engineer. Note revised locations in relation to known references on the record drawings.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

PART 2 MATERIALS

2.1 GENERAL REQUIREMENTS

A. Construction materials and equipment used for the work to meet all requirements of the Contract Documents.

B. Use, handle and store material in such a manner as to preserve quality and fitness for the work.

C. Immediately remove materials from the site of work that do not conform to the requirements of the Contract Documents as determined by the Engineer.

D. Pipe bedding is material from 4 inches below the bottom of the pipe, 6 inches for pipes 30 inches and larger, including pipe bell holes, to 6 inches above the top of the pipe for the full width of the trench.

2.2 TYPE I BEDDING

A. Type I bedding material: 3/4 inch 60% crushed or fractured (at least on one side) gravel and sand meeting the following gradation.

Sieve Size	Percent Passing
1 inch	100
3/4 inch	80-100
3/8 inch	20-70
No. 4	5-20
No. 8	0-5
No. 200	0-3

B. If the Contractor requests and the Engineer determines suitable bedding is available from excavated material, Type I bedding material may be created by screening, sifting, or manually sorting.

C. If the Engineer determines suitable excavated material does not require screening, sifting or manual sorting, there will be no payment made under Type I bedding material, except for placement and compaction only as listed in the Bid Schedule.

2.3 TYPE II BEDDING

A. Type II Aggregate Material: Use for Foundation Stabilization meeting the following gradation and as otherwise specified in Section 801 – Uncrushed Aggregates.

Sieve Size	Percent Passing
3 inch	100
No. 4	25-60
No. 200	0-12

2.4 TYPE III BEDDING

A. Sand with 100% passing the No. 4 sieve and less than 3% passing the No. 200 sieve.

2.5 TYPE IV BEDDING

A. Class 3000 psi concrete with 28-day compressive strength of 3,000 psi minimum, unless otherwise indicated in the Contract Documents.

B. Conform to Section 703 – Cast-in-Place Concrete.

2.6 SOURCE AND FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by the Engineer unless otherwise specified.

B. Lab analysis and field testing of Type I through Type III Bedding will be performed in accordance with AASHTO T 11, AASHTO T 27, AASHTO T 99, AASHTO T 310, and ASTM D 2487 as determined by the Engineer.

C. Type IV Bedding will be tested in accordance with Section 703 – Cast-in-Place Concrete.

D. If tests indicate materials do not meet specified requirements, change material and retest at no cost to Owner.

PART 3 WORKMANSHIP

3.1 PREPARATION

A. Prepare trench as described in Section 301 – Trench Excavation, and Section 302 – Rock Excavation. If the trench bottom is disturbed during excavation, compact to at least 95% maximum density as measured by AASHTO T99 prior to placement of bedding materials.

B. Place and compact Type II Aggregate (Foundation Stabilization), if necessary, as indicated in Section 304 – Trench Foundation Stabilization.

C. Prior to placement of the pipe on the first layer of bedding, excavate for bell holes and fully grade the trench to provide for uniform longitudinal pipe support.

3.2 CLASS A-1 BEDDING SYSTEM

A. Place Type I Bedding 4 inches below the bottom of the pipe, 6 inches for pipes, 30 inches and larger, to 6 inches above the pipe.

3.3 CLASS A-2 BEDDING SYSTEM

A. Place Type I Bedding 4 inches below the bottom of the pipe, 6 inches for pipes 30 inches and larger, to springline, then place either Type II or Type III bedding to 6 inches above the pipe.

3.4 CLASS B-1 BEDDING SYSTEM

A. Place Type II Bedding 4 inches below the bottom of the pipe, 6 inches for pipes 30 inches and larger, to 6 inches above the pipe.

3.5 CLASS B-2 BEDDING SYSTEM

A. Place Type III Bedding 4 inches below the bottom of the pipe, 6 inches for pipes 30 inches and larger, to 6 inches above the pipe.

3.6 CLASS C-1 BEDDING SYSTEM (CONCRETE CAP)

A. Place Type I Bedding 4 inches below the bottom of the pipe, 6 inches for pipes 30 inches and larger, to springline, and then place Type IV bedding to 6 inches above the pipe.

3.7 CLASS C-2 BEDDING SYSTEM (CONCRETE CRADLE)

A. Place Type IV Bedding 4 inches below the bottom of the pipe, 6 inches for pipes 30 inches and larger, to springline, and then place Type I bedding to 6 inches above the pipe.

3.8 CLASS C-3 BEDDING SYSTEM (CONCRETE ENCASEMENT)

A. Place Type IV Bedding 4 inches below the bottom of the pipe, 6 inches for pipes 30 inches and larger, to 6 inches above the pipe.

3.9 PLACEMENT

A. Place bedding in layers no thicker than 6 inches in depth, unless otherwise directed. Allow for bedding depth around pipe bells. Place the first layer from a point at least 4 inches below the pipe, 6 inches for pipes 30 inches and larger, to the bottom outside of the pipe.

B. Shovel slice and tamp to ensure that the bedding material is firmly placed.

C. Following placement of the pipe, place additional bedding layers up to the springline of the pipe. Shovel slice and tamp to ensure that the bedding material fills in and supports the pipe haunch area.

D. In the event that the trench shoring or the trench box is below the springline of the pipe, raise the shoring or trench box above the pipe springline and recompact the bedding (shovel sliced and tamped).

E. In six-inch lifts, place additional bedding layer from the pipe springline to 6 inches above the pipe.

F. Concrete Placement.

1. Provide supports for the pipe to maintain line and grade prior to placement of the concrete.

2. Place concrete monolithically unless otherwise approved by the Engineer and prevent flotation of the pipe prior to curing of the concrete.

3. Forming the concrete bedding may be allowed if concrete extends a minimum of 12 inches on each side of the pipe.

4. Backfill above the concrete will not be allowed until 48 hours after placement of the concrete bedding.

5. Backfill may be placed within 24 hours if an Engineer-approved high-early strength concrete is used.

3.10 COMPACTION

A. Compact each layer of Type II and Type III bedding material to 92% of the maximum density as determined by AASHTO T99.

B. If compaction fails to meet minimum density, provide necessary additional compaction effort necessary to meet specified requirements at no additional cost to the Contract.

3.11 BEDDING SYSTEM APPLICATION

A. If not otherwise specified in the Contract Documents, provide the bedding system for the type of pipe and application indicated below,

1. Gravity Sanitary Sewer, Stormdrains, Culverts and Gravity Irrigation Pipes: Use Class A-1 bedding system for PVC, PE, corrugated metal, and other flexible gravity pipe.

2. Gravity Sanitary Sewer, Stormdrains, Culverts and Gravity Irrigation Pipes: Use Class A-1, A-2, B-1, or B-2 bedding system for ductile iron, clay, steel, concrete or other rigid gravity pipe.

3. Pressure Sewer Pipes: Use Class A-1, A-2, B-1 or B-2 bedding system for rigid or flexible pressure sewer pipes.

4. Water and Pressure Irrigation: Use Class A-1, A-2, B-1, or B-2 bedding system for rigid or flexible water and pressure irrigation pipes.

5. Special Conditions: Use Class C-1, C-2, or C-3 bedding system when called for on the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Payment to be full compensation for providing all materials, labor, tools and equipment necessary to complete the work. If not listed in the Bid Schedule, pipe bedding is to be included in other Bid Items.

A. Pipe Bedding: By the linear foot measured on a horizontal basis through and including manholes, tees, fittings, and connections.

1. Bid Schedule Payment Reference: 305.4.1.A.1.
2. Bid Schedule Description: Class A-1 Pipe Bedding For _____ Diameter Pipe...linear foot (LF).

3. Bid Schedule Payment Reference: 305.4.1.A.3.
4. Bid Schedule Description: Class A-2 Pipe Bedding For _____ Diameter Pipe...linear foot (LF).

5. Bid Schedule Payment Reference: 305.4.1.A.5.
6. Bid Schedule Description: Class B-1 Pipe Bedding For _____ Diameter Pipe...linear foot (LF).

7. Bid Schedule Payment Reference: 305.4.1.A.7.
8. Bid Schedule Description: Class B-2 Pipe Bedding For _____ Diameter Pipe...linear foot (LF).

9. Bid Schedule Payment Reference: 305.4.1.A.9.
10. Bid Schedule Description: Class C-1 Pipe Bedding For _____ Diameter Pipe...linear foot (LF).

11. Bid Schedule Payment Reference: 305.4.1.A.11.
12. Bid Schedule Description: Class C-2 Pipe Bedding For _____ Diameter Pipe...linear foot (LF).

13. Bid Schedule Payment Reference: 305.4.1.A.13.
14. Bid Schedule Description: Class C-3 Pipe Bedding For _____ Diameter Pipe...linear foot (LF).

B. Pipe Bedding – Placement and Compaction Only: By the linear foot measured on a horizontal basis through and including manholes, tees, fittings, and connections.

1. Bid Schedule Payment Reference: 305.4.1.B.1.
Bid Schedule Description: Pipe Bedding – Placement and Compaction Only for _____ Diameter Pipe...linear foot (LF).

END OF SECTION

SECTION 306

TRENCH BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe bedding placement and compaction.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 302 – Rock Excavation.

C. Section 303 – Exploratory Excavation.

D. Section 305 – Pipe Bedding.

E. Section 401 – Water Pipe and Fittings.

F. Section 801 – Uncrushed Aggregate.

1.3 REFERENCES

A. AASHTO T 11: Materials Finer Than No. 200 Sieve in Mineral Aggregated by Washing.

B. AASHTO T 27: Sieve Analysis of Fine and Course Aggregates.

C. AASHTO T 99: Moisture-Density Relations of Soils Using a 5.5 pound Rammer and a 12-inch Drop.

D. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.

E. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

F. ASTM D 2487: Classification of Soils for Engineering Purposes.

1.4 SUBMITTALS

A. Samples: Submit one 45-pound sample of each specified backfill material in airtight containers to testing laboratory.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

B. Notify Engineer if installation conditions such as trench width, depth, soils, and backfilling conditions do not match those contemplated by the Contract Documents. Allow 4 hours for Engineer to modify the design, if necessary, unless otherwise specified.

1.6 PROJECT RECORD DOCUMENTS

A. If encountered utilities are not positioned as shown on the plans, notify the Engineer. Note revised locations in relation to known references on the record drawings.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

PART 2 MATERIALS

2.1 GENERAL REQUIREMENTS

A. Construction materials and equipment used for the work to meet all requirements of the Contract Documents.

B. Use, handle and store material in such a manner as to preserve quality and fitness for the work.

C. Immediately remove materials from the site of work that do not conform to the requirements of the Contract Documents as determined by the Engineer.

D. Backfill is from the top of the pipe bedding to base of surface repair for the full width of the trench.

2.2 NATIVE TRENCH BACKFILL MATERIAL

A. Excavated trench material free from cinders, ashes, refuse, organic and frozen material, cobbles or boulders with a greatest dimension exceeding 8 inches, or other unsuitable materials.

B. Material with excessive or deficient moisture content will not be considered as unsuitable if the moisture content can be adjusted to a level allowed to obtain compaction.

C. If suitable native material, as determined by the Engineer, is not used for backfill, import suitable backfill material at no additional cost to the Owner.

2.3 IMPORTED TRENCH BACKFILL MATERIAL

A. 8 inches minus uncrushed aggregate conforming to Section 801 – Uncrushed Aggregate.

2.4 FRACTURED ROCK BACKFILL

A. Fractured rock backfill is allowed, if approved by Engineer, in the trench backfill in the area of the trench from a depth of at least twenty-four inches (24”) above the top of the pipe to a depth of at least seven feet (7’) below finish grade, unless otherwise prohibited.

B. Material Requirements.

1. Rock which required blasting to facilitate removal from the trench.

2. Sorted to remove all material with a greatest dimension exceeding twenty-four inches (24”).

3. Reasonably graded such that the voids between the larger rocks are filled with smaller granular material. This may require the Contractor to import granular material to mix with the larger rocks.

PART 3 WORKMANSHIP

3.1 GENERAL

A. In non-roadway areas, backfill trench as soon as possible and within 24 hours of pipe placement and complete cleanup within 48 hours after pipe placement.

B. In roadway areas, backfill trench after placement of each section of pipe and complete backfill and cleanup after each workday.

C. Take care in placing the initial layers of backfill to avoid displacement of the pipe from line and grade. Remove material that may damage pipe.

D. The Engineer reserves the right to stop work on any line when backfilling, testing, cleanup, or restoration is not satisfactory.

E. Backfill per Standard Drawing SD-301 – Typical Trench.

3.2 PREPARATION

A. Excavate area per Section 301 – Trench Excavation, Section 302 – Rock Excavation, and Section 303 – Exploratory Excavation. If the trench bottom is overexcavated, compact to 95% maximum density as measured by AASHTO T 99, or in accordance with other method required by the Engineer prior to placement of backfill materials.

B. Place and compact bedding per Section 305 – Pipe Bedding.

C. Place thrust blocks as necessary per Section 401 – Water Pipe and Fittings.

D. Place pipe locating wire and marking tape as required.

E. Remove all form lumber and debris.

3.3 TYPE A TRENCH BACKFILL (A-1, A-2, A-3)

A. Utilization.

1. Roadways: Use within public right-of-ways and within traveled roadways or within 3 feet of all traveled roadways.

2. Other: Use in areas that will contain future facilities requiring compaction such as roadways, structures, etc.

B. Compaction Requirements.

1. 92% Compaction in accordance with AASHTO T 99: From the top of the pipe bedding to a point 4 feet below subgrade (lower zone).

2. 95% Compaction in accordance with AASHTO T 99: From a point 4 feet below subgrade to the subgrade level (upper zone).

3. Effort: If densities fail to meet minimum requirements, provide necessary additional compactive effort until backfill densities meet specified requirements at no additional cost to the Contract.

4. Method: Use A-1, A-2 or A-3 compaction technique approved by the Engineer.

C. Type A-1 Compaction.

1. Deposition: In layers suitable to the equipment used for compaction, but not more than 8 inches loose thickness.

2. Wetting: Wet to optimum moisture content ± 3%.

3. Compaction Technique: Mechanical.

4. Testing and Recompaction:

a. Freqency: Every 50-100 linear feet in maximum 8” lifts.

b. Recompact if any test location in the lower zone does not meet 92% compaction.

c. Recompact if any test location in the upper zone does not meet 95% compaction.

D. Type A-2 Compaction (for use only on river run aggregate backfill material).

1. Compaction Technique: Water settling.

2. Testing and Recompaction: Per Type A-1 Compaction.

3. Procedure:

   a. Use minimum pressure of 35 psi through a minimum 1-inch pipe and supply hose.

   b. Extend jetting pipe into the backfill material to within 2 feet of the top of the pipeline and operate until the trench is thoroughly saturated.

   c. Insert the jetting pipe on both sides of the trench and at a maximum of 6-foot intervals. Do not allow destabilization of trench walls.

   d. When trenches have a width greater than 10 feet, use a 6-foot checker board pattern.

4. Test Pits:

   a. Excavate test pits in the backfill material at 300-foot intervals through each layer of material.

   b. If test pits are more than 5 feet in depth, install safety system per OSHA Standards. Costs incidental to the Contract.

   c. Bear all costs for standby time during field density tests, re-testing as necessary, and backfilling and re-compaction of test pits.

E. Type A-3 Compaction (for use only on river run aggregate backfill material).

1. Compaction Technique: Water settling and rolling.

2. Testing: No testing is required. If all material does not meet this specification, either remove the unsatisfactory material or compaction testing will be required per Type A-2 Compaction.

3. Place in layers not to exceed 18 inches and no higher than subgrade.

4. Place each layer per Type A-2 Compaction.

5. Compact with either a track hoe mounted compactor (Hoe Pack), or a vibratory roller performing a minimum of 6 passes over the trench surface.

   a. Vibratory Roller: Minimum applied force of 11,000 pounds total and 350 pounds/linear inch of roller width.

   b. Track Hoe Mounted Compactor: Minimum applied force of 12 psi of base plate.

3.4 TYPE C TRENCH BACKFILL

A. Use in landscaping and agricultural areas where lawn sod, shrubs, topsoil, fences and other items must be removed and replaced.

B. Compaction Requirements.

1. 92% Compaction in accordance with AASHTO T99: From the top of the pipe bedding to the bottom of the surface restoration.

2. Density Requirements: As outlined in Section 202, Subsection 3.8.C.

3. Effort: If densities fail to meet minimum requirements, provide necessary additional compactive effort until backfill densities meet specified requirements at no additional cost to the Contract.

4. Method: Use Type A Backfill ,Type A-1, A-2 or A-3 compaction technique approved by the Engineer.

C. Compaction Testing.

1. In the trench area from the top of pipe bedding to 12 inches below finished grade:

a. Recompact if any test fails to meet 89% of maximum laboratory dry density.

b. Recompact if three tests within a maximum distance of 300 feet fall below 92% compaction.

c. Recompact if the average for all tests on the project is less than 92% compaction.

D. Topsoil and Finish Work. Paid under Miscellaneous Surface Restoration.

1. Keep topsoil from being mixed with the remainder of the backfill.

2. Place topsoil to a minimum depth of 12 inches in landscaping areas and at least to the depth which existed prior to trench excavation.

3. In cultivated areas, place stripped topsoil uniformly over the backfilled trench.

4. Grade topsoil to provide a smooth surface conforming to the adjoining ground surfaces. Do not compact.

5. On hillsides, compact and grade topsoil to be even with the existing terrain. Provide erosion control per Section 206 – Permanent Erosion Control.

6. In easement and landscaped areas, replace the lawn sod, shrubs, fences, and other items that have been removed and cleanup and

remove all rocks, dirt, or other debris that remains. Dispose of excess excavated material in approved waste sites.

7. In lieu of removing and replacing the lawn sod and with written approval of the Owner, replant the lawn or pay the property owner to replant or resod the lawn.
8. Secure written and signed releases from all affected property owners indicating their acceptance of the work.

3.5 FRACTURED ROCK BACKFILL

A. Place fractured rock backfill material for trench backfill in the area of the trench from a depth of at least twenty-four inches (24") above the top of the pipe to a depth of at least seven feet (7') below finish grade. Place the fractured rock backfill material horizontal layers (lifts) no thicker than six feet (6'). Jet each layer at intervals no greater than six feet (6') in any direction with a minimum water pressure of thirty-five pounds per square inch (35 psi) through a minimum one inch (1") diameter jetting pipe and supply hose. Utilize sufficient water to completely saturate the backfill layer. Upon completion of the jetting operation firmly compact each layer utilizing either a track hoe-mounted compactor (hoepack), a vibratory roller or other approved equipment performing a minimum of six (6) passes over the trench surface. The vibratory roller shall have a minimum applied force of three hundred fifty (350) pounds per linear inch of roller width. The hoepack equipment shall have a minimum applied force of twelve (12) pounds per square inch of base plate.

If, in the opinion of the Engineer, the jetting operation causes the creation of significant voids, the Contractor will be required to place another layer of granular material in the trench and perform the jetting and compaction operation listed above to fill the voids.

3.6 SERVICE/UTILITY TRENCH BACKFILL

A. For cable, conduit or pipes less than 6 inches in diameter, backfill trenches in accordance with SD-306, these specifications, and the Contract Documents.

B. For trenches in traffic areas less than the conduit diameter plus 2', use Controlled Density (flowable) fill per Section 703.

PART 4 MEASUREMENT AND PAYMENT

4.1 Trench backfill to be measured accordance with one of the following methods outlined below and identified in the Bid Schedule. Payment includes full compensation for providing all materials, labor, tools and equipment necessary to complete the work. If not separately indicated in the Bid Schedule, trench backfill will be paid for as a part of other Bid Items.

A. Trench Backfill: By the linear foot measured on a horizontal basis through all fittings and manholes.

1. Bid Schedule Payment Reference: 306.4.1.A.1.
2. Bid Schedule Description: Type "A" Trench Backfill...linear foot (LF).

3. Bid Schedule Payment Reference: 306.4.1.A.3.
4. Bid Schedule Description: Type “C” Trench Backfill...linear foot (LF).

B. Trench Backfill: By the linear foot measured on a horizontal basis through all fittings and manholes per foot of depth measured from the pipe invert to the surface repair subgrade elevation.

1. Bid Schedule Payment Reference: 306.4.1.B.1.
2. Bid Schedule Description: Type “A” Trench Backfill _____ Depth... linear foot (LF).

3. Bid Schedule Payment Reference: 306.4.1.B.3.
4. Bid Schedule Description: Type “C” Trench Backfill _____ Depth...linear foot (LF).

C. Trench Backfill: By the cubic yard measured between vertical planes for a width of 2 feet plus the outside diameter of the pipe from the top of the pipe bedding to a point 5 feet above the trench bottom and from that level to the surface repair subgrade, the trench width measured with 1:1 side slopes.

1. Bid Schedule Payment Reference: 306.4.1.C.1.
2. Bid Schedule Description: Type “A” Trench Backfill...cubic yard (CY).

3. Bid Schedule Payment Reference: 306.4.1.C.3.
4. Bid Schedule Description: Type “C” Trench Backfill...cubic yard (CY).

D. Imported Trench Backfill: By the ton based on the weight of the material minus the weight of water in the material in excess of 7% of the dry weight of the material.

1. Bid Schedule Payment Reference: 306.4.1.D.1.
2. Bid Schedule Description: Imported Trench Backfill...ton (TON).

E. Service/Utility Trench Backfill: By the linear foot measured on a horizontal basis along the center of the utility pipe from the centerline of mainline pipe to end of utility service.

1. Bid Schedule Payment Reference: 306.4.1.E.1.
2. Bid Schedule Description: Service/Utility Trench Backfill…linear foot (LF).

F. Service/Utility Trench CDF (flowable) Backfill: By the linear foot measured on a horizontal basis along the center of the utility pipe from the centerline of mainline pipe to end of utility service.

1. Bid Schedule Payment Reference: 306.4.1.F.1.
2. Bid Schedule Description: Service/Utility Trench CDF (flowable) Backfill…linear foot (LF).

G. Culvert Crossing CDF (flowable) Backfill: By the cubic yard measured within trench limits and elevations as shown on the design plans or Standard Drawing.

1. Bid Schedule Payment Reference: 306.4.1.G.1.
2. Bid Schedule Description: Culvert Crossing CDF (flowable) Backfill…cubic yard (CY).

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SECTION 307

STREET CUTS AND SURFACE REPAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Replacement and repair of pavement, curbs, gutters, cross drains, sidewalks, road shoulders, gravel roadways, driveways, landscaped areas, and similar items due to trenching operations.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 306 – Trench Backfill.

C. Section 703 – Cast-in-Place Concrete.

D. Section 705 – Concrete Pavement.

E. Section 706 – Other Concrete Construction.

F. Section 801 – Uncrushed Aggregate.

G. Section 802 – Crushed Aggregate.

H. Section 810 – Plant Mix Pavement.

I. Section 811 – Road Mix Pavement.

J. Section 1103 – Construction Traffic Control.

K. Section 1104 – Permanent Pavement Markings.

L. Section 2020 – Survey Monuments.

1.3 REFERENCES

A. AASHTO T 99: The Moisture Density Relations of Soils Using a 5.5-pound Rammer and a 12-inch Drop.

B. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

C. Manual on Uniform Traffic Control Devices, Latest Edition.

D. WAQTC TM 8: In Place Density of Bituminous Mixes Using the Nuclear Moisture Density Gauge.

1.4 SUBMITTALS

A. Submit asphalt concrete mix design, aggregate gradations, and plant certification per Division 800 – Aggregates and Asphalt.

B. Submit a traffic control plan if work will disrupt the normal flow of traffic in the work area.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

B. Notify Engineer if installation conditions such as surfacing, soils, and drainage conditions do not match those contemplated by the Contract Documents. Allow 4 hours for Engineer to modify the design, if necessary, unless otherwise specified.

1.6 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of street cuts and surface repairs in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.7 PERMITS AND TRAFFIC CONTROL

A. Obtain all necessary permits required to perform the work in the roadway right-of-way.

B. Provide traffic control per Section 1103 – Construction Traffic Control.

PART 2 MATERIALS

2.1 CONCRETE

A. Refer to Section 703 – Cast-in-Place Concrete.

B. All concrete to be Class 3000 psi unless otherwise indicated in the Contract Documents.

2.2 ASPHALT CONCRETE

A. Provide Class III unless otherwise specified. Refer to Section 810 – Plant Mix Pavement.

B. Refer to Section 811 – Road Mix Pavement.

2.3 ROADWAY AGGREGATES

A. Refer to Section 801 – Uncrushed Aggregate.

B. Refer to Section 802 – Crushed Aggregate.

2.4 PAVEMENT FABRIC

A. Non-woven Petromat by Phillips Fibers Corporation, or approved substitution.

2.5 EROSION CONTROL AND SEDIMENT BEST MANAGEMENT PRACTICES

A. Refer to Section 206 – Permanent Erosion Control.

B. Refer to Section 207 – Permanent Stormwater Best Management Practices (BMPs)

C. Refer to Division 1000 – Construction Stormwater Best Management Practices (BMPs).

2.6 STRIPING

A. Refer to Section 1104 – Permanent Pavement Markings.

PART 3 WORKMANSHIP

3.1 GENERAL REQUIREMENTS

A. Provide surface repair at the locations indicated in the Contract Documents and staked in the field or as required for the installation of pipelines, services, utilities and ancillary items.

B. Provide surface restoration in all disturbed areas to meet or exceed the quality of the surfaces removed, unless otherwise indicated in the Contract Documents. Patch widths are never to be less than 4 feet in width.

C. Complete surface restoration and final cleanup as soon as possible and in no case longer than 30 days after initial excavation or as otherwise specified in the Contract Documents, or approved by the Engineer.

D. Unless otherwise approved by the Engineer, progress with restoration so that no more than 1500 feet of trenching and backfill is not completely restored at any one time on the project. Provide traffic control per Section 1103 – Construction Traffic Control.

E. The Engineer will stop work if, backfilling, cleanup, dust control and/or surface restoration operations are not within the requirements of the Contract Documents.

F. Replace all pavement markings per Section 1104 – Permanent Pavement Markings.

3.2 SURVEY LINE AND GRADE AND SURVEY MONUMENT REPLACEMENT

A. Replace surfaces to original lines and grades or as indicated on the Contract Documents. If necessary, survey line grade control hubs will be provided by the Engineer in a manner consistent with accepted practices.

B. Preserved all stakes, markers, etc. Stakes, markers, etc. that are disturbed by the Contractor will be replaced by the Engineer at Contractor's expense.

C. Survey Monuments: Refer to Section 2020 – Survey Monuments.

3.3 SOFT SPOT REPAIR

A. Prior to beginning construction, walk area with Resident Project Representative and roadway official to identify pavement deficiencies and subgrade "soft spots" located outside of anticipated trench area.

B. As a part of pavement restoration construction, if directed by Resident Project Representative and roadway official, remove pavement in soft spot areas and remove roadway base materials to depths directed by roadway official.

C. Compact subgrade and place uncrushed aggregate base and crushed aggregate leveling course as directed by roadway official in accordance with Standard Drawing SD 303A.

3.4 SUBGRADE PREPARATION

A. Verify that subgrade has been compacted to the required density. Refer to Section 306 – Trench Backfill.

3.5 MISCELLANEOUS SURFACE RESTORATION (Sod, pasture, landscaped areas, etc.)

A. Perform work in accordance with construction within easements as described in Section 301 - Trench Excavation and in accordance with Type 'C' trench backfill as described in Section 306 – Trench Backfill.

B. Unless otherwise agreed to by the property owner, water as required to re-establish vegetation.

3.6 TYPE "B" SURFACE RESTORATION (Concrete Roadway Surfaces)

A. Restore concrete roadway surfaces removed due to trenching operations.

B. Construct per Standard Drawing SD-303 – Street Cuts and Surface Repair Details, and Section 705 – Concrete Pavement.

C. Prior to placement of the concrete resurfacing, neatly sawcut the edges of the existing concrete pavement to provide a clean break.

D. Saw cut along existing score lines or expansion joints if score lines or expansion joints are within 4 feet of the edge of the trench.

E. Finish concrete in a manner similar to the existing surface to avoid "patched" appearance.

3.7 TYPE “C” SURFACE RESTORATION (Gravel Roadway Surfaces)

A. Restore gravel roadway surfaces removed during trenching operations or where a gravel surface is required and specified for finished grade.

B. Construct per Standard Drawing SD-303 – Street Cuts and Surface Repair Details.

C. Use 8 inches compacted gravel depth unless otherwise specified.

D. Use Type I Crushed Aggregate 3/4 inch minus crushed aggregate in accordance with Section 802 - Crushed Aggregate.

E. Compact to a minimum of 95% of maximum density as measured by AASHTO T99.

F. Where the existing gravel surface outside the trench area is contaminated due to construction activities, removed and replaced with Type I crushed aggregate at no additional cost to the Contract.

3.8 TYPE “P” SURFACE RESTORATION (Asphalt Roadway Surfaces)

A. Restore asphaltic concrete pavement, asphalt concrete pavement over concrete, bituminous surface treatment, or asphaltic concrete surfacing that has been damaged or removed during trenching operations.

B. Construct per Standard Drawing SD-303 – Street Cuts and Surface Repair Details, and Section 810 – Plant Mix Pavement, or Section 811 – Road Mix Pavement.

C. Use 8 inches compacted base course, unless a greater section is otherwise indicated in the Contract Documents, consisting of Type I Aggregate in accordance with Section 802 – Crushed Aggregate.

D. Compact base course to 95% of maximum density in accordance with AASHTO T 99.

E. Asphalt concrete pavement thickness is to match existing pavement depth to a maximum depth of 6 inches unless a greater section is otherwise indicated in the Contract Documents. In no case shall pavement thickness be less than 2-½ inches on residential streets or 3 inches on designated collector and arterial streets.

F. After base compaction, trim back existing pavement only if required by local jurisdiction or as shown on the Plans by cutting to a straight line.

G. Remove pavement that has been damaged, broken, or is unsound and provide a smooth edge for joining the new pavement.

H. Repair damaged or broken sections of pavement by vertical sawcutting at 45° from existing cut line to outside of damaged pavement, then parallel to trench, then 45° back to existing cut line.

I. Surface requirements.

1. Surface: Smooth traveling surface.

2. Irregularities: None which allow ponding in excess of 0.02 feet deep unless due to existing pavement irregularities.

3. Grade: Deviation from existing surface less than 0.02 foot/10 foot in profile or 0.02 foot/10 foot in cross-section when measured with a 10-foot straight edge.

4. Markings: Replace all markings removed per Section 1104 - Permanent Pavement Markings.

J. Determination if full width pavement surface restoration is required.

1. Determination: Provide full width restoration if 50% or more of the existing surface area has been removed or damaged.

2. Calculation: Intervals of one block or 350 feet (whichever is less). Do not include removal of strips or the 1 foot cutback requirement in the calculation.

3. Strips: Remove all strips of remaining pavement less than 2 feet in width along curb and gutter or pavement edge.

4. Subgrade Stabilization: If directed by the Engineer, place additional Type II crushed aggregate subgrade stabilization outside the trench area. To be paid in addition to other Bid Items.

3.9 TYPE “P” SURFACE RESTORATION (with Pavement Fabric)

A. Restore asphaltic concrete pavement containing pavement fabric and overlay that has been damaged or removed during trenching operations.

B. Construct per Standard Drawing SD-303 – Street Cuts and Surface Repair Details, and Section 810 – Plant Mix Pavement, or Section 811 – Road Mix Pavement.

C. Use 8 inches compacted base course consisting of Type I Aggregate in accordance with Section 802 – Crushed Aggregate.

D. Compact base course to 95% of maximum density in accordance with AASHTO T-99.

E. After base compaction, trim back existing pavement only if required by local jurisdiction or as shown on the Plans by saw cutting to a straight line. Trim the asphalt overlay above the fabric an additional 4 inches.

F. Expose shelf and take care not to damage existing fabric.

G. Compact a minimum of 2 inches of asphalt concrete to the level of the fabric.

H. Spray the lower patch with AC-10 at the rate of 0.18 to 0.25 gallons/square yard at 280°-325° and install new pavement fabric the full width of the patch.

I. Overlay the fabric with new asphalt concrete to finish grade.

J. Surface tolerances, width requirements, and asphalt per Type “P” Surface Repair.

3.10 FULL WIDTH PAVEMENT SURFACE RESTORATION

A. Construct per Standard Drawing SD-303 – Street Cuts and Surface Repair Details, and Section 810 – Plant Mix Pavement, or Section 811 – Road Mix Pavement.

B. Match pavement width to existing pavement width unless otherwise specified.

C. Within trench area, gravel base course and compaction per Type ‘P’ Surface Restoration.

D. Pavement thickness and surface requirements per Type ‘P’ Surface Restoration.

E. Use existing base material outside of trench only if undisturbed, uncontaminated, and only if approved by Engineer. If directed by Engineer, perform soft spot repair in accordance with Section 307.3.3.

F. Replace gravel shoulders in accordance with Section 3.10.D – Gravel Shoulders.

3.11 MODIFIED FULL WIDTH RESTORATION

A. Construct per Standard Drawing SD 303 – Street Cuts and Surface Repair Details, Standard Drawing SD 303A – Type “P” Alternate for Modified Full Width Surface Restoration – Option A and B, and Section 810 – Plant Mix Pavement, or Section 811 – Road Mix Pavement.

B. Prior to paving, repair soft spots per Section 307.3.3.

C. Match pavement width to existing pavement width unless otherwise specified.

D. Surface requirements workmanship per Type “P” Surface Restoration.

E. Retain existing pavement outside of trench area.

F. Replace gravel shoulders in accordance with Section 3.12.C - Gravel Shoulders.

3.12 INCIDENTAL SURFACE RESTORATION

A. Provide this work incidental to other surface restoration Bid Items, unless otherwise specified in the Contract Documents.

B. Sidewalks, curbs and gutters, driveways, and cross drains.

1. General: Replace and restore sidewalks, curbs and gutters, and driveways to the same section, width, depth, line and grade as that removed or damaged.

2. Saw Cut: All concrete, regardless of the thickness, in neat, straight lines.

3. Hydro-Hammer Units: Not permitted for cutting concrete.

4. Subgrade Preparation: Perform subgrade preparation pursuant to appropriate restoration requirements.

5. Leveling Courses:

a. Sidewalks: Type I Crushed Aggregate, 2 inches minimum compacted thickness or to existing thickness, whichever is greater.

b. Driveways, Curbs and Gutters, Other: Type I Crushed Aggregate, 4 inches minimum compacted thickness, or to existing thickness, whichever is greater.

6. Sidewalk Replacement: Between scored joints or a minimum of 4 feet in width.

7. Finishes: Similar to the existing and abutting areas.

8. Standard: Per Section 706 – Other Concrete Construction.

C. Gravel Shoulders.

1. General: Restore to a minimum width of 3 feet or to existing width, whichever is greater, and to existing condition.

2. Depth: Minimum of 3 inches or to the existing depth whichever is greater.

3. Material: Type I Crushed Aggregate.

4. Reuse: Utilization of gravel removed prior to trenching is acceptable if the gravel has been carefully removed and stockpiled to avoid contamination and is pre-approved by the Engineer.

3.13 GRAVEL ACCESS ROAD

A. Construct gravel access road as indicated in the Contract Documents and Standard Drawing SD-304 – Gravel Access Road, and SD-305 – Gravel Access Road Turnaround Detail.

B. Use Type II Aggregate subbase compacted to 95% with provisions for turnouts at terminus of access roads where shown on the Contract Documents.

C. Compact gravel roadway material to 95% of maximum density in accordance with AASHTO T99.

D. Center the road on the pipeline alignment, unless otherwise indicated in the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 Surface Restoration to be measured in accordance with one of the following methods outlined below and identified in the Bid Schedule. Payment includes full compensation for providing all materials, labor, tools and equipment necessary to complete the work. If not separately indicated in the Bid Schedule, Surface Restoration is incidental to other Bid Items.

A. Miscellaneous Surface Restoration: By the linear foot measured on a horizontal basis through all fittings and manholes regardless of trench width. Includes work required to restore area to original conditions.

1. Bid Schedule Payment Reference: 307.4.1.A.1.
2. Bid Schedule Description: Miscellaneous Surface Restoration (Landscaping)…linear foot (LF).

3. Bid Schedule Payment Reference: 307.4.1.A.3.
4. Bid Schedule Description: Miscellaneous Surface Restoration (Sod)…linear foot (LF).

5. Bid Schedule Payment Reference: 307.4.1.A.5.
6. Bid Schedule Description: Miscellaneous Surface Restoration (Pasture)…linear foot (LF).

7. Bid Schedule Payment Reference: 307.4.1.A.7.
8. Bid Schedule Description: Miscellaneous Surface Restoration (Natural Ground)…linear foot (LF).

B. Type “B” Surface Restoration (Concrete Roadway): By the linear foot measured on a horizontal basis through all fittings and to manhole centerlines regardless of trench width. No additional length is given for outside of manholes and for line terminations.

1. Bid Schedule Payment Reference: 307.4.1.B.1.
2. Bid Schedule Description: Type “B” Surface Restoration (Concrete Roadway)…linear foot (LF).

C. Type “B” Surface Restoration (Concrete Roadway): By the square yard required to adjoin adjacent surfaces as measured in the field.

1. Bid Schedule Payment Reference: 307.4.1.C.1.
2. Bid Schedule Description: Type “B” Surface Restoration (Concrete Roadway)…square yard (SY).

D. Type “C” Surface Restoration (Gravel Roadway): By the linear foot measured on a horizontal basis through all fittings and to manhole centerlines regardless of trench width. No additional length is given for outside of manholes and for line terminations.

1. Bid Schedule Payment Reference: 307.4.1.D.1.
2. Bid Schedule Description: Type “C” Surface Restoration (Gravel Roadway)…linear foot (LF).

E. Type “C” Surface Restoration (Gravel Roadway): By the square yard required to adjoin adjacent surfaces as measured in the field.

1. Bid Schedule Payment Reference: 307.4.1.E.1.
2. Bid Schedule Description: Type “C” Surface Restoration (Gravel Roadway)…square yard (SY).

F. Type “P” Surface Restoration (Asphalt Roadway): By the linear foot measured on a horizontal basis along the centerline of the main through all fittings between manhole centerlines regardless of trench width. No additional length is given for outside of manholes and for main line terminations. Type “P” Surface Restoration for service lines will be by the linear foot measured on a horizontal basis along the centerline of the service line from the centerline of the main to the edge of pavement or lip of gutter. No additional payment will be made if sufficient pavement is removed or damaged to require full width Surface Restoration.

1. Bid Schedule Payment Reference: 307.4.1.F.1.
2. Bid Schedule Description: Main Line Type “P” Surface Restoration (Asphalt Roadway)…linear foot (LF).

3. Bid Schedule Payment Reference: 307.4.1.F.3.
4. Bid Schedule Description: Main Line Type “P” Surface Restoration (Asphalt Roadway with Fabric)…linear foot (LF).

5. Bid Schedule Payment Reference: 307.4.1.F.5.
6. Bid Schedule Description: Service Line Type “P” Surface Restoration (Asphalt Roadway)…linear foot (LF).

7. Bid Schedule Payment Reference: 307.4.1.F.7.
8. Bid Schedule Description: Service Line Type “P” Surface Restoration (Asphalt Roadway with Fabric)…linear foot (LF).

G. Type “P” Surface Restoration (Asphalt Roadway): By the square yard required to adjoin adjacent surfaces as measured in the field.

1. Bid Schedule Payment Reference: 307.4.1.G.1.
2. Bid Schedule Description: Type “P” Surface Restoration (Asphalt Roadway)…square yard (SY).

3. Bid Schedule Payment Reference: 307.4.1.G.3.
4. Bid Schedule Description: Type “P” Surface Restoration (Asphalt Roadway with Pavement Fabric)…square yard (SY).

H. Full Width Surface Restoration (Asphalt Roadway): By the square yard as measured in the field including service line surface restoration.

1. Bid Schedule Payment Reference: 307.4.1.H.1.
2. Bid Schedule Description: Full Width Surface Restoration (Asphalt Roadway)…square yard (SY).

I. Modified Full Width Surface Restoration (Asphalt Roadway): By the square yard as measured in the field including service line surface restoration.

1. Bid Schedule Payment Reference: 307.4.1.I.1.
2. Bid Schedule Description: Modified Full Width Surface Restoration (Asphalt Roadway)… square yard (SY).

J. Gravel Access Road: By the linear foot measured along the horizontal centerline of the access road as indicated in the Contract Documents.

1. Bid Schedule Payment Reference: 307.4.1.J.1.
2. Bid Schedule Description: Gravel Access Road – Type _____ … linear foot (LF).

K. Soft Spot Repair: Soft spot repair for uncrushed aggregate base material will be paid under two items in the Bid Schedule. For quantities greater than 10 cubic yards, payment for the first 10 cubic yards will be paid under Item 307.4.1.K.1 and the remainder under Item 307.4.1.K.3. Soft spot repair for crushed aggregate base material will be paid under two items in the Bid Schedule. For quantities greater than cubic yards, payment for the first 10 cubic yards will be paid under Item 307.4.1.K.5 and the remainder under Item 307.4.1.K.7. Asphalt concrete surface restoration associated with soft spot repair will be paid under Item 307.4.1.K.9. The amounts shown in the Bid Schedule are for bidding purposes only, and do not represent the actual amount, which will be determined during construction. Variation in quantities, as stated in the ISPWC, will not apply to these items. The unit price bid shall be used regardless of the actual quantity used in the field. Payment includes cost for removal of existing subgrade material. No payment will be made for soft spots which develop due to Contractor prematurely removing asphalt surface.

1. Bid Schedule Payment Reference: 307.4.1.K.1.
2. Bid Schedule Description: Soft Spot Repair Uncrushed Aggregate Base Material (0 to 10 cu. yds)…cubic yards (CY).

3. Bid Schedule Payment Reference: 307.4.1.K.3.
4. Bid Schedule Description: Soft Spot Repair Uncrushed Aggregate Base Material (11 cu. yds and above)…cubic yards (CY).

5. Bid Schedule Payment Reference: 307.4.1.K.5.
6. Bid Schedule Description: Soft Spot Repair Crushed Aggregate Base Material (0 to 10 cu. yds)…cubic yards (CY).

7. Bid Schedule Payment Reference: 307.4.1.K.7.
8. Bid Schedule Description: Soft Spot Repair Crushed Aggregate Base Material (11 cu. yds and above)…cubic yards (CY).

9. Bid Schedule Payment Reference: 307.4.1.K.9.
10. Bid Schedule Description: Soft Spot Asphalt Surface Restoration …square yards (SY).

END OF SECTION

SECTION 308

BORING AND JACKING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Horizontal boring and jacking for pipe installation.

1.2 RELATED SECTIONS

A. Section 205 – Dewatering.

B. Section 301 – Trench Excavation.

C. Section 306 – Trench Backfill.

D. Section 1103 – Construction Traffic Control.

1.3 REFERENCES

A. ASTM A 252: Standard Specifications for Welded and Seamless Steel Pipe Piles.

B. Manual on Uniform Traffic Control Devices, Latest Edition.

1.4 SUBMITTALS

A. Submit shop drawings of trench safety system for informational purposes only if jacking pit to be excavated is over 4 feet deep.

B. Submit a traffic control plan if the jacking or boring operation will disrupt the normal flow of traffic in the work area, per Section 1103 – Construction Traffic Control.

C. Submit a dewatering plan if surface or groundwater are encountered, per Section 205 – Dewatering.

D. Submit a jacking/boring plan and grout mix design per Subsection 3.5.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

B. Notify Engineer if installation conditions such as soils or alignment do not match those contemplated by the Contract Documents. Allow 4 hours for Engineer to modify the design, if necessary, unless otherwise specified.

1.6 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of jacking or boring alignment and encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

PART 2 MATERIALS

2.1 GENERAL REQUIREMENTS

A. Construction materials and equipment used for the work to meet all requirements of the Contract Documents.

B. Use, handle and store material in such a manner as to preserve quality and fitness for the work.

C. Immediately remove materials from the site of work that do not conform to the requirements of the Contract Documents as determined by the Engineer.

2.2 STEEL CASING PIPE

A. Conform to ASTM A252 with 3/8-inch minimum wall thickness.

B. Diameter a minimum of 2 inches larger than the outside bell diameter of the carrier pipe.

C. Casing to meet all superimposed loads, soil type conditions and other conditions presented in the project.

D. Furnish pipe of sufficient thickness to withstand the forces exerted by the insertion operations.

2.3 CASING PIPE VOID BACKFILL

A. Backfill voids created during the jacking operation between the outside of the casing pipe and the penetrated native materials with low strength pressure grout as approved by the Engineer.

B. Grout mix to be a combination of cement and water with appropriate additives or a combination of sand and cement and water with appropriate additives.

C. Submit mix design to Engineer for approval.

2.4 CARRIER PIPE SKIDS

A. Redwood, cedar, or other commercially fabricated material resistant to rot, decomposition or decay, unless otherwise indicated in the Contract Documents.

B. Use stainless steel strapping per Standard Drawing SD-307 – Boring and Jacking Details.

C. Calpico spacers or approved equivalent may be used if pre-approved by the Engineer. If Calpico spacers are used, the acceptable tolerance is 3/8" maximum from the end of the spacer to the inside of the steel casing pipe.

2.5 CARRIER PIPE

A. Comply with applicable installation requirements for type of pipe installed, unless otherwise indicated in the Contract Documents.

2.6 ANNULAR SPACE BACKFILL

A. Backfill for the void between the carrier pipe and the casing with clean sand free of deleterious material, gunite concrete, low strength grout, closed cell polyurethane, 3/8-inch maximum size gravel or other material as approved by the Engineer. Annular space backfill may be deleted if spacer is 100% non-metallic or if any metallic parts are stainless steel, with provisions to prevent buoyancy and pipe sag, as approved by the Engineer. Seal each pipe end annular space with 18" of concrete or non-shrink grout.

PART 3 WORKMANSHIP

3.1 GENERAL REQUIREMENTS

A. Bore or jack, as necessary, at the locations indicated in the Contract Documents and staked in the field for the installation of pipelines, services, utilities and ancillary items.

3.2 CONSTRUCTION SAFETY

A. Meet or exceed OSHA requirements at all times for all excavation and jacking or boring operation.

3.3 UTILITY NOTIFICATION

A. Refer to Section 301 – Trench Excavation.

3.4 PROTECTION OF PROPERTY AND UTILITIES

A. Refer to Section 301 – Trench Excavation.

3.5 BORING AND JACKING

A. Install steel casing in a manner which minimizes interference with adjacent utilities, vehicular, pedestrian and railway traffic and minimizes damage and interference with other adjacent property improvements. Do not vary grade on steel casing from those of connecting pipelines.

B. Prior to bore pit excavation and casing pipe installation, submit a jacking/boring plan outlining the proposed construction procedures to the Engineer for approval. Jacking/boring plan to include:

1. Plan view and elevation view:

    a. Dimension of the operating pit.

    b. Shoring, bracing, trusts, whalers or sheet piles used to support the excavation.

    c. Size and type of casing pipe to be installed.

2. For jacking, the proposed method of jacking the steel casing:

    a. The jacking or driving system.

    b. A detail of the separator-cushion at the end of the steel casing against which the jacking or driving force will be applied.

    c. The support for the jacking or driving system.

    d. Dewatering operations in areas where groundwater table is anticipated, if applicable.

3. For boring, the proposed method of boring the steel casing:

    a. The boring system.

    b. Dewatering operations in areas where groundwater table is anticipated, if applicable.

C. Obtain all appropriate permits and approvals from agencies responsible for the rights-of-way in which the boring operation is occurring.

D. During steel casing installation, prevent caving ahead of the casing which could cause voids outside of the casing. Washing, sluicing, or jetting will not be permitted.

E. If drilling methods are used, do not advance the auger or rotary drill head more than 4 inches ahead of the bit end of the casing.

F. When drillings being excavated exceed normal soil unit volumes, withdraw the drill head inside of the casing bit end and use jacking or driving methods preceding the drilling operations.

G. Weld sections of casings to be jacked with a continuous circumferential weld. Provide for stress transfer across the joints capable of resisting the jacking forces involved. Welding to be performed by a certified welder.

H. Fill voids between outside of the installed casing and the penetrated native materials.

1. Method: Employ vertical, horizontal or a combination of both pressure grout methods to achieve a homogeneous replacement of materials in the void areas surrounding the installed casing.

2. Grout Tubes: Use of grout tubes connected to the casing may be required for horizontal grouting, if necessary.

3. Mix Design: Approved by the Engineer prior to grouting.

I. Place skids on the carrier pipe for its entire length exclusive of the pipe bells of sufficient height to permit clearance between the pipe bell and the casing wall. Secure the skids to the carrier pipe using stainless steel strapping, cables or clamps. Refer to Standard Plan SD-307 – Boring and Jacking Details.

J. Place the carrier pipe utilizing winch or jacking procedures. Do not damage pipe or bell joints. Use of lubricant between the skids and the casing to facilitate installation is acceptable.

K. Fill the annular space between the casing and the carrier pipe with approved annular space backfill material. Prevent floating or displacement of the carrier pipe and do not induce pressures that will collapse or distort the carrier pipe. Install end seal at each end of the carrier pipe to ensure a tight seal between the carrier pipe and outer casing pipe.

L. Backfill the boring pits in accordance with the requirements for Type A Backfill per Section 306 – Trench Backfill, unless otherwise specified in the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 Boring and jacking to be measured accordance with the following methods outlined below and identified in the Bid Schedule. Payment includes full compensation for providing all materials, labor, tools and equipment necessary to complete the work including steel casing pipe, pipe skids, carrier pipe, bore pit excavation and backfill, labor, dewatering, miscellaneous material, surface restoration and all incidental work required. If not separately indicated in the Bid Schedule, boring and jacking will be paid for as a part of other Bid Items.

A. Boring and Jacking: By the linear foot measured on a horizontal basis through the centerline of the casing pipe for the size of casing pipe indicated.

1. Bid Schedule Payment Reference: 308.4.1.A.1.
2. Bid Schedule Description: Steel Casing Pipe Boring and Jacking, _____ (diameter)...linear foot (LF).

B. Boring and Jacking: On a lump sum basis for the location indicated.

1. Bid Schedule Payment Reference: 308.4.1.B.1.
2. Bid Schedule Description: Pipe Boring and Jacking, _____ (diameter), STA _____ to STA _____ lump sum (LS).

END OF SECTION

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SECTION 309

HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Horizontal directional drilling for pipe installation.

1.2 RELATED SECTIONS

A. Section 205 – Dewatering

B. Section 301 – Trench Excavation

C. Section 401 – Water Pipe and Fittings

D. Section 501 – Sewer Pipe and Fittings

E. Section 505 – Pressure Sewers

F. Section 601 – Culvert, Storm Drain, and Gravity Irrigation Pipe

G. Section 901 – Irrigation Pipe and Fittings

H. Section 1103 – Construction Traffic Control

1.3 REFERENCES

A. ASTM D 2241: PVC Pressure Rated Pipe

B. AWWA C 900: Polyvinyl Chloride (PVC) Pressure Pipe 4-inch through 12-inch for Water Distribution

1.4 SUBMITTALS

A. Submit shop drawings of safety systems for information purposes for any construction pits deeper than 4 feet.

B. Submit a traffic control plan if the horizontal directional drilling operation will disrupt the normal flow of traffic in the work area, per Section 1103 – Construction Traffic Control.

C. Submit a dewatering plan if surface or groundwater are encountered, per Section 205 – Dewatering.

D. Submit a work plan detailing the procedure and schedule used to execute the project. The work plan should include a description of all equipment to be used, down-hole tools, a list of personnel, and a list of subcontractors.

E. Submit a bore plan detailing the pilot bore plan, showing finished grade, deflection and radii of the pilot bore, and all existing utilities with clearances.

1.5 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated in the Contract Documents.

B. Notify Engineer if installation conditions such as soils or alignment do not match those contemplated by the Contract Documents. Allow 4 hours for Engineer to modify the design, if necessary, unless otherwise specified.

1.6 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of boring alignment and encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

PART 2 MATERIALS

2.1 GENERAL REQUIREMENTS

A. Construction materials and equipment used for the work to meet all requirements of the Contract Documents.

B. Use, handle and store material in such a manner as to preserve quality and fitness for the work.

C. Immediately remove materials from the site of work that do not conform to the requirements of the Contract Documents as determined by the Engineer.

2.2 POTABLE WATER PIPE AND COUPLINGS (AS CARRIER PIPE)

A. PVC Carrier Pipe

1. Conform to AWWA C 900 with a minimum Pressure Class of 150 psi, cast iron OD size.

2. Pipe to be restrained joint Certa-Lok C900/RJ or as approved by the Engineer.

3. Exposed splines to be cut ¾” from coupling and couplings to be tapered on leading edges to reduce soil drag.

2.3 GRAVITY SEWER AND DRAINAGE, PRESSURE SEWER AND PRESSURE IRRIGATION PIPE AND COUPLINGS (AS CARRIER PIPE)

A. PVC Carrier Pipe

1. AWWA C900 with a minimum Pressure Class of 150 psi, cast iron pipe size (CIPS) or ASTM D 2241 with a minimum pressure rating of 160 psi, iron pipe size (IPS).

2. Pipe to be restrained joint Certa-Lok C900/RJ or as approved by the Engineer.

3. Exposed splines to be cut ¾" from coupling and couplings to be tapered on leading edges to reduce soil drag.

2.4 DRILLING EQUIPMENT AND MATERIALS

A. General: The directional drilling equipment to consist of:

1. A directional drilling rig of sufficient capacity to perform the bore and pull back the pipe.

2. A drilling fluid mixing, delivery and recovery system of sufficient capacity to successfully complete the installation.

3. A drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused.

4. A guidance system to accurately guide boring operations, and trained and competent personnel to operate the system.

B. Drilling Rig: The directional drilling machine to consist of:

1. A hydraulically powered system to rotate and push hollow drilling pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head

2. Rig to have a system to monitor and record the force generated during pullback operations.

C. Drill Head:

1. The drill head to be steerable by changing its rotation and shall provide necessary cutting surfaces and drilling fluid jets.

D. Drill Pipe:

1. The drill pipe to be constructed of high quality seamless steel tubing with threaded box and pins.

E. Guidance System:

1. The guidance system to be an electronic “walkover” tracking system, a Magnetic Guidance System, or a proven gyroscopic probe and interface.

2. The guidance system to be capable of tracking at all depths up to 50 feet and in any soil condition.

F. Drilling Fluid:

1. The drilling fluid to be composed of water and bentonite clay.

2. The viscosity of the fluid to be suitable for use with the soil conditions encountered.

G. Mixing System:

1. Self-contained, closed, drilling fluid mixing system to be of sufficient size to mix and deliver adequate drilling fluid for the drilling operation.

2. The drilling fluid reservoir to be a minimum of 1,000 gallons.

3. The mixing system to continually agitate the fluid during the drilling operation.

H. Delivery System:

1. The drilling fluid delivery system to have a minimum capacity of 35 to 500 gpm and be capable of delivering the drilling fluid at a constant minimum pressure of 1200 psi.

2. The delivery system to have in-line filters to prevent solids from being pumped into the drill pipe.

3. Used drilling fluid and spilled drilling fluid to be contained and conveyed to the drilling fluid recycling system or to be removed from the site by suitable methods.

2.5 SPACERS BETWEEN CARRIER PIPE AND SLEEVE

A. Refer to Section 308.2.4.

PART 3 WORKMANSHIP

3.1 GENERAL REQUIREMENTS

A. Install pipe through horizontal directional drilling, as necessary, at the locations indicated in the Contract Documents and staked in the field.

3.2 CONSTRUCTION SAFETY

A. Meet or exceed OSHA requirements at all times for all excavation and horizontal directional drilling operations.

3.3 UTILITY NOTIFICATION

A. Refer to Section 301 – Trench Excavation.

3.4 PROTECTION OF PROPERTY RIGHTS AND UTILITIES

A. Refer to Section 301 – Trench Excavation

3.5 HORIZONTAL DIRECTIONAL DRILLING OPERATION

A. Provide all material, equipment, and facilities required for directional drilling. Consistently maintain proper alignment and elevation of the borehole throughout the directional drilling operation. The method used to complete the directional drill to conform to the requirements of all applicable permits.

B. Accurately survey the entire drill path with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. Using a magnetic guidance system survey, drill path for any surface geo-magnetic variations or anomalies.

C. Place silt fence between all drilling operations and any drainage, well-fields, wetland, waterway or other area designated for such protection if required by documents, or state, federal and local regulations. Put in place additional environmental protection necessary to contain any hydraulic or drilling fluid spills including berms, liners, turbidity curtains and other measures. Adhere to all applicable environmental regulations. Fuel may not be stored in bulk containers within 200 feet of any water body or wetland.

D. Record readings after advancement of each successive drill pipe (no more than 10') and plot readings on a scaled drawing of 1:20 (1"=2') vertical and 1:200 (1"=20') horizontal. Access to all recorded readings and plan and profile information to be made available to the Engineer at all times. At no time shall the deflection radius of the drill pipe exceed the deflection limits of the carrier pipe as specified by the carrier pipe manufacturer.

E. Submit a complete list of all drilling fluid additives and mixtures to be used in the directional operation to the Engineer, along with their respective Material Safety Data Sheets. Contain all drilling fluids and loose cuttings in pits or holding tanks for recycling or disposal - no fluids are allowed to enter any unapproved areas or natural waterways. Upon completion of the directional drill project, dispose of the drilling mud and cuttings at an approved dumpsite.

F. Drill the pilot hole on bore path with no deviations greater than 5% of depth over the length of the bore unless previously agreed to by the Engineer. In the event that pilot does deviate from the bore path more than 5% of depth over the length of the bore, notify Engineer, who may require pull-back and re-drill from the location along bore path before the deviation. In the event of a drilling fluid fracture, inadvertent returns, or returns loss during pilot hole drilling operations, cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and wait another 30 minutes. If mud fracture or returns loss continues, discuss additional options with the Engineer and then proceed as agreed.

G. Upon completion of pilot hole phase of the operation, submit a complete set of record drawings in duplicate to the Engineer. These records to include copies of the pilot bore path plan and profile record drawing, as well as directional survey reports as recorded during the drilling operation.

H. Upon approval of the pilot hole location by the Engineer, the hole opening or enlarging phase of the installation can begin. Increase the borehole diameter to accommodate the pullback operation of the required size of carrier pipe. Determine the type of hole opener or back reamer to be utilized in this phase by the types of subsurface soil conditions that have been encountered during the pilot hole drilling operation. Select the proper reamer type with the final hole opening being a maximum of 1.5 times the largest outside diameter pipe system component to be installed in the borehole.

I. Stabilize the open borehole by means of bentonite drilling slurry pumped through the inside diameter of the drill rod and through openings in the reamer. The drilling slurry must be in a homogenous/flowable state serving as an agent to carry the loose cuttings to the surface through the annulus of the borehole. Calculate the volume of bentonite mud required for each pullback based on soil conditions, largest diameter of the pipe system component, capacity of the bentonite mud pump, and the speed of pullback as recommended by the bentonite drilling fluid manufacturer. Contain the bentonite slurry at the exit or entry side of the directional bore in pits or holding tanks. The slurry may be recycled at this time for reuse in the hole opening operation, or shall be hauled to an approved dumpsite for proper disposal.

J. Join together the carrier pipe section according to manufacturer's specifications. Inspect the gaskets and the ends of pipe with a wet cloth prior to each joint assembly so they are free of any dirt or sand. The pipe must be free of any chips, scratches, or scrapes. Attach a pulling eye to the pulling head on the lead stick of pipe that in turn will be attached to a swivel on the end of the drill pipe. Attach a tracer wire (#8) solid coated copper) to the pulling eye and the crown of carrier pipe with duct tape @ 24" O.C. and a minimum of two full wraps around the pipe. This will allow for a straight, smooth pull of the carrier pipe as it enters and passes through the borehole toward the drill rig and original entrance hole of the directional bore. Elevate the carrier pipe to the approximate angle of

entry and support by means of a sideboom with roller arm, or similar equipment, to allow for the "free stress" situation as the pipe is pulled into the exit hole toward the drill rig. Carry out the pullback phase of the directional operation in a continuous manner until the pipe reaches the original entry side of the bore. At no time shall the pullback force exceed the carrier pipe manufacturer's recommendations.

3.6 TESTING PIPE

A. Clean and flush the pipe in order to obtain a clear and debris free product. Potable water lines are to be disinfected according to Section 401 – Water Pipe and Fittings.

B. Test carrier pipe after pullback. Testing shall meet the requirements described in Section 401 – Water Pipe and Fittings, Section 501 – Gravity Sewers, Section 505 – Pressure Sewers, Section 601 - Culvert, Storm Drain and Gravity Irrigation Pipe, Section 901 – Pressure Irrigation Pipe and Fittings, or at the discretion of the Engineer.

C. Observe the pipe manufacturer's recommendations on pipe stretch allowances, bending radius, tensile strength, allowable test leakage allowance, and magnitude and duration of test pressure.

D. Test pipeline end to end.

E. Test all new service lines connected to the new main and installed with new pipe along with the newly installed main.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit prices as designated on the Bid Schedule for the size and type of carrier to be used. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Horizontal Directional Drilling – Size _____ - Type _____ _____: By the linear foot for the type and size of carrier pipe measured along the horizontal centerline of the pipe through all fittings and valves. Includes pipe, (if not included as a separate Bid Item), fittings, connections, drilling equipment and materials, drill pits, traffic control, restraint, cleaning, disinfection and testing, excavation, bedding, backfill and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 309.4.1.A.1.
2. Bid Schedule Description. Horizontal Directional Drilling – Size ___ _____ - Type _____…linear foot (LF).

END OF SECTION

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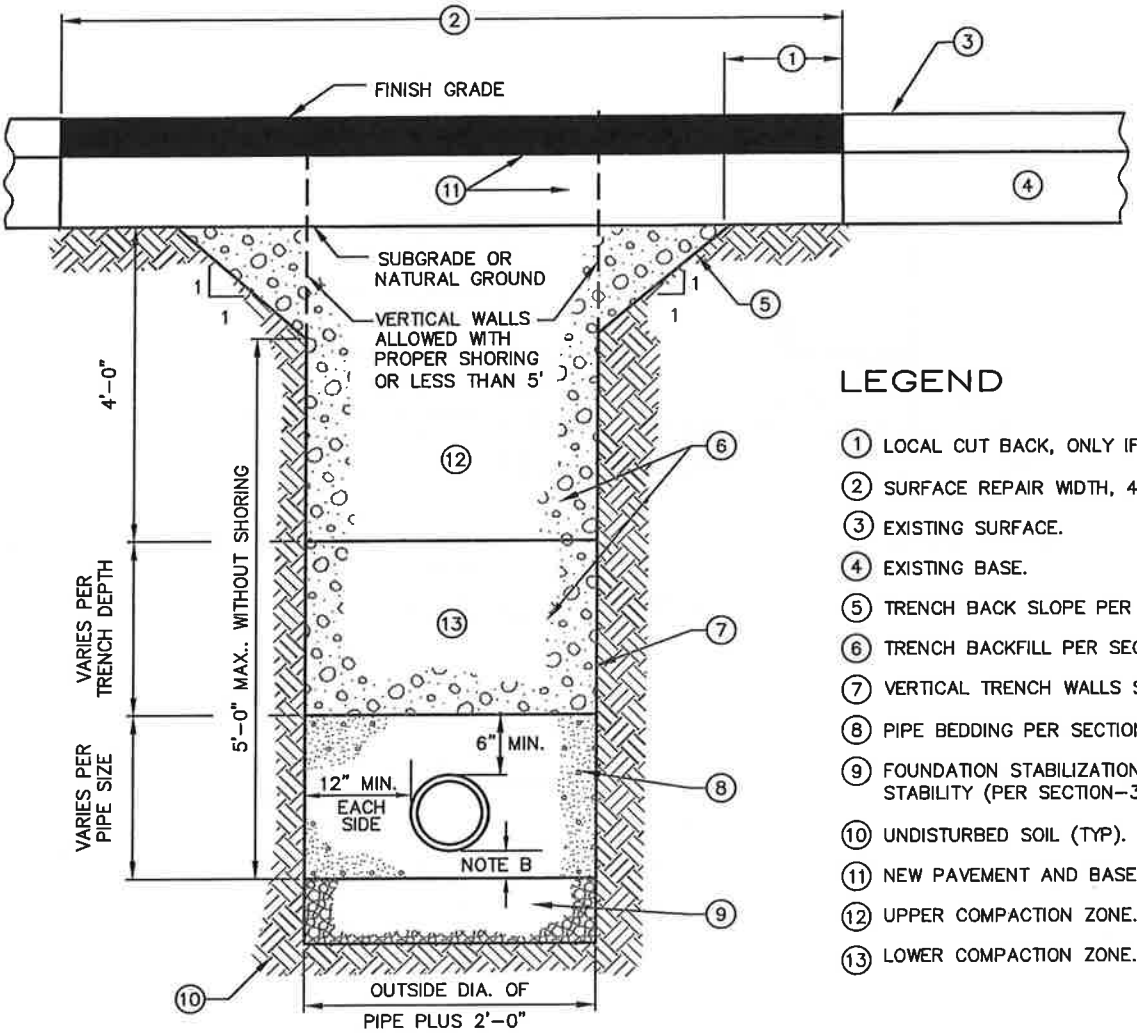
ISPWC - DIVISION 300

Trenching

Standard Drawings

SD-301 – Typical Trench
SD-302 – Typical Pipe Bedding Section
SD-303 – Street Cuts and Surface Repair Details
SD-303A – Type “P” Alternate for Modified Full Width Surface Restoration
SD-303B – Type “P” Alternate for Modified Full Width Surface Restoration
SD-304 – Gravel Access Road
SD-305 – Gravel Access Road Turnaround Detail
SD-306 – Utility Trench
SD-307 – Boring and Jacking Details
SD-308 – Flowable Fill at Culvert Crossings



LEGEND

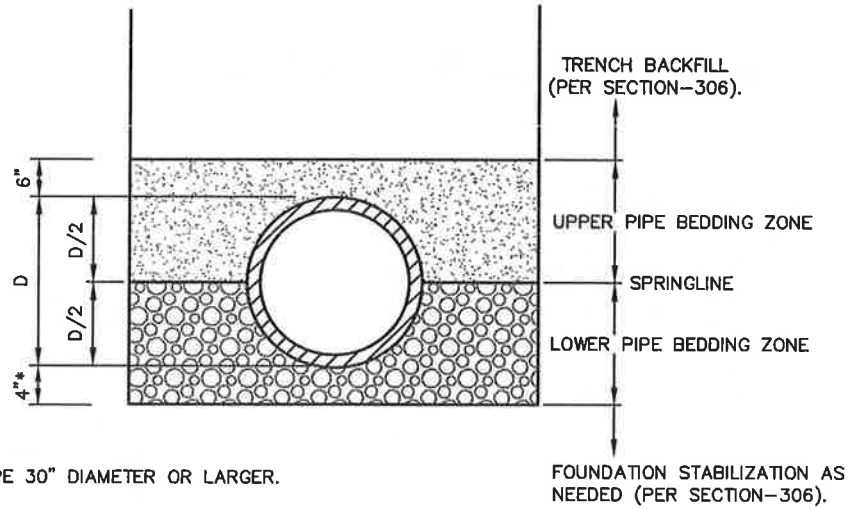
1. LOCAL CUT BACK, ONLY IF REQUIRED.
2. SURFACE REPAIR WIDTH, 4' MINIMUM.
3. EXISTING SURFACE.
4. EXISTING BASE.
5. TRENCH BACK SLOPE PER O.S.H.A. OR SUITABLE SHORING.
6. TRENCH BACKFILL PER SECTION–306.
7. VERTICAL TRENCH WALLS SHORING PER O.S.H.A..
8. PIPE BEDDING PER SECTION–305 (SEE SD–302).
9. FOUNDATION STABILIZATION MAY VARY PER SOIL TYPE AND STABILITY (PER SECTION–304).
10. UNDISTURBED SOIL (TYP).
11. NEW PAVEMENT AND BASE.
12. UPPER COMPACTION ZONE.
13. LOWER COMPACTION ZONE.

NOTES

- (A) TRENCH EXCAVATION PER SECTION–301.
- (B) PIPE BEDDING PER SECTION–305.
- (C) BACKFILL AND COMPACTION PER SECTION–306.
- (D) SURFACE REPAIR AND BASE PER SECTION–307. SEE SD–303.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL TRENCH	STANDARD DRAWING NO. SD–301



* 6" FOR PIPE 30" DIAMETER OR LARGER.

TYPICAL PIPE BEDDING SECTION

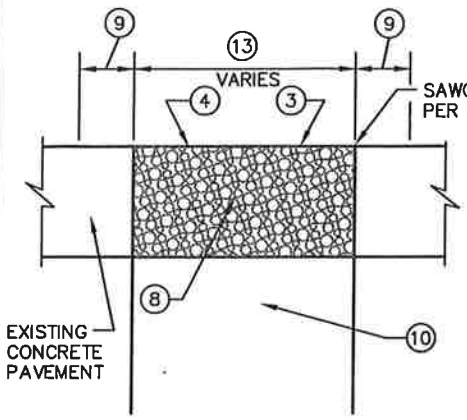
BEDDING SYSTEM	BEDDING MATERIAL	
	LOWER BEDDING ZONE	UPPER BEDDING ZONE
CLASS A-1	TYPE I	TYPE I
CLASS A-2	TYPE I	TYPE II OR TYPE III
CLASS B-1	TYPE II	TYPE II
CLASS B-2	TYPE III	TYPE III
CLASS C-1 (CONCRETE CAP)	TYPE I	TYPE IV
CLASS C-2 (CONCRETE CRADLE)	TYPE IV	TYPE I
CLASS C-3 (CONCRETE ENCASEMENT)	TYPE IV	TYPE IV

NOTE

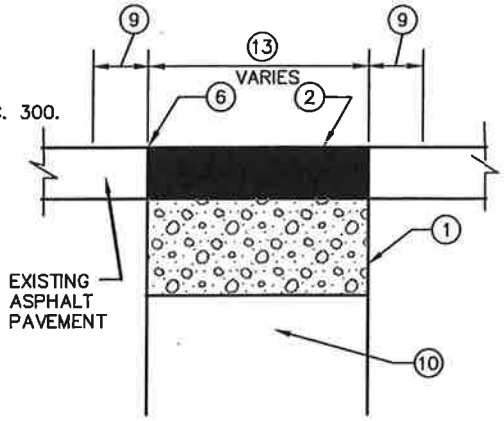
(A) REFER TO SECTION-305 FOR MATERIAL AND COMPACTION REQUIREMENTS.

2015

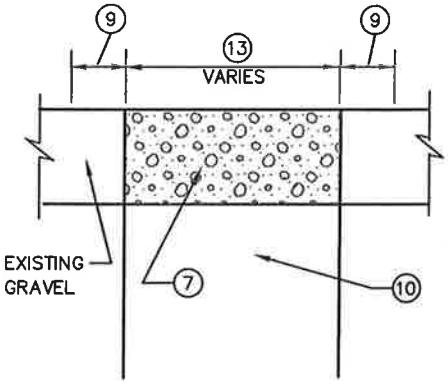
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL PIPE BEDDING SECTION	STANDARD DRAWING NO. SD-302



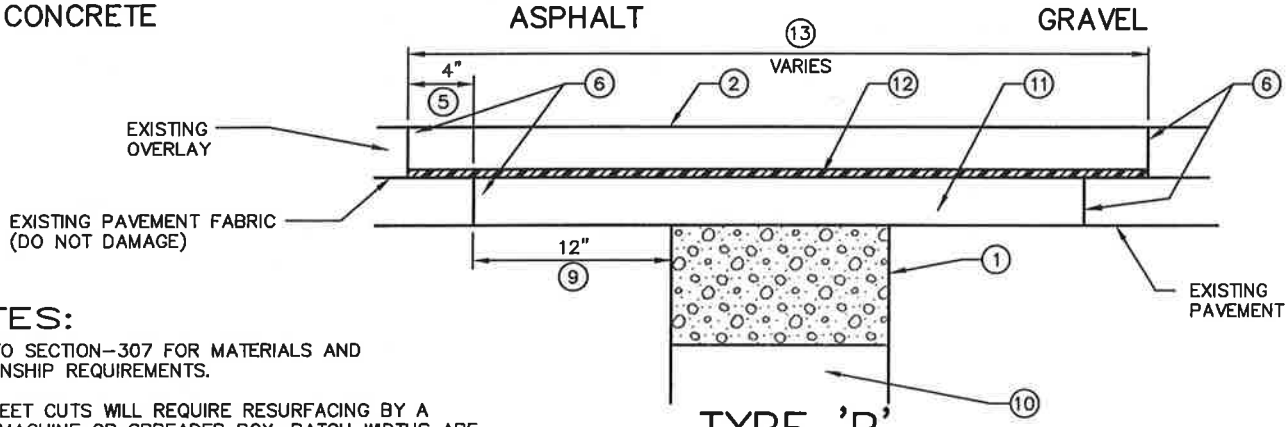
TYPE "B"
CONCRETE



TYPE 'P'
ASPHALT



TYPE "C"
GRAVEL



TYPE 'P'
ASPHALT W/PAVEMENT FABRIC

NOTES:

(A) REFER TO SECTION–307 FOR MATERIALS AND WORKMANSHIP REQUIREMENTS.

(B) ALL STREET CUTS WILL REQUIRE RESURFACING BY A PAVING MACHINE OR SPREADER BOX. PATCH WIDTHS ARE NEVER TO BE LESS THAN 4' IN WIDTH. LOCATE THE MATCH OF THE NEW TO EXISTING PAVEMENT OUT OF THE VEHICLE WHEEL PATH OF THE STREET.

(C) WHERE THE STREET SURFACE INCLUDES AN OVERLAY WITH FABRIC, TAKE THE FOLLOWING ADDITIONAL STEPS:
- A. OVERLAY ABOVE FABRIC AN ADDITIONAL 4" ON EACH SIDE TO EXPOSE EXISTING FABRIC.
- B. INSTALL NEW ASPHALT TO GRADE FABRIC.
- C. INSTALL NEW FABRIC FULL WIDTH OF CUT, IN ACCORDANCE WITH MANUFACTURE'S INSTRUCTIONS.
- D. OVERLAY FABRIC WITH ASPHALT TO FINISH GRADE OF STREET.

(D) TACK ALL COLD JOINT SURFACES WITH EMULSION WHICH HAS BEEN "BROKEN" PRIOR TO PATCHING.

LEGEND

(1) 8" OF 3/4" MINUS CRUSHED AGGREGATE BASE (MIN.) UNLESS A GREATER DEPTH IS OTHERWISE SPECIFIED.

(2) MATCH EXISTING PAVEMENT DEPTH TO 6" UNLESS A GREATER DEPTH IS OTHERWISE SPECIFIED. USE A 2 1/2" (MIN.) MAT ON RESIDENTIAL STREETS AND 3" (MIN.) MAT ON COLLECTORS AND ARTERIALS.

(3) PORTLAND CEMENT CONCRETE SHALL BE CLASS 3000 psi EARLY STRENGTH, AND COMPLY WITH SECTION–706. CUT ASPHALT MAT IN NEAT STRAIGHT LINE.

(4) KEEP TRAFFIC OFF 72 HOURS, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

(5) MINIMUM DISTANCES. 4 OVERLAP APPLIES WHERE FABRIC IS BETWEEN ASPHALT LAYERS.

(6) CUT ASPHALT IN NEAT STRAIGHT LINE.

(7) 3/4" MINUS AGGREGATE SURFACE COURSE (8") OR THICKNESS OF EXISTING GRAVEL, WHICHEVER IS GREATER.

(8) THICKNESS EQUALS EXISTING PAVEMENT DEPTH PLUS 2" OF CONCRETE OR PAVEMENT.

(9) LOCAL CUTBACK, ONLY IF REQUIRED.

(10) COMPACTED TRENCH BACKFILL AS PER SD–301 AND SECTION–306 OF THESE SPECIFICATIONS.

(11) ASPHALT TO EXISTING SHELF (MIN 2" THICK).

(12) PLACE NEW PAVEMENT FABRIC FULL WIDTH OF ASPHALT PATCH.

(13) 4' MINIMUM WIDTH FOR SURFACE RESTORATION.

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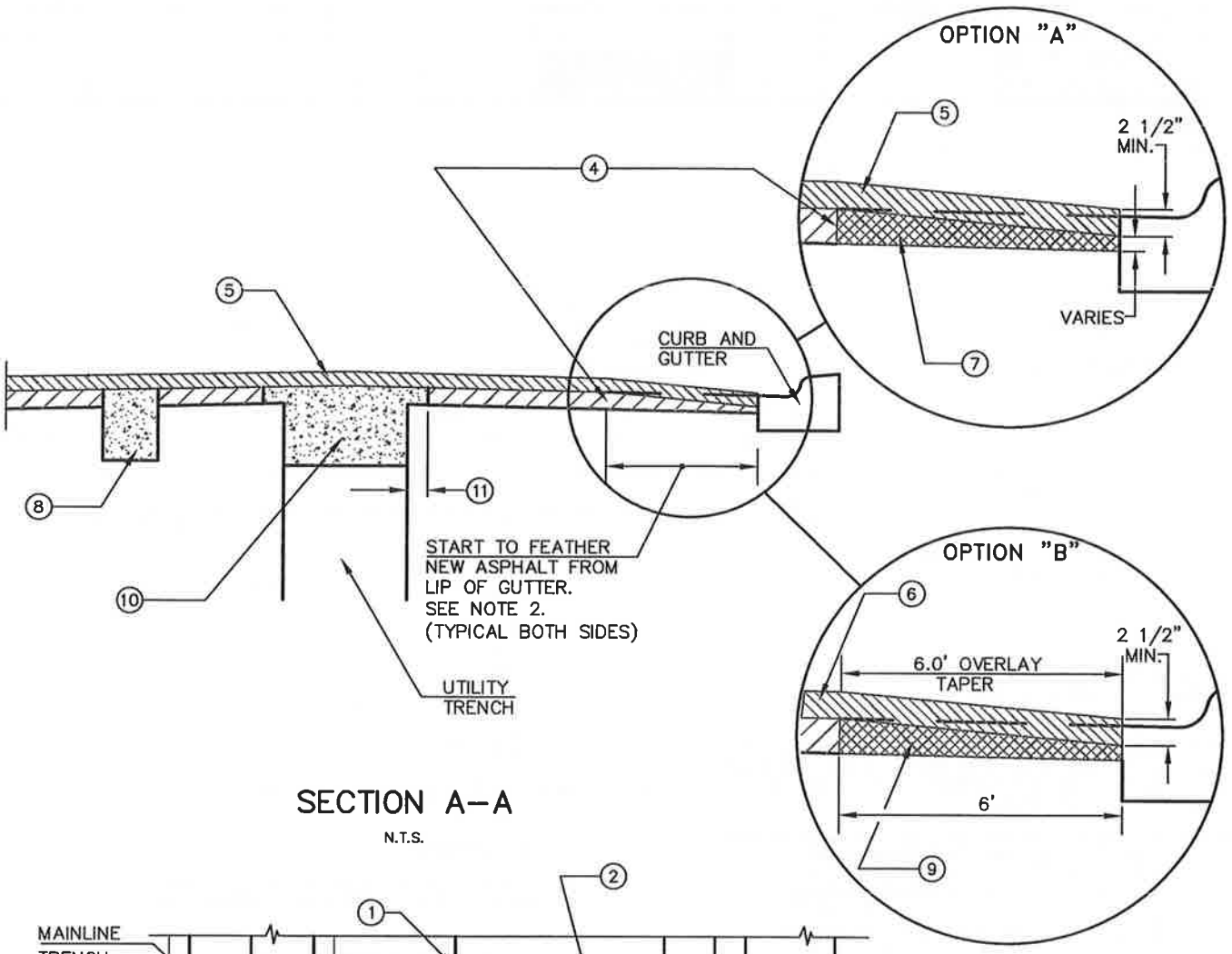
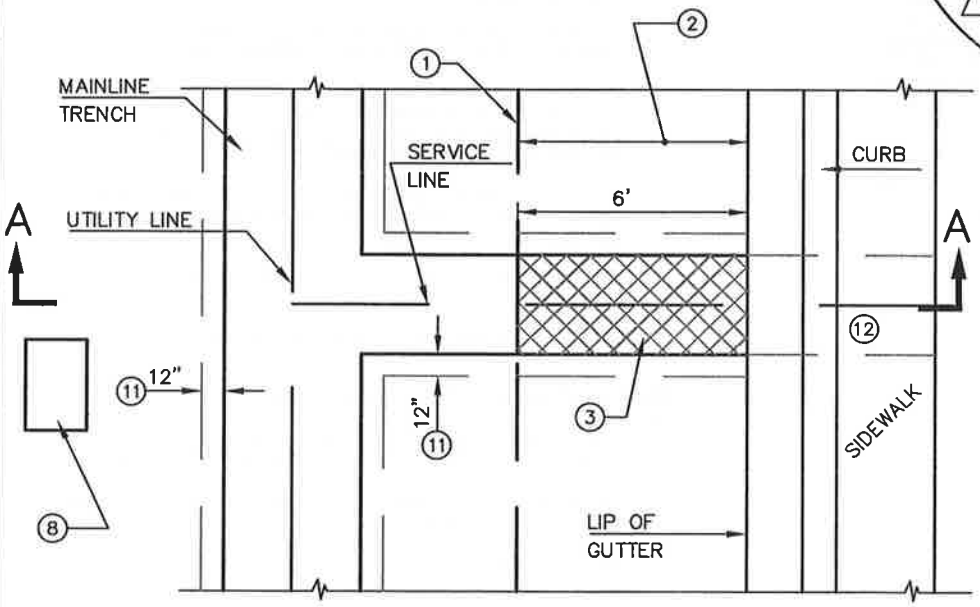
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STREET CUTS AND SURFACE REPAIR DETAILS	STANDARD DRAWING NO. SD–303



SECTION A–A

N.T.S.



PLAN VIEW

N.T.S.

MODIFIED FULL WIDTH SURFACE RESTORATION

NOTE:

(A) REPAIR PAVEMENT SOFT SPOTS PRIOR TO OVERLAY.

(B) SEE SD-303B FOR LEGEND.

2015 * FOR LOCAL OR RESIDENTIAL STREETS ONLY.

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPE "P" ALTERNATE FOR MODIFIED FULL WIDTH SURFACE RESTORATION *	STANDARD DRAWING NO. SD-303A

LEGEND

(1) BEGIN TAPER.

(2) REMOVE OR ROTOMILL 6' OF PAVEMENT UNDER OPTION "A". UNDER OPTION "B", THIS DISTANCE CAN BE 3' WHEN THE SERVICE LINES ARE PATCHED AND THE CROWN OF THE STREET IS NOT EXCESSIVE ENOUGH TO PROMOTE A SLOPE THAT EXCEEDS 8% CROSS SLOPE IN A PARKING LANE OR 4% IN A DRIVENG LANE. IF THE ASPHALT IS CUT OR REMOVED, DO NOT ALLOW THE PATCH SEAM TO FALL WITHIN A WHEEL PATH. OPTION "B" IS MORE TYPICAL OF A STREET THAT DOES NOT HAVE CURB OR GUTTER.

(3) WIDTH OF ROAD EDGE REPAIR: 6' FOR OPTION "A". MINIMUM 3' FOR OPTION "B". SEE NOTE (2).

(4) REMOVE OR ROTOMILL 6' WIDE ASPHALT STRIP FOR OPTION "A" AND PREPARE A MINIMUM 3' WIDE SECTION FOR OPTION "B" (TYPICAL FOR BOTH SIDES). OPTION "B" WILL BE USED WHERE NO CURB IS PRESENT, UNLESS OTHERWISE APPROVED.

(5) 2.5" (MIN.) ASPHALT FULL WIDTH OVERLAY.

(6) ASPHALT WILL TAPER FROM 2.5" TO THE LIP OF CURB.

(7) PLACE 3/4" MINUS CRUSHED GRAVEL TO CREATE TAPER. ALL SERVICE LINES SHALL FOLLOW NOTE (10).

(8) SOFT SPOT REPAIR, SEE SPECIFICATIONS.

(9) ALL SERVICE LINE TRENCH PATCHES SHALL HAVE A MINIMUM OF 2.5" OF ASPHALT OR MEET THE EXISTING ASPHALT THICKNESS, WHICHEVER IS GREATER UP TO A 6" MAXIMUM DEPTH. EXTEND THE SERVICE PATCH 12" BEYOND THE START OF THE TAPER. THE PATCH WILL BE PLACED TO THE ORIGINAL SURFACE GRADE.

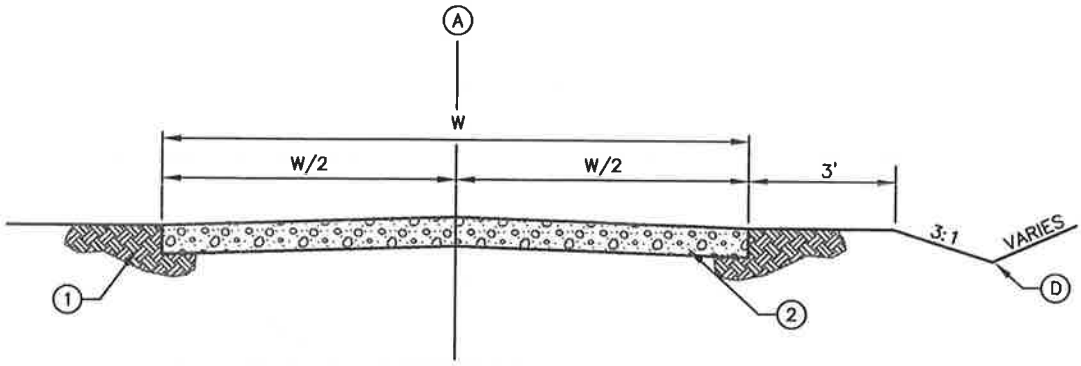
(10) PLACE A MINIMUM OF 8" OF 3/4" MINUS GRAVEL AS BASE IN TRENCH OR MATCH EXISTING BASE THICKNESS, WHICHEVER IS GREATER.

(11) NO LONGITUDINAL ASPHALT PATH SEAMS SHALL FALL IN THE WHEEL PATH FOR VEHICULAR TRAFFIC.

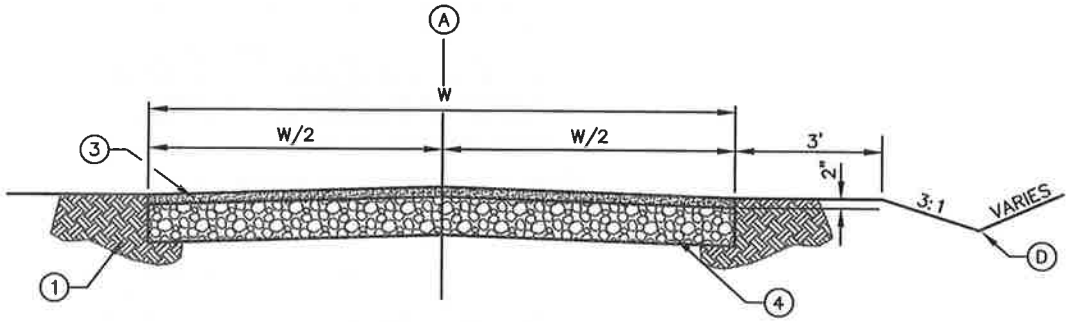
(12) REPLACE ANY DAMAGED CURB, GUTTER, OR SIDEWALK DURING CONSTRUCTION.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPE "P" ALTERNATE FOR MODIFIED FULL WIDTH SURFACE RESTORATION *	STANDARD DRAWING NO. SD-303B



TYPE 1
N.T.S.



TYPE 2
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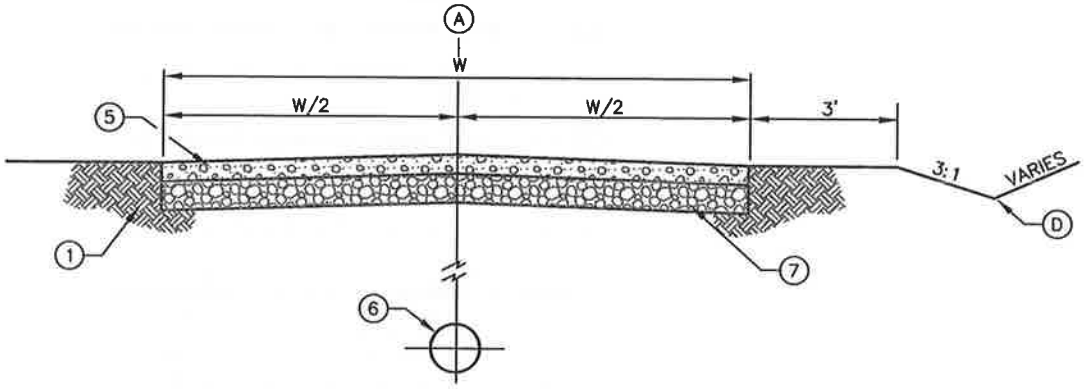


TYPE 3
N.T.S.

NOTES:

(A) C/L OF GRAVEL ACCESS ROAD MAY VARY. SEE PLANS FOR LOCATION.

(B) PROVIDE 2% CROWN ON ALL ROAD TYPES.

(C) IF ROADWAY PROVIDES FIRE ACCESS, WIDTH MUST BE AT LEAST 20' MIN. WIDTH=12' UNLESS OTHERWISE SPECIFIED.

(D) BORROW DITCHES SHALL HAVE A MINIMUM 3:1 FORE SLOPE WITH 4:1 SLOPE RECOMMENDED. THE BACK SLOPE OF BORROW DITCH SHALL BE A MINIMUM 1:1 BACK SLOPE WITH 4:1 BACK SLOPE RECOMMENDED. THE FLOW LINE OF THE DITCH SHALL BE MINIMUM OF 6" BELOW THE LOWEST AGGREGATE BASE COURSE TO ENCOURAGE DRAINAGE. PIPING DITCH UNDER DRIVEWAYS REQUIRED WITH APPROVED LENGTH AND TYPE.

LEGEND

(1) NATURAL GROUND.

(2) PLACE 8" MIN. OF 3/4" MINUS CRUSHED AGGREGATE COMPACTED TO 95% DRY DENSITY.

(3) CLEAN TOPSOIL SEEDED WITH PASTURE GRASS MATCH EXISTING.

(4) PLACE 10" OF 6" MINUS PITRUN GRAVEL COMPACTED TO 95% DRY DENSITY.

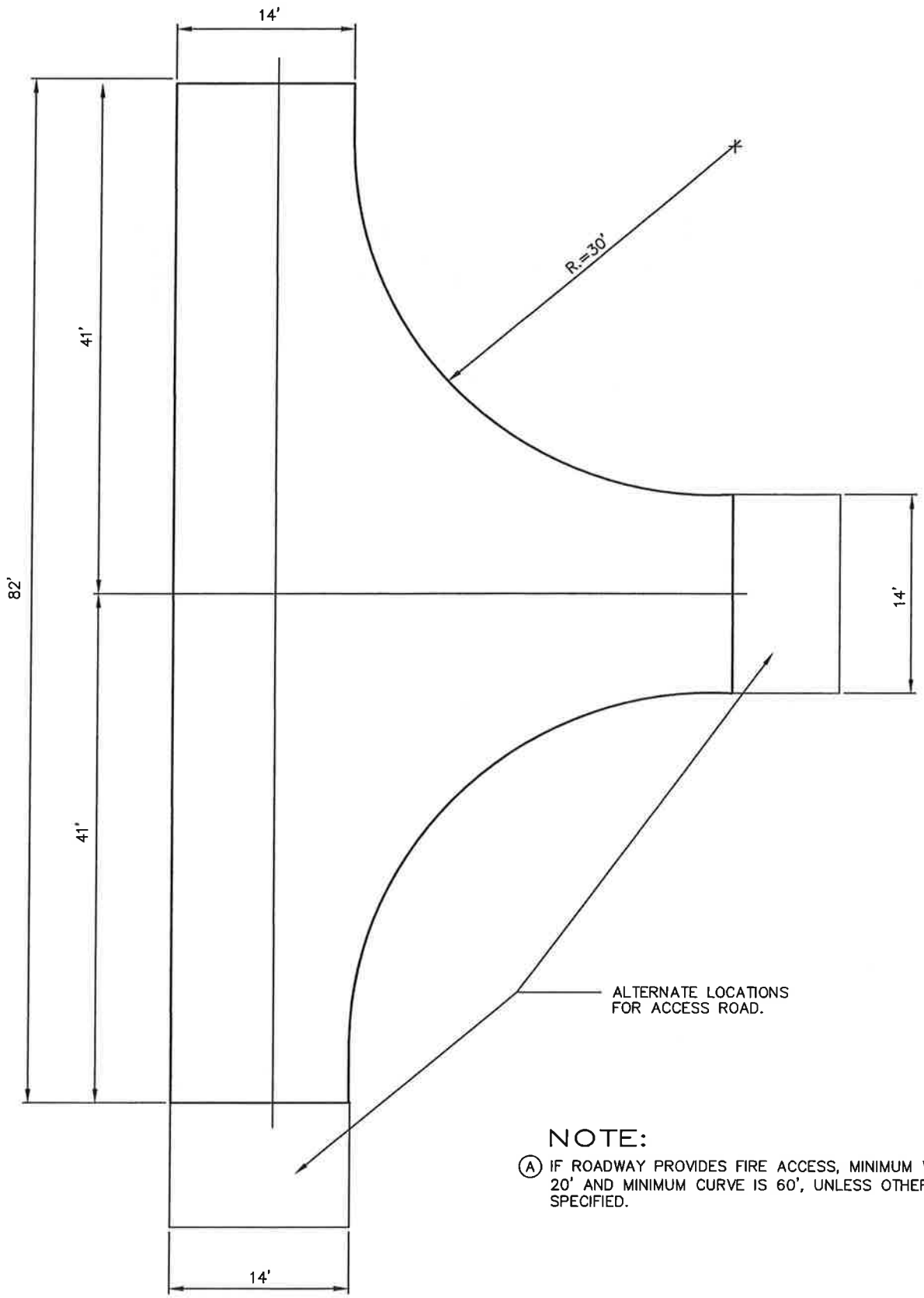
(5) PLACE 3" OF 3/4" ROADMIX GRAVEL.

(6) PROPOSED PIPE LINE.

(7) PLACE 8" OF 6" MINUS PITRUN GRAVEL COMPACTED TO 95% DRY DENSITY.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	GRAVEL ACCESS ROAD	STANDARD DRAWING NO. SD-304

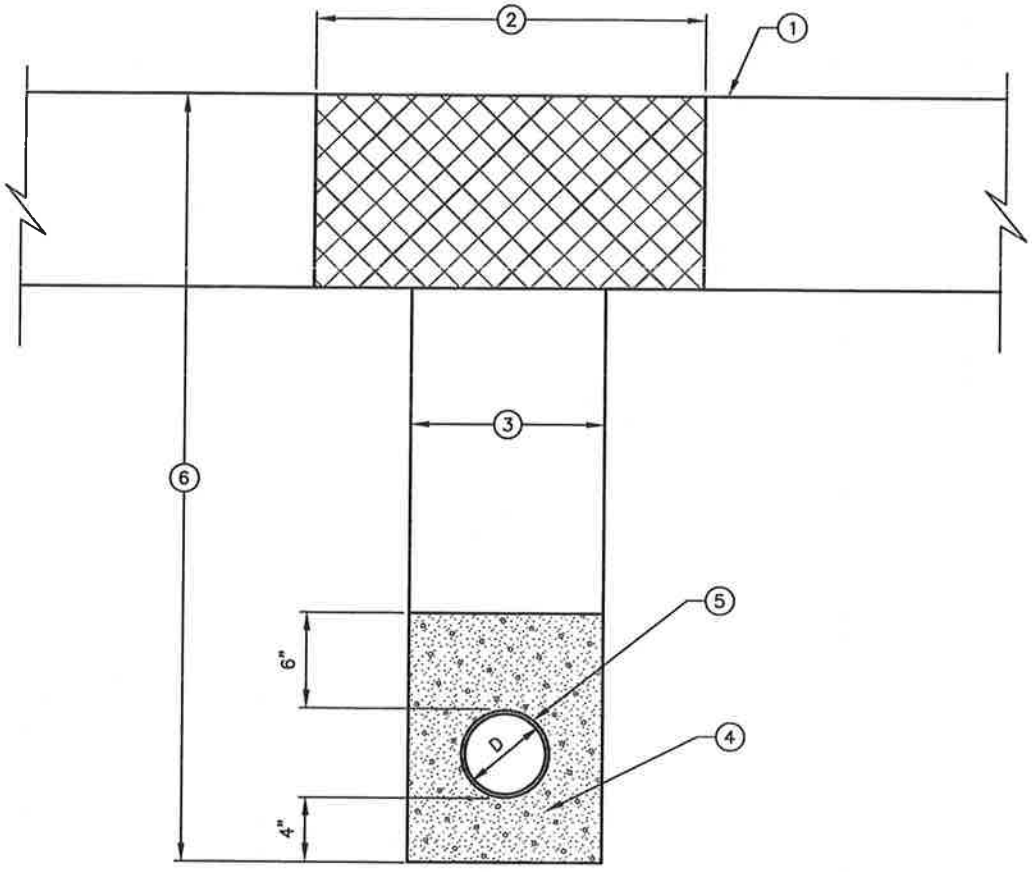


NOTE:

(A) IF ROADWAY PROVIDES FIRE ACCESS, MINIMUM WIDTH IS 20' AND MINIMUM CURVE IS 60', UNLESS OTHERWISE SPECIFIED.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	GRAVEL ACCESS ROAD TURNAROUND DETAIL	STANDARD DRAWING NO. SD-305



NOTES

(A) USE THIS TRENCH TO PLACE CABLE, CONDUIT, OR PIPE 6" OR LESS IN DIAMETER.

(B) COMPACT BACKFILL PER SECTION–306.

(C) CUT ALL ASPHALT IN A STRAIGHT LINE.

(D) FOR ANY TRENCH WIDTH < D+2' IN TRAFFIC AREAS, USE FLOWABLE FILL (CDF) PER SECTION 703.

LEGEND

(1) FINISH GRADE.

(2) SURFACE REPAIRS PER SECTION–307. MINIMUM 2' WIDTH.

(3) 12" MINIMUM INSIDE VEHICLE TRAVEL AREAS, D+3" OUTSIDE VEHICLE TRAVEL AREAS.

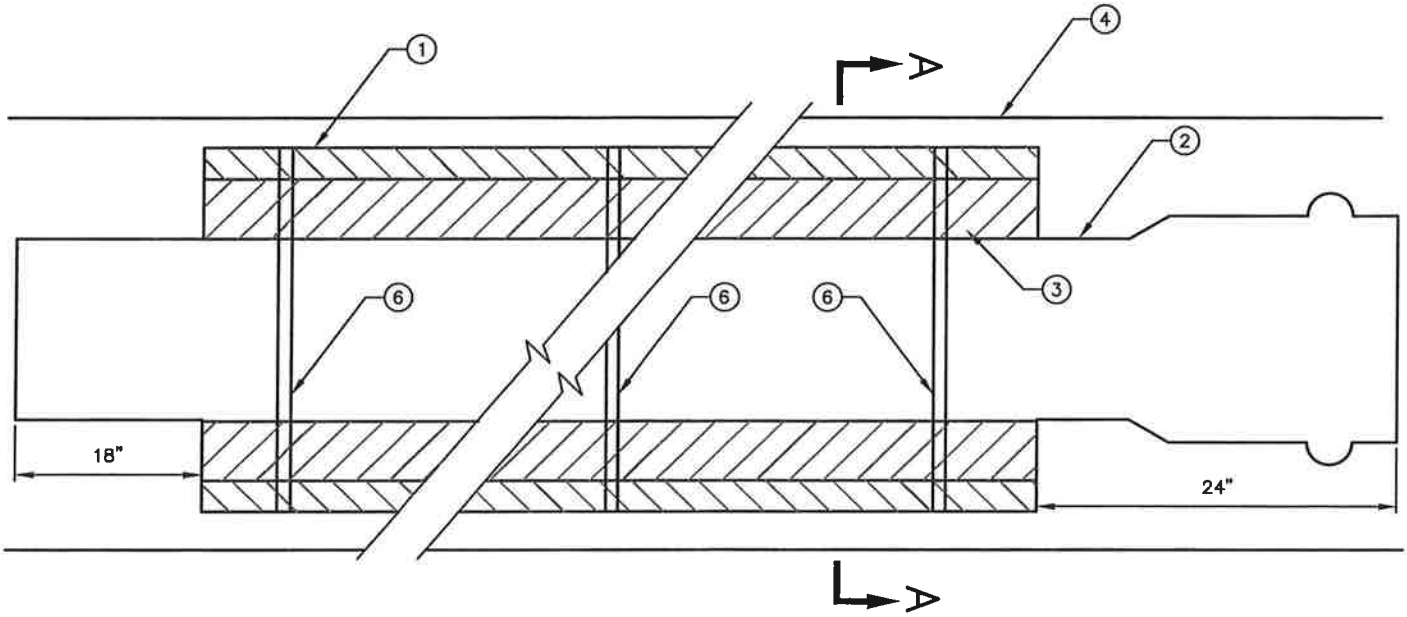
(4) TYPE I OR TYPE III BEDDING FOR AREAS INSIDE THE VEHICLE TRAVEL AREA. TYPE I OR TYPE III BEDDING, OR NATIVE NON–ORGANIC MATERIAL WITH MAXIMUM PARTICLE SIZE OF 3/4" OUTSIDE VEHICLE TRAVEL AREA.

(5) PIPE OR CONDUIT.

(6) 48" MAX. UNLESS OTHERWISE SPECIFIED.
30" MIN. INSIDE VEHICLE TRAVEL AREAS.
18" MIN. OUTSIDE VEHICLE TRAVEL AREAS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	UTILITY TRENCH	STANDARD DRAWING NO. SD–306



SKID DETAIL
N.T.S.

LEGEND

(1) SKID CUT TO FIT.

(2) CARRIER PIPE.

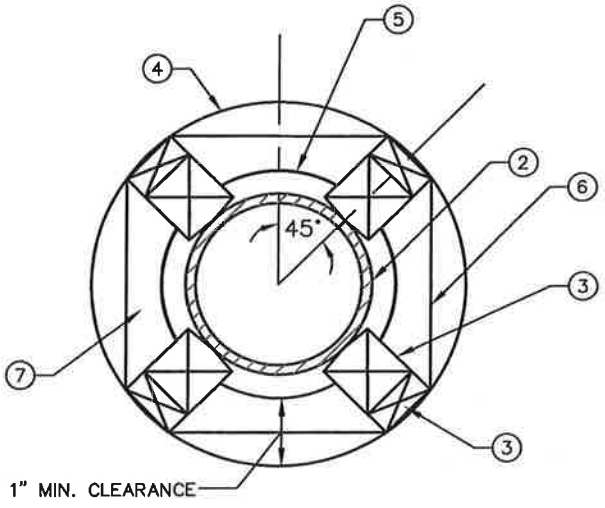
(3) 4"x4" CEDAR OR REDWOOD SKIDS, OR COMMERCIALLY FABRICATED CASING INSULATORS (Calpico Inc. OR APPROVED SUBSTITUTION.
13' CARRIER PIPE, 2 SPACERS PER STICK.
18'–20' CARRIER PIPE, 3 SPACERS PER STICK).

(4) SMOOTH STEEL CASING 3/8" MIN. WALL THICKNESS. MIN. DIAMETER 2" GREATER THAN CARRIER PIPE BELL.

(5) OUTSIDE PIPE BELL.

(6) 2" X 0.050" STAINLESS STEEL STRAPPING. 4" O.C. WITH A MIN. OF TWO STRAPS BETWEEN PIPE JOINTS.

(7) ANNULAR SPACE FILLED WITH SAND, GROUT, 3/8" GRAVEL OR OTHER MATERIAL AS APPROVED BY THE ENGINEER.



SECTION A–A
N.T.S.

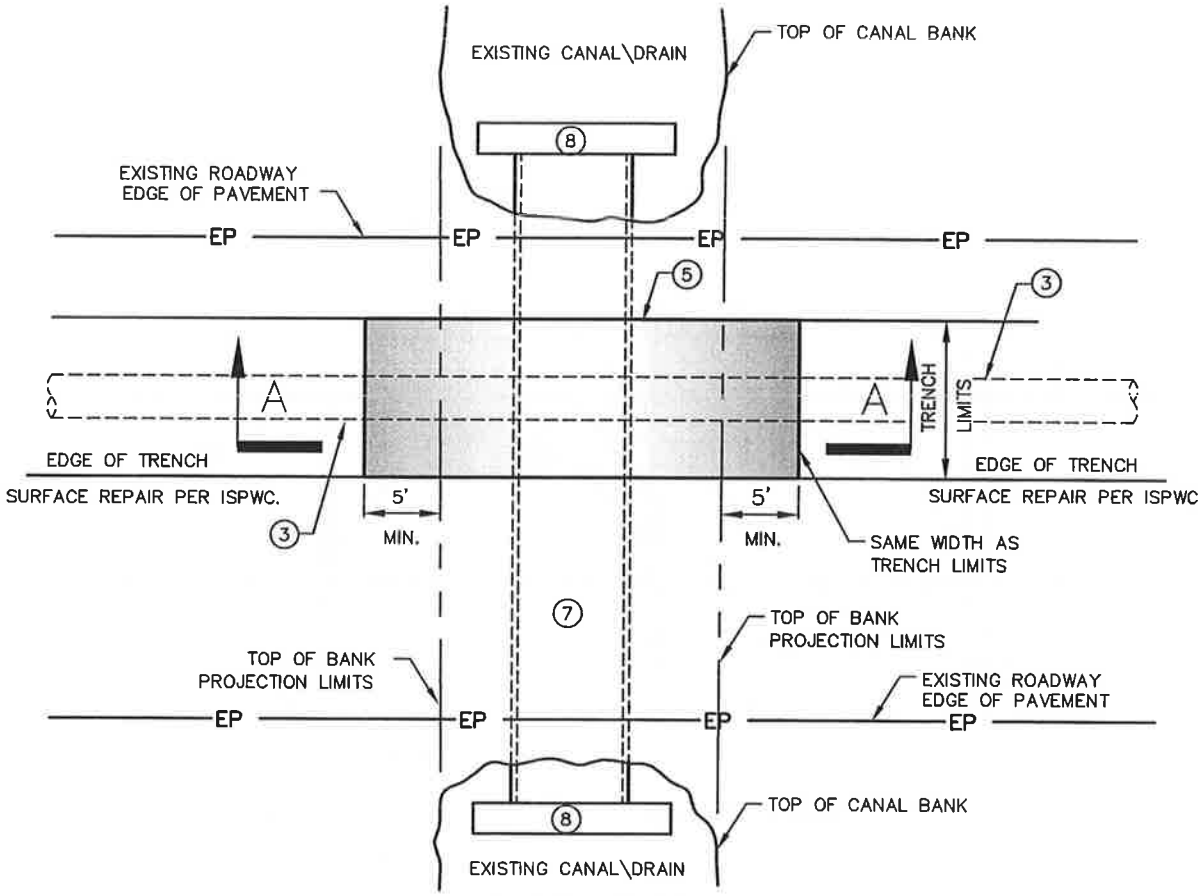
NOTES:

(A) IF A METHOD OTHER THAN THE METHOD SHOWN IN THIS DETAIL IS PROPOSED, SUBMIT SHOP DRAWINGS FOR APPROVAL BY THE ENGINEER PRIOR TO CONSTRUCTION.

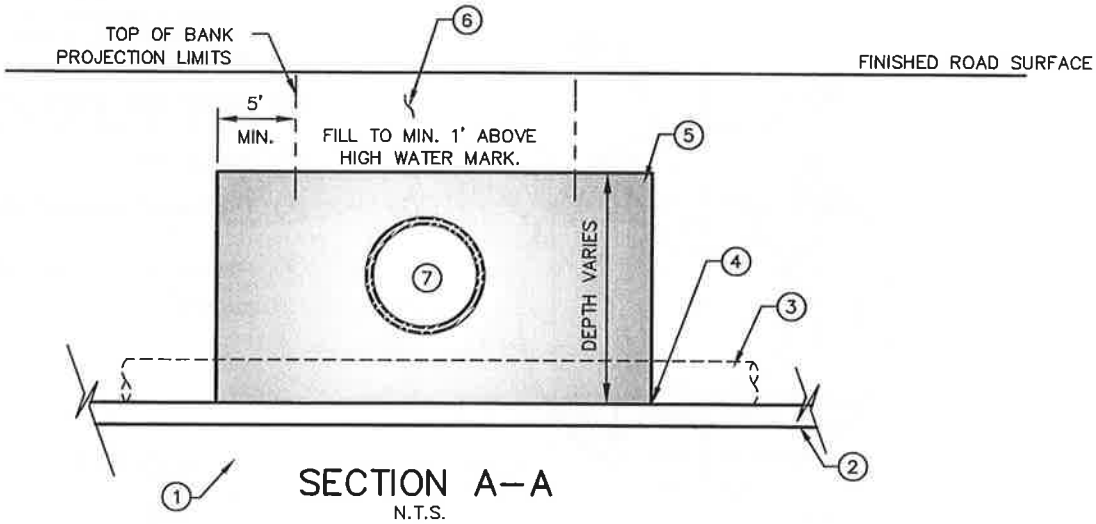
(B) SUBMIT A WRITTEN DISCUSSION OF THE METHOD OF PROVIDING PIPE SUPPORT, ACHIEVEMENT OF THE LINE AND GRADE AVOIDANCE OF CARRIER PIPE FLOATATION, AND FILING OF ANNULAR SPACE BETWEEN CASING PIPE AND CARRIER PIPE, ALL FOR THE APPROVAL BY THE ENGINEER PRIOR TO INSTALLING THE PIPE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	BORING AND JACKING DETAILS	STANDARD DRAWING NO. SD–307



PLAN VIEW
N.T.S.



SECTION A–A
N.T.S.

LEGEND

1. EXISTING GROUND.
2. PIPE BEDDING PER ISPWC.
3. INSTALLED PIPE BENEATH CANAL\DRAIN CROSSING.
4. FLOWABLE FILL FROM TOP OF PIPE BEDDING.
5. FLOWABLE FILL.
6. BACKFILL PER SD–301. SURFACE REPAIR PER SD–303.
7. CULVERT CROSSING.
8. HEADWALL.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	FLOWABLE FILL AT CULVERT CROSSINGS	STANDARD DRAWING NO. SD–308

ISPWC – DIVISION 400

Water

Section 401 – Water Pipe and Fittings
Section 402 – Hydraulic Valves
Section 403 – Hydrants
Section 404 – Water Service Line and Meters
Section 405 – Non-Potable Water Line Separation

SECTION 401

WATER PIPE AND FITTINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Potable water transmission and distribution pipe and fitting materials, installation, testing, and disinfection.

B. Thrust blocks and pipe anchors.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 304 – Trench Foundation Stabilization.

C. Section 305 – Pipe Bedding.

D. Section 306 – Trench Backfill.

E. Section 402 – Hydraulic Valves.

F. Section 403 – Fire Hydrants.

G. Section 404 – Water Service Line and Meters.

H. Section 405 – Non-Potable Water Line Separation.

I. Section 703 - Cast-in-Place Concrete.

1.3 REFERENCES

A. ANSI/AWWA B 300: Hypochlorites

B. ANSI/AWWA B 301: Liquid Chlorine

C. ANSI/AWWA C 104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings, for Water.

D. ANSI/AWWA C 105: Polyethylene Encasement for Ductile Iron Pipe Systems.

E. ANSI/AWWA C 110: Ductile Iron and Gray-Iron Fittings 3 inch through 48 inches for Water and Other Liquids.

F. ANSI/AWWA C 111: Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

G. ANSI/AWWA C 115: Flanged Ductile Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.

H. ANSI/AWWA C 151: Ductile Iron Pipe, Centrifugally Cast for Water.

I. ANSI/AWWA C 153: Ductile Iron Compact Fittings, 3 inch through 24 inch and 54 inch through 64 inch for Water Service.

J. ANSI/AWWA C 213: Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.

K. ANSI/AWWA C 550: Protective Interior Coatings for Valves and Hydrants.

L. ANSI/AWWA C 600: Installation of Ductile-Iron Water Mains and Their Appurtenances.

M. ANSI/AWWA C 605: Installation of Polyvinyl Chloride Pressure Pipe and Fittings.

N. ANSI/AWWA C 651: Disinfecting Water Mains.

O. ANSI/AWWA C 900: Polyvinyl Chloride (PVC) Pressure Pipe 4 inch through 12 inch for Water Distribution.

P. ANSI/AWWA C 905: Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 inch through 36 inch.

Q. ANSI/AWWA C 906: PE Pressure Pipe for Water Distribution.

R. ANSI/AWWA C 907: Polyvinyl Chloride (PVC) Pressure Fittings for Water, 4 inch through 8 inch.

S. ANSI/AWWA C 909: Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe, 4 inch through 12 inch, for Water Distribution.

T. ANSI B 16.3: Malleable Iron Threaded Fittings.

U. ASTM A 53: Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated (Galvanized), Welded and Seamless.

V. ASTM D 1248: Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

W. ASTM F 1674: Standard Test Method for Joint Restraint Products for Use with PVC Pipe.

X. ASTM D 2774: Standard Practice for Underground Installation of Thermoplastic Pressure Piping.

Y. ASTM D 3261: Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

Z. ASTM F 477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

AA. ASTM F 2164: Field Leak Testing of Polyethylene (PE) Pressure Piping Systems using Hydrostatic Pressure.

BB: NSF/ANSI 61: Drinking Water System Components – Health Effects

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed under this section.

B. Submit manufacturer's certification that pipe and fittings meet or exceed specified requirements.

C. Submit manufacturer's installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of constructed pipelines and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store pipe per manufacturer’s recommendations and in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from sunlight and contamination.

PART 2 MATERIALS

2.1 PIPE AND FITTINGS SIZE, TYPE AND STRENGTH

A. Comply with pipe and fitting size, type and strength classification indicated in the Contract Documents.

B. If type and strength classifications are not indicated in the Contract Documents, contact the Engineer.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match those contemplated by the Contract Documents.

2.2 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. PVC Pressure Pipe Sizes 4 inch through 12 inch for Water Distribution: ANSI/AWWA C 900

1. Pressure Class: As indicated in the Contract Documents.

2. Outside Diameter Basis: Cast iron (CI) pipe equivalent.

3. Joints: Bell and spigot end with ASTM F 477 elastomeric gaskets.

B. PVC Pressure Pipe 14 inch through 36 inch for Water Transmission: ANSI/AWWA C 905

1. Pressure Class: As indicated in the Contract Documents.

2. Outside Diameter Basis: Cast iron (CI) pipe equivalent.

3. Joints: Bell and spigot end with ASTM F 477 elastomeric gaskets.

C. PVC Pressure Pipe Sizes 4 inch through 12 inch for Water Distribution: ANSI/AWWA C 909.

1. Pressure Class: As indicated in the Contract Documents.

2. Outside Diameter Basis: Cast iron (CI) pipe equivalent.

3. Joints: Bell and spigot end with ASTM F 477 elastomeric gaskets.

D. Pipe Fittings: (type as specified in Contract Documents):

1. Ductile Iron Compact Fittings 3 inch through 24 inch: ANSI/AWWA C 153

a. Pressure Class: 350 psi.

b. Petroleum Asphaltic Outside Coating: 1.0 mil minimum thickness.

c. Lining: Cement mortar.

2. Ductile or Gray Iron Fittings: ANSI/AWWA C 110

a. Pressure Class: 4 inch to 24 inch = 350 psi, and 30 inch to 36 inch = 250 psi.

b. Petroleum Asphaltic Outside Coating: 1.0 mil minimum thickness.

c. Lining: Cement mortar.

3. PVC Fittings 4 inch through 8 inch: ANSI/AWWA C 907.

a. Pressure Class: 150 psi.

E. Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings: ANSI/AWWA C 111.

2.3 DUCTILE IRON PIPE AND FITTINGS

A. Ductile Iron Pipe, 3 inch through 64 inch, Centrifugally Cast, for Water: ANSI/AWWA C 151

1. Thickness Class: As indicated in the Contract Documents.

2. Lining: Cement mortar.

3. Joints: Push-on unless otherwise noted in the Contract Documents.

B. Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges: ANSI/AWWA C 115

1. Pressure Class: 250 psi.

2. Lining: Cement mortar.

C. Ductile Iron Compact Fittings Using Mechanical or Push-on Joints, 3 inch through 24 inch: ANSI/AWWA C 153

1. Pressure Class: 350 psi.

2. Lining: Cement mortar.

D. Ductile Iron or Gray Iron Fittings Using Mechanical, Flanged, or Push-on Joints, 3 inch through 24 inches: ANSI/AWWA C 110

1. Pressure Class for Mechanical or Push-on Ductile Iron Joints: 350 psi.

2. Pressure Class for Flanged Ductile Iron Joints: 250 psi.

3. Pressure Class for all Gray Iron Joints: 250 psi.

4. Lining: Cement mortar.

E. Ductile Iron or Gray Iron Fittings Using Mechanical, Flanged, or Push-on Joints, 30 inches through 48 inches: ANSI/AWWA C 110

1. Pressure Class for all Material and Joint Types: 250 psi.

2. Lining: Cement mortar.

F. Rubber Gasket Joints Ductile Iron Pressure Pipe and Fittings: ANSI/AWWA C 111

G. Outside Coating for Pipe and Fittings: ANSI/AWWA C 110

1. Petroleum Asphaltic Outside Coating: 1.0 mil minimum thickness.

2.4 CEMENT MORTAR LINING

A. Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water: ANSI/AWWA C 104

1. Thickness: Standard, single thickness.

2. Seal Coat: Yes.

2.5 POLYETHYLENE PIPE AND FITTINGS

A. PE Pressure Pipe and Fittings for Water Distribution: ANSI/AWWA C 906

1. Standard PE Designation: PE 3406.

2. Outside Diameter Base: Steel pipe (IPS).

3. Dimension Ratio: As indicated in the Contract Documents.

4. Fittings: PE 3406, thermal butt-fusion welded per ASTM D 3261.

2.6 COUPLINGS

A. Couplings: Smith-Blair OMNI 441 coupling system, or approved substitution. Couplings shall be lined and coated with a minimum thickness of 0.012” of fusion-bonded epoxy, or approved substitution. Coating must comply with AWWA C 213 and AWWA C 550.

B. Flanged Coupling Adapters: Smith-Blair 912, or approved substitution. Couplings shall be lined and coated with a minimum thickness of 0.012” of fusion-bonded epoxy, or approved substitution. Coating must comply with AWWA C 213 and AWWA C 550.

C. HDPE Couplings: Electrofusion couplings to solid wall HDPE and flange by flange elsewhere or as directed by the Engineer.

2.7 POLYETHYLENE ENCASEMENT

A. Polyethylene Encasement for Ductile Iron Pipe Systems: ANSI/AWWA C 105/A21.5.

1. Material: ASTM D 1248 tubular high density cross laminated film.

2. Class: C, Black.

2.8 THRUST BLOCKS

A. Concrete: Per Section 703 – Cast-in-Place Concrete. Minimum compressive strength of 2500 psi.

B. Placement: Per this section and Standard Drawing SD-403 – Thrust Block and Anchor Details.

2.9 MECHANICAL RESTRAINT

A. Type: Standard mechanical joint restraint gland, restraint devices for MJ fittings and appurtenances to conform to ANSI/AWWA C 111/A21.11 or ANSI/AWWA C 153/A21.53.

B. Product: EBAA iron series 2000 PV (PVC Pipe) or EBAA Iron Series 1100 Megalug (Ductile Iron Pipe) or approved substitution, and to meet requirements of ASTM F 1674. An identification number consisting of year/day/plant/shift to be cast into each gland body from which to trace test results.

C. Application: Approved for above-grade installation. Belowground installation as an alternative to thrust blocks is to be only upon approval of the Engineer and the Idaho Department of Environmental Quality based on service and installation conditions.

2.10 LOCATING WIRE

A. Type: (No. 12 AWG) copper with insulation.

B. Splicing: Epoxy splice kits.

2.11 PIPE ANCHORS

A. Concrete and Rebar: per Section 703 – Cast-in-Place Concrete and Standard Drawing SD-510 – Pipe Anchors.

2.12 HEALTH REQUIREMENTS

A. Applicable NSF Compliance: All products used to construct a public drinking water system and will be in contact with potable water must be certified by an accredited ANSI certification body to meet applicable ANSI/NSF standards. Affidavits of compliance may be required.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify trench excavations are to required alignment and grade and pipe location meets Section 405 – Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA and other State and Federal Requirements.

C. Verify that excavation will allow a minimum pipe cover of 48 inches, unless otherwise indicated in the Contract Documents.

D. Examine pipe and fittings for defects or damage.

E. Verify all pipe, fittings, aggregate, and all materials delivered to the site meet the requirements of these Contract Documents.

F. Verify utility locations, existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

G. Notify all affected businesses and residences of all water system shutdowns or interruptions 48 hours in advance.

3.2 PIPE INSTALLATION

A. Prepare trench bottom as required by Section 301 – Trench Excavation.

B. If excavation enters an area of petroleum or other contamination, stop work and notify the Engineer for verification of piping and gasket material usage. In such areas, use pipe and joint materials not subject to permeation by organic compounds. Use non-permeable materials for all portions of the system affected by organic contamination endangering water mains, services, and hydrant leads.

C. Do not lay pipe unless groundwater is 1 foot below the pipe invert and a foundation has been provided in accordance with Section 304 – Trench Foundation Stabilization.

D. Provide pipe bedding and initial backfill as required by Section 305 – Pipe Bedding.

E. Install pipe in accordance with the manufacturer's recommendations.

F. Use standard lengths of pipe unless otherwise required for installation of tees, fittings, or valves.

G. Utilize proper tools for cutting and beveling pipe ends and joining pipe. Use manufacturer's recommended tools designed for this task.

H. Move pipe carefully and prevent damage to pipe and manufactured ends while lowering pipe into trench.

I. Prevent foreign material including debris, tools, clothing, and dirt from entering the pipe. Remove dirt and other foreign material from pipe.

J. Prepare pipe joint using specified gasket and manufacturer's recommended lubricant.

K. Mark, or verify that pipe ends are marked, to indicate insertion stop position (home). Ensure that pipe is inserted into bell to this mark. Push spigot into bell using methods recommended by the manufacturer. Protect the end of the pipe during "homing" and do not use excessive force that may result in over-assembled joints, dislodged gaskets, or damaged ends. If full entry is not achieved, disassemble and clean the joint and reassemble.

L. Provide sufficient restraint for the pipe to ensure that joints are held in place while bedding and initial backfill are placed.

M. When pipe installation is not in progress, block and plug the open end of the pipe to prevent creep, uplift or floating and entrance of water or other material into the pipe.

N. Ensure pipe is installed to lines and grades indicated in the Contract Documents.

O. Place locating wire directly above pipe. Ensure that locating wire remains directly above pipe during and after backfill has been placed.

P. Install anchors and supports as indicated in the Contract Documents.

Q. Backfill trench as required by Section 306 – Trench Backfill.

3.3 POLYETHYLENE ENCASEMENT

A. Secure polyethylene encasement around pipe per ANSI/AWWA C 105 Method A.

B. Cut tube to a length 24 inches longer than the pipe section and wrap around pipe in accordion fashion.

C. After placement in trench and jointing, secure overlapping tubing. Provide 24 inches of overlap at each joint. Repair any cuts or tears with tape or patch secured in place.

3.4 THRUST BLOCKS

A. Place thrust blocks at each angled fitting, tee, cross, reducer, cap, plug and valve in accordance with Standard Drawing SD-403 – Thrust Block and Anchor Details.

B. Provide bearing area against undisturbed earth.

C. Place thrust blocks such that fitting or valve can be removed at a later date without damage to the pipeline, valve or fitting.

D. Place 6 mil polyethylene between thrust block and fitting.

E. Place concrete so no concrete touches the nuts and bolts of the fitting or valve, and the nuts and bolts can be removed and replaced without removing any concrete.

F. Thrust block bearing areas as listed on Standard Drawing SD-403 – Thrust Block and Anchor Details. For test pressures greater than 150 psi or soil bearing pressures less than 2,000 psi, increase thrust block bearing areas as directed by the Engineer.

3.5 PIPE ANCHORS

A. Place pipe anchors on all pipe installed on slopes of 20% or greater measured along the centerline of pipe. Install per Standard Drawing SD-510 - Pipe Anchors.

B. Provide bearing area against undisturbed earth.

3.6 PRESSURE TESTING

A. Perform testing in the presence of the Engineer.

B. Assure that trench is properly backfilled and thrust blocking has cured to a degree that will allow pressure testing without damage, or pipe/fitting movement.

C. Gradually fill pipe with water. For pipe working pressures less than or equal to 100 psi, sustain a test pressure of 150 psi. For pipe working pressures greater than 100 psi, sustain a test pressure at least 1.5 times the working pressure or as determined by the Engineer.

D. Expel all air.

E. Verify that, in a two-hour test, the pipe does not leak in excess of the allowable leakage as defined by the following formula in which Q is the allowable leakage in gallons/hour.

$$Q = \frac{LD\sqrt{P}}{148{,}000}$$

Where:
- Q = allowable leakage in gallons per hour
- L = length of pipe section being tested, in feet
- D = nominal diameter of the pipe, in inches
- P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)

F. Pressure test HDPE pipe per ASTM F 2164 Field Leak Testing of Polyethylene (PE) Pressure Piping Systems using Hydrostatic Pressure.

3.7 LOCATING WIRE

A. Place locating wire at the crown of the pipe.

B. Test for and ensure continuity.

3.8 PIPE MARKERS

A. Furnish and install pipe markers at stub-outs per Standard Drawing SD-512 - Standard Service Marker.

B. Provide Engineer with 2 working days notice to allow measurement of the vertical and horizontal location of pipe ends before the pipeline is covered.

3.9 FLUSHING AND DISINFECTION

A. Flushing Prior to Disinfection.

1. Before chlorination, flush the mains thoroughly after the pressure and leakage test are completed.

2. Use a minimum flushing velocity in the main of 2.5 feet/second.

3. If no hydrant is installed at the end of the main, provide a tap of the size sufficient to produce a velocity in the main of at least 2.5 feet/second.

4. Table 1 shows the rates of flow required to produce a velocity of 2.5 feet/second in various size pipes.

Table 1
REQUIRED FLOW AND OPENINGS TO FLUSH PIPELINES
40 PSI RESIDUAL PRESSURE IN WATER MAIN (1)

	Flow Required to Produce 2.5 fps (approx)	Size of Tap (Inch) (1) (1-1/2) (2)			Hydrant Outlets	
Pipe Diam. (inch)	Velocity in Main, (Gpm)	Number of taps on pipe (2)			Number	Size in (inch)
4	100	1			1	2-1/2
6	220		1		1	2-1/2
8	400		2	1	1	2-1/2
10	600		3	2	1	2-1/2
12	900			2	2	2-1/2
16	1600			4	2	2-1/2
1)	With a 40 psi pressure in the main with the hydrant flowing to atmosphere, a 2-1/2 inch hydrant outlet will discharge approximately 1,000 gpm and a 4-1/2 inch hydrant nozzle will discharge approximately 2500 gpm.					
2)	Number of taps on pipe based on discharge through 5 feet of galvanized iron (GI) pipe with one 90° elbow.					

5. Exercise extreme care and conduct a thorough inspection during the water main laying to prevent and detect small stones, pieces of concrete, particles of material, or other foreign material that may have entered the mains.

6. Clean large material by flushing and inspecting all hydrants on the lines to ensure that the entire valve operating mechanism of each hydrant is in good condition.

B. Disinfection of Water Pipes.

1. General.

a. Comply with ANSI/AWWA C 651: Disinfecting Water Mains, these specifications, and Engineer's direction.

b. Keep the interior of all pipe, fittings and appurtenances free from dirt, heavy and foreign particles.

c. Disinfect all water pipes and appurtenances prior to placing in service.

2. Form of chlorine used to be pre-approved by the Engineer.

a. Liquid chlorine.

1) Form: Liquid containing 100% available chlorine under pressure in steel containers.

2) Standard: ANSI/AWWA B 301.

3) Execution: Used only by trained personnel with appropriate gas-flow chlorinators and ejectors.

4) Authorization: Only with written authorization of the Engineer.

b. Sodium hypochlorite.

1) Form: Liquid containing approximately 5 to 15% available chlorine.

2) Standard: ANSI/AWWA B 300.

c. Calcium hypochlorite.

1) Form: Granular or in 5g tablets containing approximately 65% available chlorine by weight.

2) Standard: ANSI/AWWA B 300.

3. Methods of chlorination used to be pre-approved by the Engineer.

a. Tablet or Granule Method.

1) Solution Strength: 25 mg/L minimum.

2) Use: Only if the pipes and appurtenances are kept clean and dry during construction. Do not use on solvent welded plastic or screwed joint steel pipe.

3) Placement When Using Granules: During construction, place calcium hypochlorite granules at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-foot intervals.

4) Granular Quantity: Refer to Table 2.

Table 2
OUNCES OF GRANULES

Pipe Diameter (inches)	Amount (ounces)
4	1.7
6	3.8
8	6.7
10	10.5
12	15.1
16	26.8
18	34.0
20	41.9
24	60.4

5) Placement When Using Tablets: During construction, place 5g calcium hypochlorite tablets in each section of pipe and also place one tablet in each hydrant, hydrant branch and other appurtenance. Attach tablets to the inside of the pipe using an adhesive such as Permatex No. 2 or approved substitution. Assure no adhesive is on the tablet except on the broad side attached to the surface of the pipe. Attach all the tablets at the inside tip of the main, with approximately equal numbers of tablets at each end of a given pipe length. If the tablets are attached before the pipe section is placed in the trench, mark their position on the section so it can be readily determined that the pipe is installed with the tablets at the top.

6) Tablet Quantity: Refer to Table 3.

Table 3
NUMBER OF TABLETS (1)

Pipe Diameter (inches)	Number of 5g Tablets (2)
4	1
6	1
8	2
10	3
12	4
16	6
18	7
20	9
24	13

a) Adjust for pipe length other than 18 feet.
b) Based on 3.25g available chlorine per tablet.

7) Filling Procedure: When granule or tablet installation has been completed, fill the main with clean water at a velocity not exceeding 1 fps. Take precautions to assure that air pockets are eliminated. Leave this water in the pipe for at least 24 hours. If the water temperature is less than 41°F, leave the water in the pipe for at least 48 hours. Position valve so that the chlorine solution in the main being treated will not flow into water mains in active service.

b. Continuous Feed Method.

1) Solution Strength: Dose at 25 mg/L for 4 hours.

2) Residual: 10 mg/L at 24 hours.

3) Dosing Methods:

a) Liquid Chlorine: Solution feed vacuum-operated chlorinator in combination with a booster pump.

b) Direct Feed: Not allowed.

c) Hypochlorite Solution: Chemical feed pump designed for feeding chlorine solutions.

d) Calcium Hypochlorite Granules: Refer to previous section.

4) Filling Procedure: Use approved source to flow clean water at a constant, measured rate into the newly laid water main. Fill at a point not more than 10 feet downstream from the beginning of the new main. Measure the chlorine concentration at regular intervals and ensure a 25 mg/L dose. Position valves so that the chlorine solution in the main being treated does not flow into water mains in active service. Do not stop chlorine application until the entire main is filled with chlorinated water. Retain the chlorinated water in the main for at least 4 hours, operating all valves and hydrants in the section treated. At the end of the 24-hour period, verify the treated water in all portions of the main has a residual of 10 mg/L free chlorine.

c. Slug Method.

1) Solution Strength: 100 mg/L.

2) Dosing Methods: Per Engineer's direction.

3) Filling Procedure: Use approved source to flow clean water at a constant, measured rate into the newly laid water main. Fill at a point not more than 10 feet downstream from the beginning of the new main. Measure concentration at regular intervals to ensure 100 mg/L dose. Apply the chlorine continuously and for the time required to develop a solid column or "slug" of chlorinated water that will, as it moves through the main, expose all interior surfaces to a 100 mg/L for at least 3 hours. Measure the chlorine residual in the slug as it moves through the main. If at any time it drops below 50 mg/L, stop flow and relocate chlorination equipment at the head of the slug, and as flow is resumed, add chlorine to restore the free chlorine in the slug to not less than 100 mg/L. As the chlorinated water flows past fittings and valves, operate valves and hydrants to disinfect appurtenances and pipe branches.

C. Final Flushing.

1. After the retention period, flush the chlorinated water from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that in the system, or is acceptable for domestic use.

2. Dispose of flushing water to a location approved by the Engineer.

D. Bacteriological Tests.

1. After final flushing and before the water main is placed in service, test samples collected from the main(s) for coliform bacteria. Take 2 samples from each location at least 24 hours apart.

2. Unless otherwise directed by the Engineer, collect samples from each 1,200 feet of the new main and one from each branch.

E. Redisinfection.

1. If the initial disinfection fails to produce approved bacteriological samples, reflush and resample the main.

2. If check samples show bacterial contamination, re-chlorinate the main until approved results are obtained.

F. Swabbing.

1. If connections are not disinfected along with the newly installed main, swab or spray the interior of all pipe and fittings used in making the connections with a 1% hypochlorite solution before installation.

3.10 CONNECTIONS TO EXISTING MAINS

A. Expose existing main and verify line size and type of pipe.

B. Furnish and install necessary fittings to make connection.

C. Maximum allowable pipe gap at couplings is 1/2 inch.

D. Disinfect.

3.11 ABANDONMENT OF EXISTING MAINS

A. Expose main to be abandoned and verify line size and type of pipe.

B. Cut out existing fitting that connects abandoned main to pipe that is to remain in service.

C. Replace fitting with section of new pipe and required couplings.

D. Disinfect new pipe.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use either the first or both of the following unit prices as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Water Main Pipe – Size _____ - Type _____: By the linear foot for the type and size of pipe measured along the horizontal centerline of the pipe through all fittings and valves. Includes pipe, (if not included as a separate Bid Item), fittings, connections, thrust blocks, restraint, cleaning, disinfection and testing, excavation, bedding, backfill and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 401.4.1.A.1.
2. Bid Schedule Description: Water Main Pipe – Size ____ - Type _____… linear foot (LF).

B. Water Main Fitting – Size _____ - Type _____: Per each for the type, size and material of the fitting. Includes fittings, connections, thrust blocks, restraint, cleaning, disinfection and testing, excavation, bedding, backfill and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 401.4.1.B.1.
2. Bid Schedule Description: Water Main Fitting – Size ____ - Type _____… each (EA).

END OF SECTION

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SECTION 402

HYDRAULIC VALVES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water Valves.

B. Valve Boxes.

1.2 RELATED SECTIONS

A. Section 401 – Water Pipe and Fittings.

B. Section 403 – Hydrants.

C. Section 404 – Service Line and Meters.

D. Section 703 – Cast-in-Place Concrete.

1.3 REFERENCES

A. ANSI/AWWA C 504 – Rubber Seated Butterfly Valves.

B. ANSI/AWWA C 509 – Resilient Seated Gate Valves for Water Supply Service.

C. ANSI/AWWA C 512 – Air Release, Air/Vacuum and Combination Air Valves for Waterworks Service.

D. ANSI/AWWA C 515 - Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service.

E. ANSI/AWWA C 550 – Protective Epoxy Interior Coatings for Valves and Hydrants.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that valves and appurtenances meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the job site.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with manufacturer's recommendations.

1.6 OPERATION AND MAINTENANCE MANUALS

A. Provide operation and maintenance manuals with all valves.

1.7 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of constructed valves and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.8 DELIVERY, STORAGE AND HANDLING

A. Handle and store valves per manufacturer’s recommendation and in a manner, which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect valve gasket and seal materials from damage, sunlight and contamination.

PART 2 MATERIALS

2.1 VALVE SIZE, TYPE AND STRENGTH

A. Comply with valve size, type, fitting type and strength classification indicated in the Contract Documents.

B. If type and strength classifications are not indicated in the Contract Documents, notify the Engineer.

C. Notify the Engineer if installation conditions do not match those contemplated by the Contract Documents.

2.2 RESILIENT SEATED GATE VALVES

A. Resilient Seated Gate Valves and Reduced Wall Resilient Seated Gate Valves for Water Supply Service: ANSI/AWWA C 509 and/or ANSI/AWWA C 515 (ductile iron only).

1. Body Type: Flanged, mechanical or push-on joint.

2. Stem: Non-rising.

3. Actuator: 2-inch square wrench nut opening counterclockwise.

4. Stem Seal: O-ring.

5. Interior and Exterior Coating: Required.

6. Type of Installation: Buried.

2.3 BUTTERFLY VALVES

A. Rubber Seated Butterfly Valves: ANSI/AWWA C 504.

1. Body Type: Flanged, mechanical or push-on joint.

2. Class: 150B.

3. Disk and seal: Cast iron disk with seal in valve body.

4. Shaft: Stainless steel.

5. Metallic Mating Seats: Stainless steel or nickel-copper alloy.

6. Packing: Multiple V-type.

7. Actuator: 2-inch square wrench nut opening counterclockwise with position indicator.

8. Interior and Exterior Coating: Required.

9. Type of Installation: Buried.

2.4 AIR RELEASE, AIR/VACUUM AND COMBINATION AIR VALVES

A. Air Release/Air Vacuum and Combination Air Valves for Waterworks Service: ANSI/AWWA C 512.

1. Valve Size, Type, Working Pressure, Inlet and Outlet Configuration: As indicated in the Contract Documents and consistent with pipe system.

2. Body and Cover: Ductile iron.

3. Interior and Exterior Coating: Required.

4. Standard Detail: Refer to Standard Drawing SD-408-Air Release/ Vacuum Valve.

2.5 BLOW-OFF ASSEMBLY

A. Refer to Standard Drawing SD-405 – 4” Blow-off Assembly Detail.

2.6 PROTECTIVE EPOXY COATINGS FOR VALVES

A. Protective Epoxy Interior Coatings for Valves and Hydrants: ANSI/AWWA C 550.

2.7 VALVE BOXES

A. Size: Minimum 5-1/4 inch inside diameter, locking style.

B. Material: Cast iron.

C. Adjustment: Adjustable with sufficient length for bury.

D. Cover: Cast iron stamped “Water”.

E. Detail: Standard Drawing SD-406 – Valve Box and Lid Detail.

2.8 THRUST BLOCKS

A. Concrete: Per Section 703 – Cast-in-Place Concrete.

B. Placement: Per Standard Drawing SD-403 – Thrust Block and Anchor Details.

PART 3 WORKMANSHIP

3.1 EXAMINATION

A. Verify that excavations are to required grade.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA and other State and Federal requirements.

C. Examine valves and appurtenances for defects or damage.

D. Verify valves and appurtenances delivered to the site meet the requirements of the Contract Documents.

E. Verify utility locations, existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 INSTALLATION

A. Install valves and appurtenances in accordance with manufacturer's recommendations and the Standard Drawings.

B. Install valves plumb and vertical. Set valve box centered and plumb over wrench nut and flush with ground or street surface. Install box per Standard Drawing SD-406 – Valve Box and Lid Detail.

C. Install all valves so a watertight seal is provided at joints.

D. Install valve appurtenances as required in the Contract Documents.

E. Install all valves so weight and torque forces are supported by the valve and thrust block and not adjacent piping.

F. Install thrust blocks under buried valves per Section 401 – Water Pipe.

3.3 DEMONSTRATION

A. Demonstrate valve operation, adjustments and maintenance.

B. Demonstrate valve functions within specified requirements.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Valve – Size _____ - Type _____ : Per each for the type and size of valve specified. Includes valve, fittings, valve boxes, connections, actuators, and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 402.4.1.A.1.
2. Bid Schedule Description: Valve – Size _____ - Type _____… each (EA).

END OF SECTION

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SECTION 403

HYDRANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire hydrants.

B. Removal and replacement of existing fire hydrants.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 306 – Trench Backfill.

C. Section 401 – Water Pipe and Fittings.

D. Section 402 – Hydraulic Valves.

E. Section 703 - Cast-in-Place Concrete.

F. Section 801 – Uncrushed Aggregates.

1.3 REFERENCES

A. ANSI/AWWA C 502: Dry-Barrel Fire Hydrants.

B. AWWA M 17: Installation, Field Testing, and Maintenance of Fire Hydrants.

C. *NFPA 1963 Standard for Fire Hose Connections and Matching Owner's Existing Pattern.*

1.4 SUBMITTALS

A. Submit shop drawings and product data for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that hydrants, hydrant valves, pipe and fittings meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with manufacturer's recommendations, AWWA M 17, and the Contract Documents.

B. Maintain one copy of the manufacturer's installation instructions at the jobsite.

1.6 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of constructed hydrants, valves and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.7 DELIVERY, STORAGE AND HANDLING

A. Handle and store hydrants and appurtenances per manufacturer's recommendations and in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect hydrant gasket and seal materials from damage, sunlight and contamination until ready for installation to the pipe.

1.8 OPERATION AND MAINTENANCE MANUAL

A. Provide operation and maintenance manuals with all hydrants.

PART 2 MATERIALS

2.1 HYDRANT SIZE AND TYPE

A. Comply with hydrant size and type indicated in the Contract Documents.

B. If classification is not indicated in the Contract Documents, notify the Engineer.

C. Notify the Engineer if installation conditions do not match those contemplated by the Contract Documents.

2.2 FIRE HYDRANT

A. Dry Barrel Fire Hydrants: ANSI/AWWA C 502.

1. Main Valve Opening: 5-¼ inch nominal.

2. Nozzle Configuration: Three-way (2 hoses, 1 pumper) sized per NFPA.

3. Extensions: As necessary to meet depth of bury and height requirements.

4. Inlet: 6 inch mechanical joint attached to lead pipe.

5. Outlet Nozzle Threads: NFPA 1963 Standard for Fire Hose Connections and Matching Owner's Existing Pattern.

6. Outlet Drain: Retained.

7. Seals: O-ring.

2.3 COLOR

A. Prepare and paint fire hydrants as required by the Contract Documents or per manufacturer's specifications if not otherwise specified.

2.4 AUXILIARY GATE VALVE AND VALVE BOX

A. Conform to Section 402 – Hydraulic Valves.

2.5 PIPE AND FITTINGS

A. Conform to Section 401 – Water Pipe and Fittings, with end connections per Standard Drawing SD-404 – Fire Hydrant Detail.

2.6 CONCRETE THRUST BLOCKS

A. Concrete: Per Section 703 – Cast-in-Place Concrete.

2.7 DRAIN ROCK

A. One-inch minus aggregate as specified in Section 801 – Uncrushed Aggregate.

2.8 FILTER FABRIC

A. Mirafi 140-N, or approved substitution.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade per Section 301 - Trench Excavation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA and other State and Federal requirements.

C. Examine hydrants, valves, pipe and fittings for defects or damage.

D. Verify hydrants, valves, pipe, fittings, aggregate, and materials delivered to the site meet the requirements of the Contract Documents.

E. Verify utility locations, existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless specified.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and AWWA Manual of Practice M-17 at locations and elevations indicated in the Contract Documents or as directed by the Engineer and in accordance with local fire authority.

B. Install in accordance with Standard Plan 404 – Fire Hydrant Detail with pumper outlet nozzle facing the street. Ensure outlet nozzles are at least 12 inches above grade.

C. Install plumb and vertical providing a watertight seal at all joints.

D. Provide thrust restraint for fittings and the auxiliary valve per Standard Drawing SD-403 – Thrust Block and Anchor Details. Joint restraint may be used as an alternate to thrust block, subject to approval of the Engineer.

E. Remove foreign matter from piping prior to installing auxiliary valve and hydrant.

F. Install appurtenances as required in the Contract Documents.

G. Disinfect by opening and closing the main valve during disinfection of the water main. Flush the hydrant after disinfection. Disinfect and flush in accordance with Section 401 – Water Pipe and Fittings.

3.3 DEMONSTRATION AND TESTING

A. Pressure test hydrants with the main water system per Section 401 – Water Pipe and Fittings.

B. Conduct a drainage test on each hydrant.

1. Procedure: Close main hydrant valve, remove one nozzle cap, and place hand over opening.

2. Results: Drainage should create noticeable suction. If not, repair drain and redo test.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Hydrant: Per each as specified. Includes hydrant, valve, pipe, thrust blocks, restraint, fittings, valve boxes, connections, drain rock, filter fabric, spare parts, excavation, bedding, backfilling, testing and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 403.4.1.A.1.
2. Bid Schedule Description: Hydrant…each (EA).

END OF SECTION

SECTION 404

WATER SERVICE LINE AND METERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Service Pipe.

B. Water Meters.

C. Appurtenances.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 304 – Trench Foundation Stabilization.

C. Section 306 – Trench Backfill.

D. Section 401 – Water Pipe and Fittings.

E. Section 402 – Hydraulic Valves.

F. Section 405 – Non-Potable Water Line Separation.

1.3 REFERENCES

A. ANSI/AWWA C 651: Disinfecting Water Mains.

B. ANSI/AWWA C 700: Cold Water Meters - Displacement Type, Bronze Main Case.

C. ANSI/AWWA C 800: Underground Service Line Valves and Fittings.

D. ANSI/AWWA C 900: Polyvinyl Chloride (PVC) Pressure Pipe 4 inch through 12 inch for Water Distribution.

E. ANSI/AWWA C 901: Polyethylene (PE) Pressure Pipe and Tubing, ½ inch through 3 inch, for Water Service.

F. ASTM B 88: Seamless Copper Water Tube.

G. ASTM D 3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

H. NSF/ANSI 61: Drinking Water System Components – Health Effects.

1.4 SUBMITTALS

A. Submit shop drawings and product data for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that service pipe and meters meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of water services and meters in relation to existing benchmarks.

B. Provide copy of record documents to owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store pipe and meters per manufacturer's recommendations and in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from damage, sunlight and contamination.

1.7 METER WARRANTY AND OPERATION AND MAINTENANCE MANUAL

A. Main Case: Manufacturing workmanship defect guarantee for the life of the unit.

B. Registers and Metering Components: Free from manufacturing defects for a period of 10 years, non-prorated.

C. Provide an operation and maintenance manual for each type of meter supplied.

PART 2 MATERIALS

2.1 PIPE AND FITTINGS SIZE, TYPE AND STRENGTH

A. Comply with pipe and fitting size, type and strength classification indicated in the Contract Documents.

B. If type and strength classifications are not indicated in the Contract Documents, use polyethylene pipe.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match those contemplated by the Contract Documents.

2.2 SERVICE PIPE

A. Polyethylene (PE) Pressure Pipe for Water Service: ANSI/AWWA C 901.

1. Pressure Class: 200 psi.

2. Outside Dimension Ratio: DR 7.

3. Dimension Basis: Iron Pipe Size (IPS).

4. Standard PE Code Designation: PE 3408 per ASTM D 3350.

B. Seamless Copper Water Tube: ASTM B 88.

1. Type: K.

2. Temper: Annealed.

C. Polyvinyl Chloride (PVC) Pipe for Water Distribution: ANSI/AWWA C 900

1. Pressure Class: 200 psi.

2.3 WATER METER

A. Cold Water Meters – Displacement Type: ANSI/AWWA C 700.

1. Product: In accordance with the Contract Documents.

2.4 APPURTENANCES

A. Service Saddles.

1. 1” taps or less: Ford FC101, Romac 101NS, or approved substitution. Iron saddle bodies shall be lined and coated with fusion-bonded epoxy, nylon, or approved substitution. Lining or coating per manufacturer’s specifications unless directed otherwise by Engineer.

2. Larger than 1” taps: Ford FC202, Romac 202NS, or approved substitution. Iron saddle bodies shall be lined and coated with fusion-bonded epoxy, nylon, or approved substitution. Lining or coating per manufacturer’s specifications unless directed otherwise by Engineer.

B. Corporation Stops.

1. Type: Pack joint corporation stops for polyethylene pipe.

2. Threads: Iron pipe.

3. Product: Ford FB1101 Ballcorp style for IPS PE pipe, or approved substitution.

C. Couplings.

1. Type: Pack joint couplings for polyethylene pipe, or approved substitution.

D. Meter Setters.

1. Type: Copper with integral pack joints on both ends.

2. Fittings: Iron pipe size for polyethylene pipe.

3. Bracing: Brace pipe eye on the cross brace.

4. Valving: Integral dual check valve on outlet.

5. Product: Ford VHH92 series, or approved substitution.

E. Fittings.

1. All brass or copper with iron pipe threads.

F. Locating Wire.

1. Type: Insulated copper locating wire No. 12 gauge.

G. Meter Box.

1. For ¾ inch to 1 inch service:

a. Size: 42-inch depth and 20-inch diameter.

b. Product: Midstates Plastics, Inc., with thermal pack insulating pad and locating shelf or approved substitution.

2. For 1-½ inch to 2 inch service:

a. Type: 30 inch x 44 inch C.M.P with grade rings per Standard Drawing SD-402 – Water Service Connection (1-1/2 – 2”).

H. Meter Box Cover.

1. Configuration: Flush mounted with a flush mounted lid and locking device on the lid with a standard pentagon bolt.

2. Material: Cast iron.

3. Size: Lid and frame shall be traffic rated and sized to match water meter box.

4. Product: D & L Supply B-5020 (in traffic area) and Tyler Pipe, model 6150-20 or Ford type X43 (in non-traffic areas) or approved substitution.

2.5 HEALTH REQUIREMENTS

A. Applicable NSF Compliance: All products used to construct a public drinking water system and will be in contact with potable water must be certified by an accredited ANSI certification body to meet applicable ANSI/NSF standards. Affidavits of compliance may be required.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade per Section 301 - Trench Excavation and Standard Drawings SD-306-Utility Trench, and that installation meets Section 405 – Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA and other State and Federal requirements.

C. Verify that trench depth will allow a minimum of 48 inches cover over service lines.

D. Examine service pipe, fittings, meters and appurtenances for defects or damage.

E. Verify service pipe, fittings, meters, and materials delivered to the site meet the requirements of the Contract Documents.

F. Verify utility locations, existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 INSTALLATION

A. Coordinate with property owners prior to connection, at least 48 hours in advance. Disruption of service shall not exceed 4 hours in duration.

B. Install service lines and water meters in the locations indicated on the Contract Documents.

C. Install pipe, fittings, meters, and meter boxes in accordance with the manufacturer's recommendations and Standard Drawings SD-401 and SD-402 – Water Service Connections.

D. Install service lines under paved concrete surfaces by pulling or boring the new service line in place from the new water main to the meter. If, according to the Engineer, pulling or boring is not attainable, install service lines by trenching.

E. Prepare trench bottom as required by Section 301 – Trench Excavation.

F. Do not lay pipe unless groundwater is 1 foot below the pipe invert and a foundation has been provided in accordance with Section 304 – Trench Foundation Stabilization.

G. Provide pipe bedding and initial backfill as required by Section 306 – Trench Backfill.

H. Utilize proper tools for cutting and beveling pipe ends and installing fittings.

I. Clean and prepare pipe and fittings.

J. Assure that no dirt or other foreign material is allowed in pipe.

K. Assure that continuity is maintained in locating wire for both open cut and "pulled" service lines.

L. Disinfect service water lines in accordance with Section 401 – Water Pipe and Fittings and ANSI/AWWA C 651.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Water Service Connection: Per each as specified. Includes excavation, bedding, backfill, service tap and saddle, corporation stop, service pipe, fittings, meter, meter box and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 404.4.1.A.1.
2. Bid Schedule Description: Water Service Connection, size _____ - …each (EA).

END OF SECTION

SECTION 405

NON-POTABLE WATER LINE SEPARATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for the separation of mains and water service lines and non-potable water lines and appurtenances. Non-Potable water lines include all: sanitary sewer, sewer services, storm sewer, culvert, sewer manhole, gravity or pressure irrigation lines, irrigation service, or appurtenance which conveys or contains non-potable water.

1.2 REFERENCES

A. Idaho Rules for Public Drinking Water Systems – IDAPA 58.01.08.542.07

PART 2 MATERIALS

2.1 REFER TO APPROPRIATE SECTIONS

A. Section 401 – Water Pipe and Fittings.

B. Section 404 – Water Service Line and Meters.

C. Section 501 – Gravity Sewers.

D. Section 504 – Sewer Service Lines.

E. Section 601 – Culverts, Storm Drain, and Gravity Irrigation Pipe.

F. Section 703 – Cast-in-Place Concrete.

G. Section 901 – Pressure Irrigation Pipe and Fittings.

PART 3 WORKMANSHIP

3.1 REFER TO APPROPRIATE SECTIONS

A. Section 401 – Water Pipe and Fittings.

B. Section 404 – Water Service Line and Meters.

C. Section 501 – Gravity Sewers.

D. Section 504 – Sewer Service Lines.

E. Section 601 – Culverts, Storm Drain, and Gravity Irrigation Pipe.

F. Section 703 – Cast-in-Place Concrete.

G. Section 901 – Pressure Irrigation Pipe and Fittings.

3.2 PARALLEL INSTALLATIONS

A. Normal Conditions: Maintain a horizontal separation of at least 10 feet between water lines (including fire hydrants and fire service lines) and all non-potable water lines and force mains. Maintain at least 25 feet between water lines and storm water seepage beds and unlined retention ponds.

B. Close Horizontal Separation: When 10-foot horizontal separation cannot be maintained, lay water and non-potable water lines in accordance with Standard Drawing SD-407 – Non-Potable Water Line (NPWL) Separation.

1. Variation from Specification: Any variation from the above specifications must first be approved by the IDEQ.

3.3 CROSSING INSTALLATIONS

A. Normal Conditions: The bottom of a water line or water service is to cross a minimum of 18 inches above the top of all non-potable water lines.

B. Close Vertical Separation: When the 18-inch vertical separation cannot be maintained, comply with requirements of Standard Drawing SD-407 - Non-Potable Water Line (NPWL) Separation.

1. Variation from Specification: Any variation from the above specifications must first be approved by the IDEQ.

PART 4 MEASUREMENT AND PAYMENT

4.1 Unless otherwise indicated in the Contract Documents all work necessary to comply with this specification and to provide adequate non-potable water separation and crossings is to be considered incidental to other Bid Items.

END OF SECTION

ISPWC - DIVISION 400

Water

Standard Drawings

SD-401 – Water Service Connection (3/4” - 1”)
SD-402 – Water Service Connection (1-1/2” - 2”)
SD-403 – Thrust Block and Anchor Details
SD-404 – Fire Hydrant Detail
SD-405 – 4” Blow-off Assembly Detail
SD-406 – Valve Box and Lid Detail
SD-407 – Potable and Non-Potable Water Line (NPWL) Separation
SD-408 – Air Release / Vacuum Valve
SD-408A – Combination Air Release/Vacuum Valve

NOTES:

Ⓐ ALL PRODUCTS AS LISTED OR APPROVED SUBSTITUTIONS.

Ⓑ NO GALVANIZED PIPE OR YELLOW BRASS FITTINGS TO BE USED.

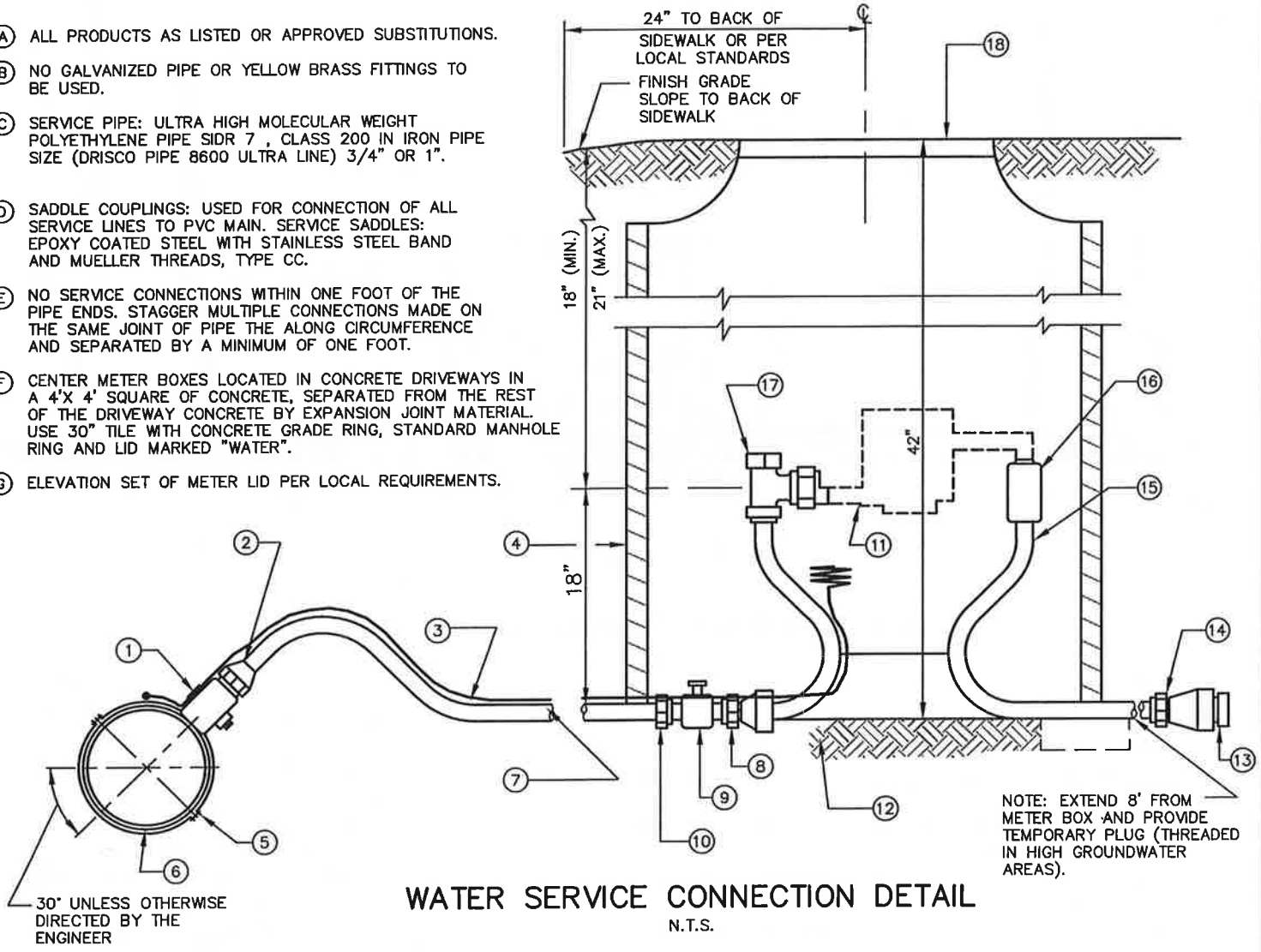
Ⓒ SERVICE PIPE: ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE PIPE SIDR 7 , CLASS 200 IN IRON PIPE SIZE (DRISCO PIPE 8600 ULTRA LINE) 3/4" OR 1".

Ⓓ SADDLE COUPLINGS: USED FOR CONNECTION OF ALL SERVICE LINES TO PVC MAIN. SERVICE SADDLES: EPOXY COATED STEEL WITH STAINLESS STEEL BAND AND MUELLER THREADS, TYPE CC.

Ⓔ NO SERVICE CONNECTIONS WITHIN ONE FOOT OF THE PIPE ENDS. STAGGER MULTIPLE CONNECTIONS MADE ON THE SAME JOINT OF PIPE THE ALONG CIRCUMFERENCE AND SEPARATED BY A MINIMUM OF ONE FOOT.

Ⓕ CENTER METER BOXES LOCATED IN CONCRETE DRIVEWAYS IN A 4'X 4' SQUARE OF CONCRETE, SEPARATED FROM THE REST OF THE DRIVEWAY CONCRETE BY EXPANSION JOINT MATERIAL. USE 30" TILE WITH CONCRETE GRADE RING, STANDARD MANHOLE RING AND LID MARKED "WATER".

Ⓖ ELEVATION SET OF METER LID PER LOCAL REQUIREMENTS.



WATER SERVICE CONNECTION DETAIL

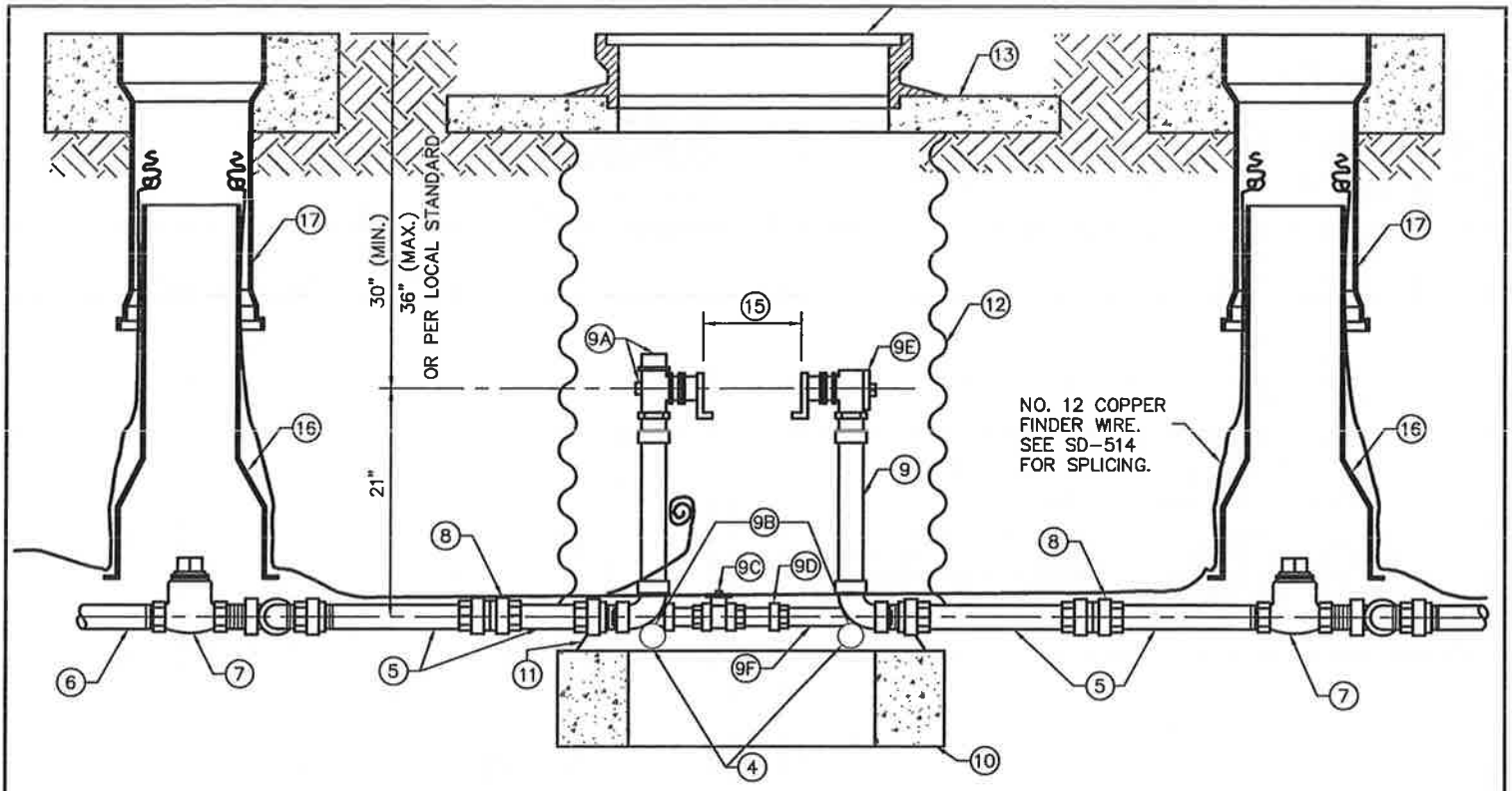
N.T.S.

LEGEND

1. FORD FB-1101 OR MUELLER BALL CORPORATION STOP 3/4" OR 1".
2. MUELLER H-15072.
3. NO. 12 COPPER FINDER WIRE. SEE SD-514 FOR SPLICING.
4. 20" DIA. X 42" DEEP METER BOX (NOTCH FOR SERVICE LINES).
5. STAINLESS STEEL SADDLE.
6. WATER MAIN.
7. 3/4" OR 1" SERVICE LINE (TYP.) NO SPLICING IS ALLOWED.
8. MALE SWIVEL END.
9. FULL OPENING 3/4" OR 1" MUELLER 300 BALL OR FORD B-11333 BALL VALVE.
10. CURB STOP ADAPTER (FORD C-86 OR MUELLER H-15426 "GRIP JOINT").
11. FUTURE METER INSTALLED BY WATER PURVEYOR.
12. FIRM UNDISTURBED EARTH. (SET TILE ON 2"X 22" DIAMETER PRECAST CONCRETE BLOCK IF OVER EXCAVATION OCCURS).
13. PROVIDE TEMPORARY PLUG (THREADED IN HIGH WATER AREAS).
14. DOUBLE PURPOSE COUPLING.
15. FORD VHH-92-18" YOKE WITH MALE CONNECTION AND EXTENDED END OR APPROVED EQUAL.
16. FORD CARTRIDGE DUAL CHECK VALVE (VERTICAL).
17. FORD BALL VALVE 18" (92,93,94 SERIES OR MUELLER B24101-142) 3/4"-1" COPPERSETTER WITH PADLOCK WINGS AND EXTENDED END ON EACH.
18. FORD TYPE X SINGLE LID COVERS NO. X43, 13 1/2" OPENING-1 1/32" PENTAGONAL NUT.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	WATER SERVICE CONNECTION (3/4" – 1")	STANDARD DRAWING NO. SD-401



WATER SERVICE CONNECTION DETAIL

N.T.S.

LEGEND

(1) WATER MAIN PER SECTION-401.

(2) SADDLE WITH CC THREAD AND STAINLESS STEEL STRAP.

(3) BALLCORP TYPE FB400 INLET AWWA TAPER-CC X PACK JOINT W/S.S. INSERT {FORD 1 1/2" (FB1001-6), 2" (FB1001-7)}.

(4) 1" DIA. GALVANIZED BRACE PIPE (APPROX. 18" LONG), 2 REQUIRED.

(5) 6" LONG RED BRASS NIPPLE.

(6) SERVICE LINE: 1 1/2" OR 2" POLYETHYLENE PIPE WITH PACK JOINT BRASS FITTINGS AND STAINLESS STEEL INSERTS.

(7) FORD BALL VALVE CURB STOP W/ VALVE RISER AND LOCKING LID (IF REQUIRED).
1 1/2" = B11-666
2" = B11-777

(8) RED BRASS UNION.

(9) METER SETTER W/ THE FOLLOWING FACTORY ASSEMBLED ITEMS:
A. ANGLE BALL VALVE WITH PADLOCK WING.
B. BRACE PIPE EYELETS STANDARD.
C. BALL VALVE WITH PADLOCK WING ON BY-PASS.
D. BY-PASS PACK JOINT.
E. ANGLE CHECK VALVE.
F. RED BRASS BY-PASS.

(10) 2" X 35" O.D. CONCRETE GRADE RING (UNDER YOKE).

(11) NOTCH CMP FOR OFFSET ON GRADE RING.

(12) 30" DIA. X 44" MIN. LENGTH CMP.

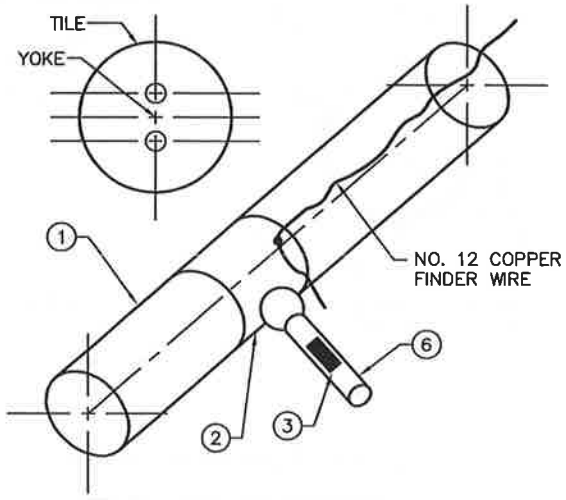
(13) 4" X 35" O.D. CONCRETE GRADE RING.

(14) STANDARD 24" DIA. MANHOLE RING & "WATER" COVER.

(15) 1 1/2" METER = 13 1/4" WITH GASKETS, 2" METER = 17 1/4" WITH GASKETS.

(16) 4" DIA. SEWER PIPE. NOTCH BOTTOM TO FIT OVER CURB STOP.

(17) VALVE BOX



TAP CONNECTION

N.T.S.

NOTES:

(A) ALL PRODUCTS AS NOTED OR APPROVED SUBSTITUTION.

(B) THE DIAMETER (1-1/2" OR 2") OF EACH APPURTENANCE SHOWN HEREON IS THE SAME AS THE METER SIZE.

(C) NO BY-PASS ALLOWED ON METER SETTERS FOR LANDSCAPE OR PRESSURIZED IRRIGATION SYSTEM.

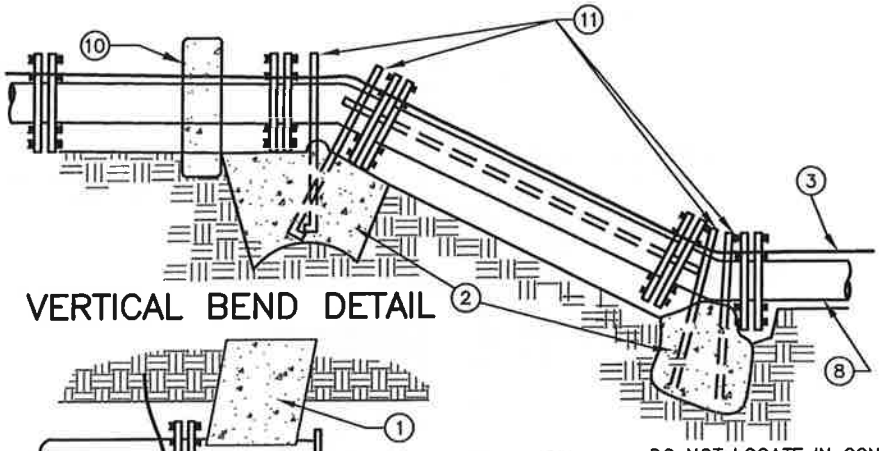
(D) SD-402 WATER SERVICE CONNECTION (1 1/2"- 2") ALLOWED IF TWO OR MORE YOKES ARE USED FOR THE SAME SERVICE.

(E) NO GALVANIZED PIPE OR YELLOW BRASS FITTINGS.

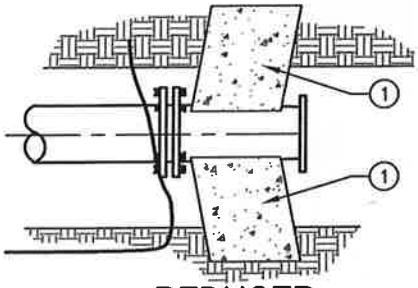
(F) NO TAPS WITHIN ONE FOOT OF THE PIPE ENDS.

2015

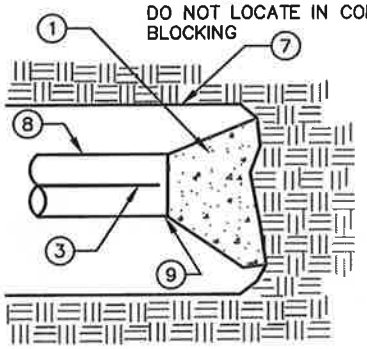
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	WATER SERVICE CONNECTION (1 1/2" - 2")	STANDARD DRAWING NO. SD-402



VERTICAL BEND DETAIL

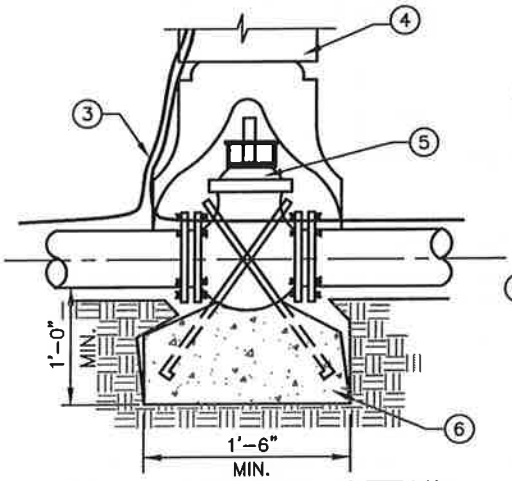


REDUCER

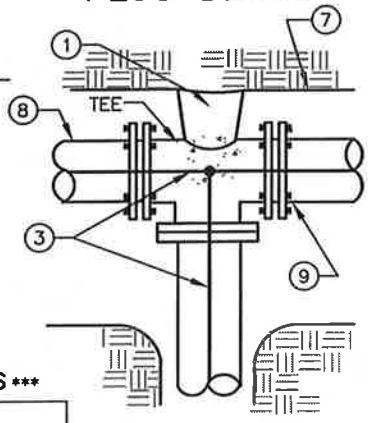


DO NOT LOCATE IN CONCRETE BLOCKING

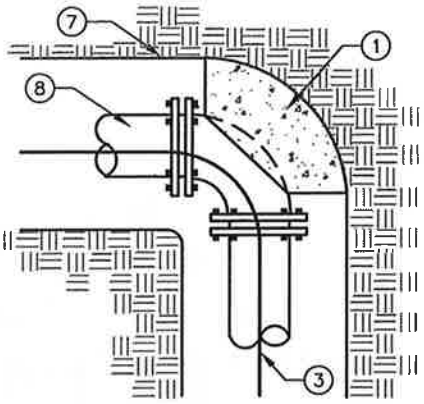
PLUG DETAIL



VALVE ANCHOR DETAIL



TEE DETAIL



TYP. BEND DETAIL

LEGEND

(1) FOR HORIZONTAL PIPE BENDS, BEARING THRUST BLOCKS MUST PROVIDE 2500 P.S.I. CONCRETE POURED AGAINST UNDISTURBED EARTH PER TABLE 1.

(2) FOR VERTICAL PIPE BENDS, GRAVITY THRUST THRUST BLOCKS MUST PROVIDE A VOLUME OF CONCRETE POURED AGAINST UNDISTURBED EARTH WHICH IS SIZED FOR EXPECTED FORCES WITH A MINIMUM 1.5 FACTOR OF SAFETY.

(3) NO. 12 COPPER FINDER WIRE. SEE SD-514 FOR SPLICING.

(4) C.I. VALVE BOX WITH COVER.

(5) C.I. GATE VALVE (M.J.).

(6) PRECAST BLOCK FOR CUT IN TEE AND VALVE OR CAST IN PLACE WITH 2 1/2" ø MIN. REBAR.

(7) TRENCH SIDE.

(8) PIPE.

(9) PLUG.

(10) HAMMERHEAD THRUST BLOCKING.

(11) ANCHOR BARS (1/2"ø MIN.).

TABLE 1
THRUST AREA FOR HORIZONTAL BENDS ***

SOIL BEARING PRESSURE = 2000 PSF WORKING PRESSURE RATING = 150 PSI SAFETY FACTOR = 1.5				
	MINIMUM SQUARE FEET OF THRUST AREA ONTO UNDISTURBED EARTH*			
PIPE SIZE	TEE, PLUG OR VALVE	90° BEND**	45° BEND	22.5°, 11.25° BENDS OR REDUCER
3	0.8	1.1	0.6	0.3
4	1.4	2.0	1.1	0.6
6	3.2	4.5	2.4	1.2
8	5.7	8.0	4.3	2.2
10	8.8	12.5	6.8	3.4
12	12.7	18.0	9.7	5.0
14	17.3	24.5	13.3	6.8
16	22.6	32.0	17.3	8.8
18	28.6	40.5	21.9	11.2

* MUST BE INCREASED BASED ON DIFFERENT CONDITIONS (HIGHER WORKING PRESSURE OR LOWER SOIL BEARING STRENGTH).

** OR TEE ACTING AS A 90° BEND.

*** THRUST BLOCK DEPTH TO BE A MINIMUM OF 12" FOR PIPE SIZES 3"-8" AND 18" FOR PIPE SIZES 10"-18" OR THE SQUARE ROOT OF THE REQUIRED BEARING AREA, WHICHEVER IS GREATER.

NOTES:

(A) ANCHOR ALL VALVES CONNECTED TO P.V.C. PIPE AS SHOWN.

(B) COVER BOLTS AND FLANGES WITH PLASTIC TO PROTECT FROM CONCRETE ADHERENCE DURING CONSTRUCTION OF THRUST BLOCKS.

(C) SEE CHART FOR MIN THRUST BLOCKS BEARING AREAS.

(D) ALL CONCRETE TO BE 2500 P.S.I. STRENGTH POURED AGAINST UNDISTURBED EARTH.

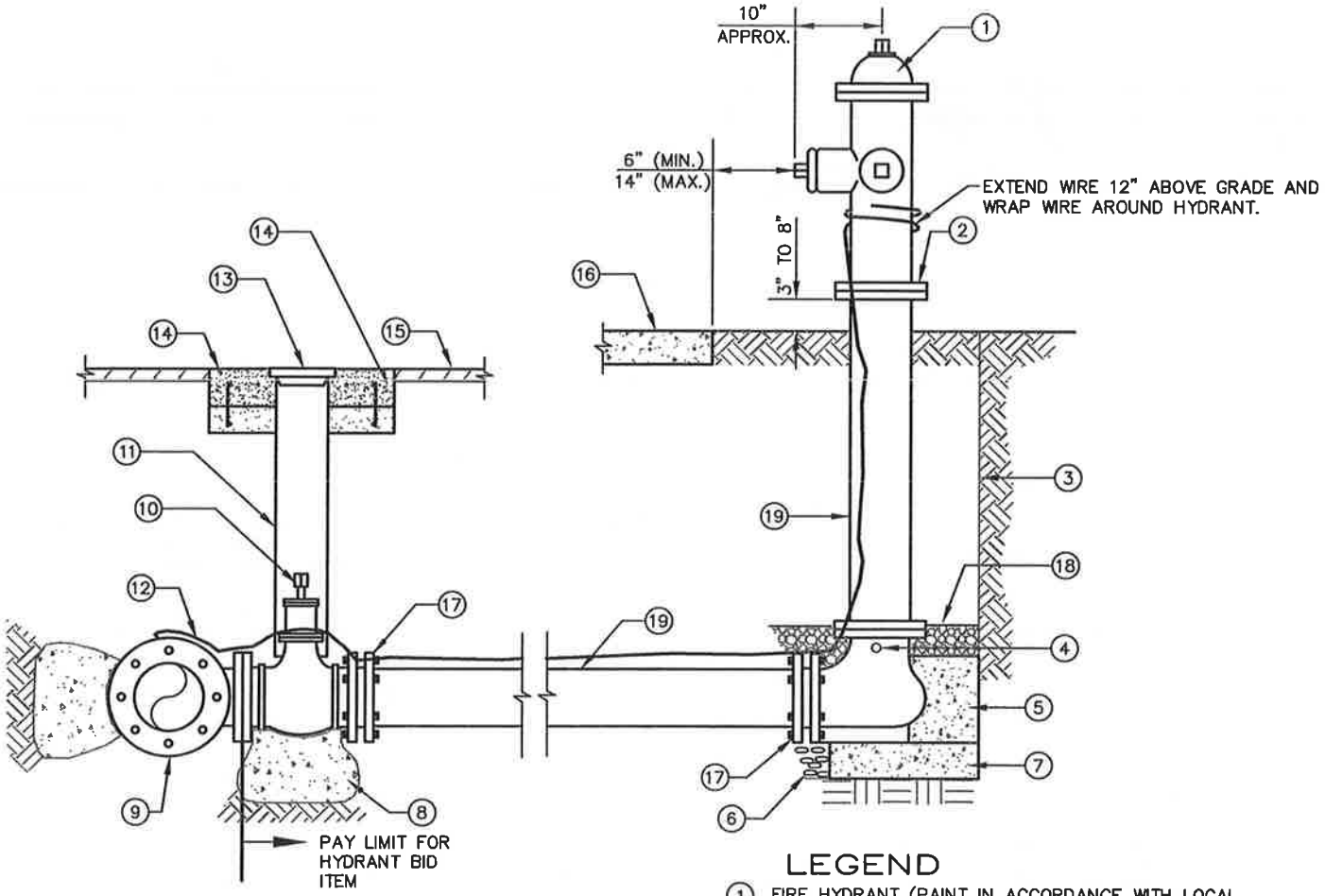
(E) PROVIDE 6 MIL POLYPROPYLENE BETWEEN FITTINGS AND CONCRETE.

(F) NOTIFY ENGINEER FOR ANY CONDITION OR PIPE SIZE NOT INDICATED.

(D) ALL BLOCKS TO BE CENTERED AROUND PIPE SPRING LINE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	THRUST BLOCK AND AND DETAILS	STANDARD DRAWING NO. SD-403



FIRE HYDRANT DETAIL

N.T.S.

NOTES:

(A) HYDRANTS THAT ARE TO BE RELOCATED AS CALLED FOR ON THE PLAN VIEW SHALL BE REINSTALLED IN ACCORDANCE WITH THIS DETAIL. LOCATION TO BE SET IN ACCORDANCE WITH LOCAL STANDARDS OR AS DIRECTED BY THE ENGINEER.

(B) ALL AUXILIARY VALVES TO BE LOCATED AT THE TEE ON THE WATER MAIN AS SHOWN ON THIS DETAIL OR AS DIRECTED BY THE ENGINEER. WHERE EXISTING FITTINGS ARE NOT COMPATIBLE WITH NEW MAIN CONSTRUCTION, USE SUITABLE ADAPTERS OR NEW FITTINGS UPON APPROVAL BY THE ENGINEER.

(C) ALL ANCHORS AND BLOCKING TO BEAR AGAINST UNDISTURBED SOIL.

(D) IF WATER SERVICE TO HYDRANT IS TO COMMENCE PRIOR TO SETTING OF CONCRETE THRUST BLOCKING, USE A COMBINATION OF CONCRETE AND UNI-FLANGE SERIES 1300 JOINT RESTRAINT.

(E) PLACE LOCATOR WIRE DIRECTLY ABOVE PIPE. SECURE FINDER WIRE UNDER (MJ) BOLT AT MAIN.

(F) JOINT RESTRAINT DEVICES MAY BE USED AS AN ALTERNATE TO THRUST BLOCK WITH ENGINEER'S APPROVAL.

LEGEND

(1) FIRE HYDRANT (PAINT IN ACCORDANCE WITH LOCAL STANDARDS).

(2) BREAK AWAY BOLTS.

(3) END OF TRENCH, EDGE OF RIGHT-OF-WAY.

(4) DRAIN – KEEP CLEAR.

(5) CAST IN PLACE CONCRETE THRUST BLOCK (4 SQ. FT. OF THRUST BLOCK REQUIRED) (SEE NOTE D).

(6) 1" DRAIN ROCK EXTENDS 12" HORIZONTALLY FROM EACH SIDE OF CONCRETE BASE AND THRUST BLOCK AND VERTICALLY TO 2" ABOVE HYDRANT DRAIN WALL.

(7) PRECAST CONCRETE BLOCK 1' X 1' X 6" THICK.

(8) VALVE SUPPORT (PRECAST OR CAST IN PLACE).

(9) TEE (MJ X MI X FLANGE) WITH THRUST BLOCK.

(10) 6" C.I. AUXILIARY VALVE (MJ X FLANGE).

(11) CAST IRON VALVE BOX.

(12) NO. 12 AWG. COPPER WIRE FINDER. SEE SD-514 FOR SPLICING (SEE NOTE E).

(13) 5 1/4" LOCKING LID (TYLER NO. 6855).

(14) 24"ø X 6' CONCRETE COLLAR WITH (2) #4 REBAR HOOPS.

(15) FINISHED GRADE.

(16) SIDEWALK.

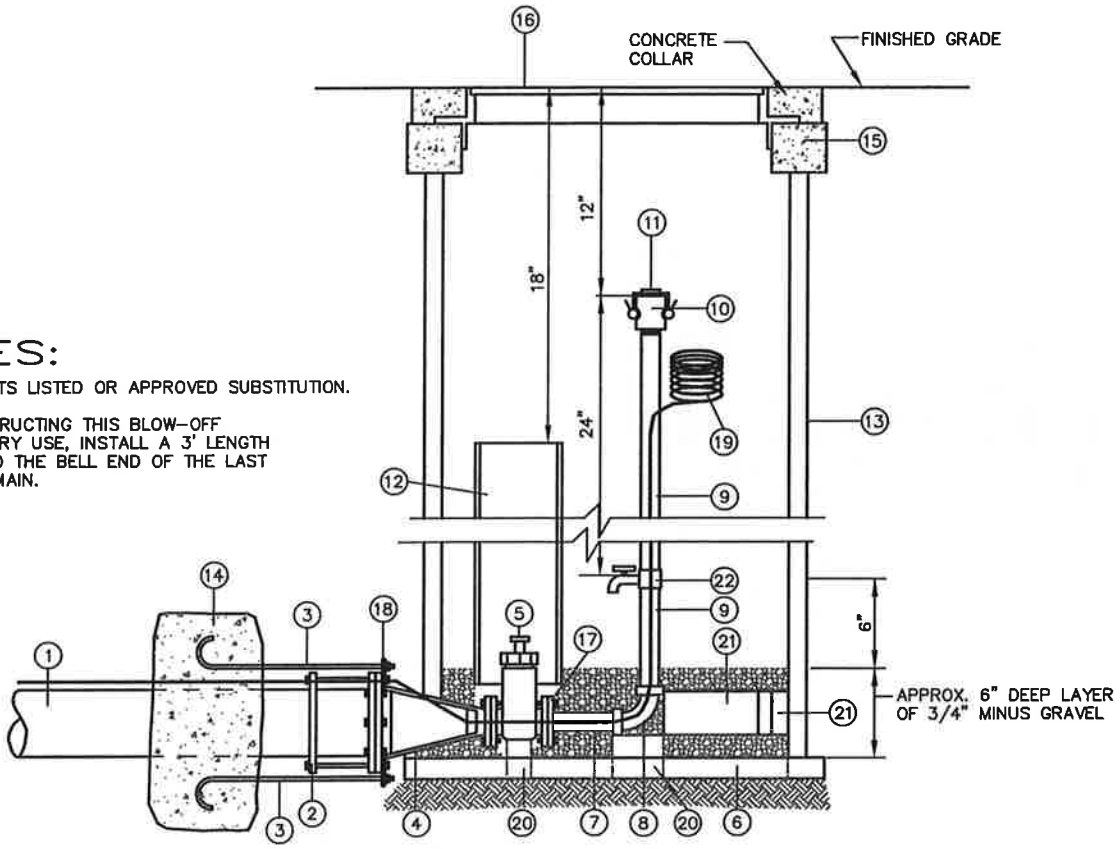
(17) MECHANICAL CONNECTION.

(18) COVER DRAIN ROCK WITH FILTER FABRIC.

(19) 6" DIAMETER PIPE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	FIRE HYDRANT DETAIL	STANDARD DRAWING NO. SD-404



NOTES:

(A) ALL PRODUCTS LISTED OR APPROVED SUBSTITUTION.

(B) WHEN CONSTRUCTING THIS BLOW-OFF AS TEMPORARY USE, INSTALL A 3' LENGTH OF PIPE INTO THE BELL END OF THE LAST LENGTH OF MAIN.

4" BLOW-OFF ASSEMBLY DETAIL

N.T.S.

LEGEND

(1) WATER MAIN (SIZE VARIES). BELL END REQUIRED FOR TEMPORARY INSTALLATION WITH 18" PIPE SECTION.

(2) UNI-FLANGE RETAINER SERIES 1300 FOR PVC PIPE.

(3) 3/4" ± RODS 2 REQUIRED ON 6" AND SMALLER, 3/4"± RODS 4 REQUIRED ON 8" AND LARGER.

(4) MAIN SIZE MJ X 4" REDUCER. IF 4" MAIN, GATE VALVE TO BE MJ X FLANGE.

(5) 4" GATE VALVE RESILIENT WEDGE FLANGE X FLANGE.

(6) PRE-CAST GRADE 2" RING USED TO SUPPORT CMP (X 35" O.D.) CONCRETE.

(7) 4" X 6" THREADED GALVANIZED NIPPLE.

(8) 4" THREADED GALVANIZED 90° ELBOW.

(9) 4" THREADED GALVANIZED PIPE.

(10) 4" THREADED X ALUM. KAM-LOCK QUICK COUPLING MALE ADAPTER.

(11) 4" KAM-LOCK CAP.

(12) PLASTIC VALVE BOX BOTTOM SECTION.

(13) 30" CMP CUT TO FIELD LENGTH.

(14) HAMMERHEAD THRUST BLOCK 10.3 SQ. FT.

(15) 4" X 35" O.D. PRE-CAST CONCRETE GRADE RING MIN. 1-4" GRADE RING, MAX. 1-4" GRADE RING AND 1-2" GRADE RING (OTHERWISE CMP EXTENSION AND CMP BAND).

(16) WATER MANHOLE RING AND LID.

(17) 4" COMPANION FLANGE CAP TAPPED 4" F.I.P.

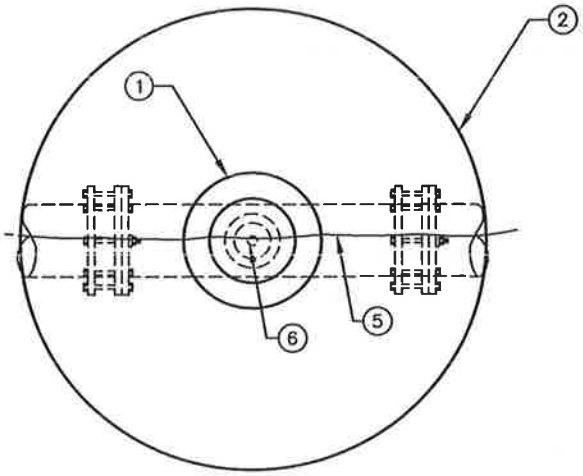
(18) EYE-BOLTS.

(19) LOCATOR WIRE-LONG ENOUGH TO BE PULLED UP AND OUT TO ABOVE GROUND LEVEL. SEE SD-514 FOR SPLICING.

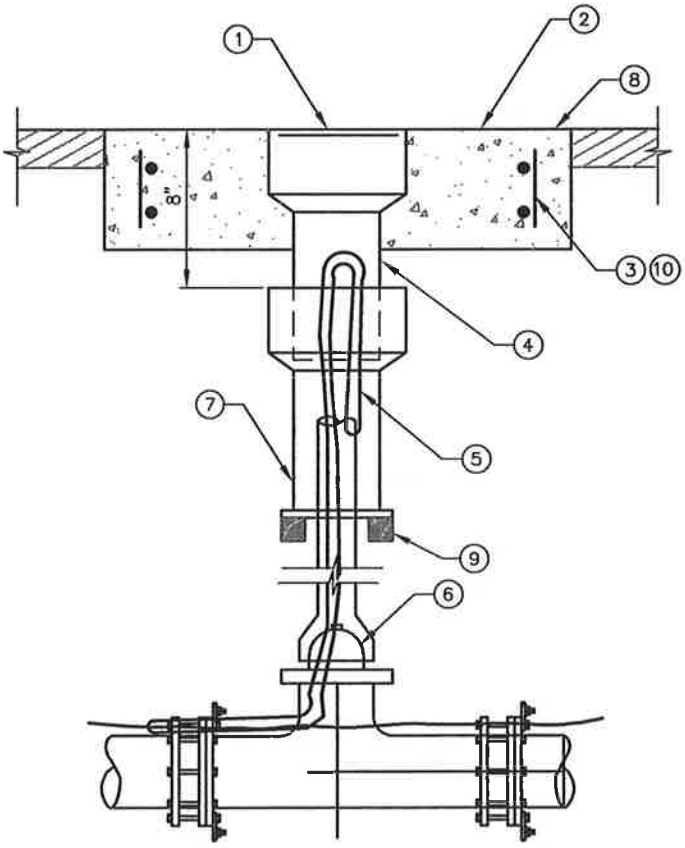
(20) PRE-CAST CONCRETE BLOCKS.

(21) PRE-CAST CONCRETE BLOCKS WEDGED IN PLACE, FILL VOID BETWEEN TILE AND BLOCKS.

(22) 1/4" DRAIN VALVE WITH SADDLE (1/4 TURN TO OPEN).



PLAN VIEW



ELEVATON VIEW

VALVE BOX AND LID

N.T.S.

LEGEND

1. 5 1/4" LOCKING LID IF REQUIRED (TYLER NO. 6855).
2. 24"ø X 6" CONCRETE COLLAR.
3. (2) #4 REBAR HOOPS WITH #4 VERTICALS.
4. PACK VOID WITH RUBBER SILICONE.
5. NO. 12 AWG. COPPER WIRE FINDER.
6. VALVE.
7. CAST IRON VALVE RISER.
8. FINISHED GRADE.
9. REDWOOD BLOCKS.
10. FIBRILLATED POLYPROPYLENE FIBER (ADDED PER MANUFACTURER'S RECOMMENDATIONS) MAY BE USED IN LIEU OF #4 REBAR IN CONCRETE COLLARS.

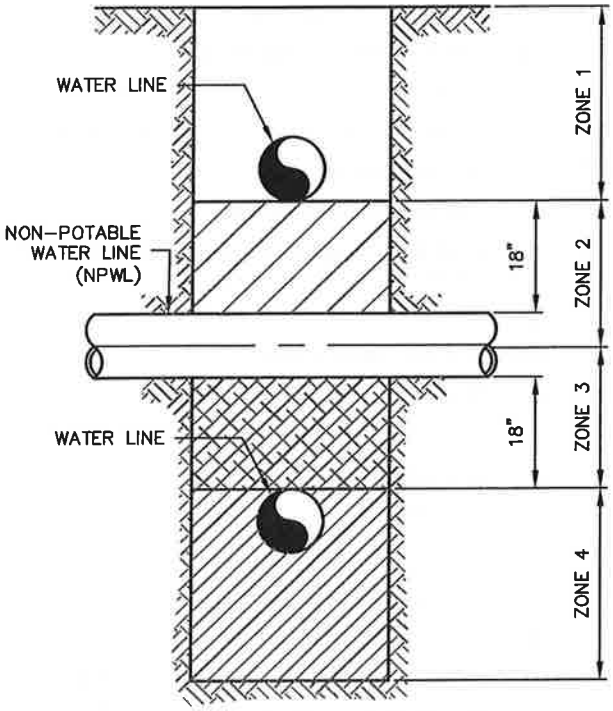
NOTE:

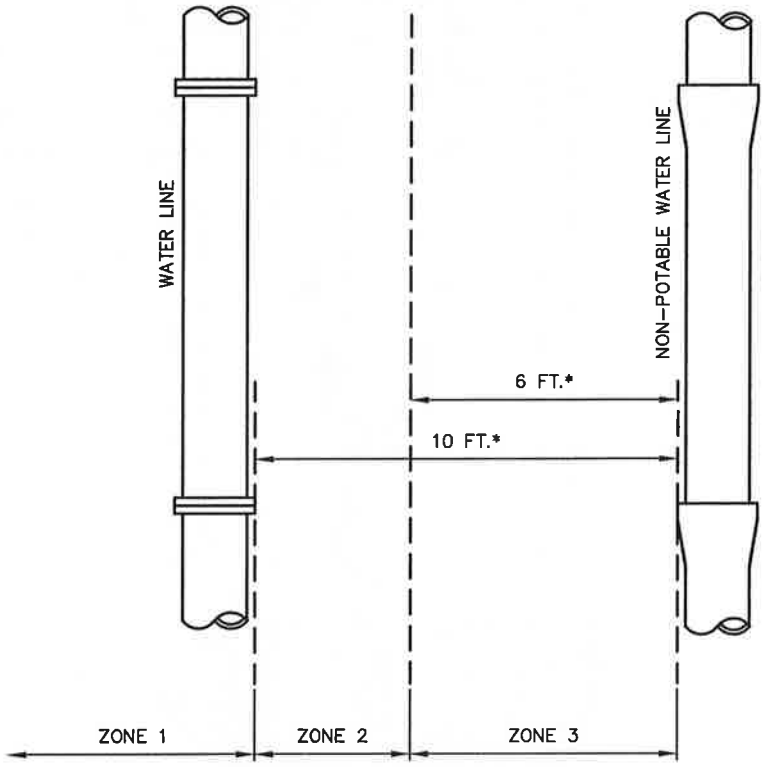
A. ALL PRODUCTS AS INDICATED OR APPROVED SUBSTITUTION.

B. IF AUTHORIZED BY THE ENGINEER, A HEAVY (10 GAGE) STEEL VALVE BOX AND CAP MAY BE USED IN LIEU OF CAST IRON BOX AND LID.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	VALVE BOX AND LID DETAIL	STANDARD DRAWING NO. SD-406





* DISTANCES ARE HORIZONTAL.

VERTICAL SEPARATION REQUIREMENTS

ZONE 1: A) WATER AND NPWL MUST BE SEPARATED BY AT LEAST 18" AND B) ONE FULL, UNCUT LENGTH OF BOTH PWL AND NPWL PIPE MUST BE CENTERED ON THE CROSSING SO THAT THE JOINTS ARE AS FAR AS POSSIBLE FROM THE CROSSING.

ZONE 2: A) ONE FULL, UNCUT LENGTH OF BOTH PWL AND NPWL PIPE MUST BE CENTERED ON THE CROSSING SO THAT THE JOINTS ARE AS FAR AS POSSIBLE FROM THE CROSSING.

AND EITHER B) NPWL MUST BE CONSTRUCTED TO WATER MAIN STANDARDS AND PRESSURE TESTED FOR WATER TIGHTNESS FOR A HORIZONTAL DISTANCE OF 10 FEET ON BOTH SIDES OF CROSSING.

OR C) EITHER THE NPWL OR WATER LINE OR BOTH MUST BE ENCASED WITH A SLEEVEING MATERIAL ACCEPTABLE TO DEQ FOR A HORIZONTAL DISTANCE OF 10 FEET ON BOTH SIDES OF THE CROSSING.

ZONE 3: SAME REQUIREMENTS AS ZONE 2 EXCEPT THE NPWL MUST ALSO BE SUPPORTED ABOVE THE CROSSING TO PREVENT SETTLING.

ZONE 4: SAME REQUIREMENTS AS ZONE 1 EXCEPT THE NPWL MUST ALSO BE SUPPORTED ABOVE THE CROSSING TO PREVENT SETTLING.

HORIZONTAL SEPARATION REQUIREMENTS

ZONE 1: A) NO SPECIAL REQUIREMENTS.

ZONE 2: A) NO SPECIAL REQUIREMENTS FOR POTABLE OR NON-POTABLE SERVICES.

B) WATER AND NPWL SEPARATED BY AT LEAST 6 FEET AT OUTSIDE WALLS.

AND C) WATER AT LEAST 18 INCHES HIGHER IN ELEVATION THAN THE NPWL.

AND EITHER D) NPWL CONSTRUCTED TO WATER MAIN STANDARDS AND PRESSURE TESTED FOR WATER TIGHTNESS.

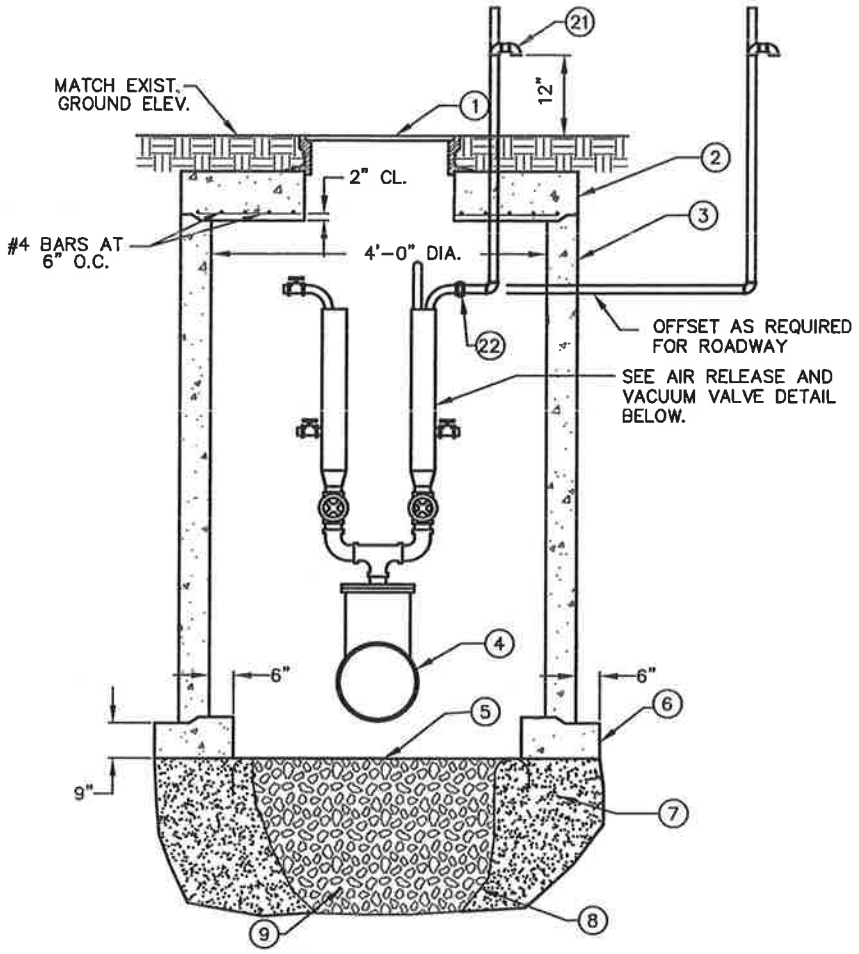
OR E) SITE SPECIFIC REQUIREMENTS APPROVED BY DEQ.

ZONE 3: NOT ALLOWED WITHOUT DEQ WAIVER.

NOTE: SANITARY SEWER FORCE MAINS MUST HAVE MIN. 10' HORIZONTAL SEPARATION AND 18" VERTICAL SEPARATION. ZONE 2 AND ZONE 3 PLACEMENTS ARE NOT ALLOWED WITHOUT A WAIVER GRANTED BY DEQ.

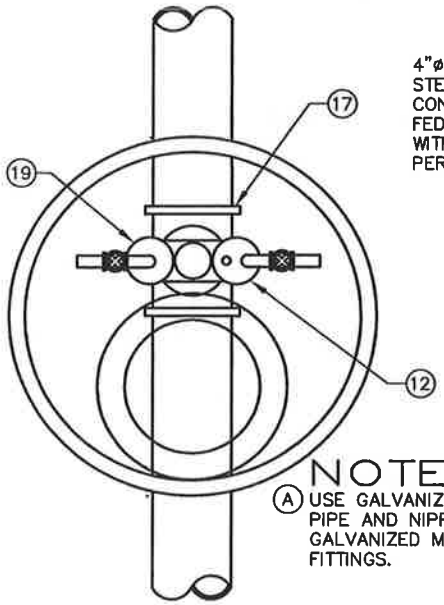
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	POTABLE AND NON-POTABLE WATER LINE (NPWL) SEPARATION	STANDARD DRAWING NO. SD-407



ELEVATION

N.T.S.

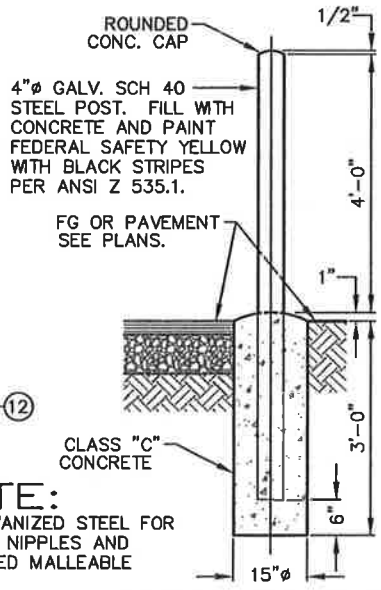


PLAN

N.T.S.

NOTE:

(A) USE GALVANIZED STEEL FOR PIPE AND NIPPLES AND GALVANIZED MALLEABLE FITTINGS.



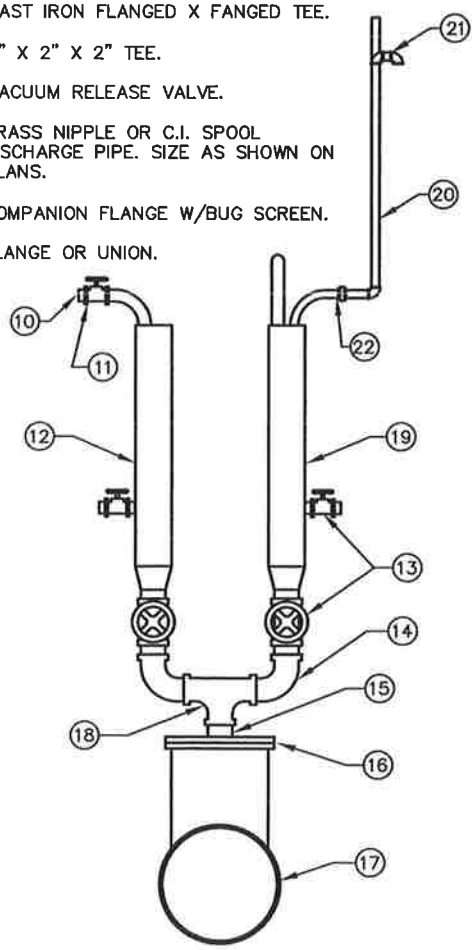
GUARD POST FOR BLOWOFF

N.T.S.

NOTE: PROVIDE 3/8" EJ MATERIAL WHERE INSTALLED IN CONC. PAVING.

LEGEND

1. CAST IRON RING AND COVER MARKED "WATER" PER SD-507.
2. STANDARD MANHOLE SLAB.
3. MANHOLE TYPE "A" PER SD-501.
4. WATER PIPE.
5. VOLUME OF ROCK TO BE 15 CUBIC FEET MINIMUM.
6. CONCRETE FOOTING.
7. COMPACTED TYPE 1 BEDDING.
8. DRAIN ROCK ABSORPTION SUMP WITH GEOTEXTILE FABRIC.
9. 2" MINUS WASHED DRAIN ROCK.
10. SHUT OFF VALVE (TYP).
11. QUICK DISCONNECT COUPLING.
12. 2" AIR RELEASE, VENT TO SUMP WITH AIR GAP.
13. GATE VALVE.
14. 90° ELBOW.
15. 2" THREADED CONNECTION.
16. BLIND FLANGE TAPPED FOR 2" IPT NIPPLE.
17. CAST IRON FLANGED X FANGED TEE.
18. 2" X 2" X 2" TEE.
19. VACUUM RELEASE VALVE.
20. BRASS NIPPLE OR C.I. SPOOL DISCHARGE PIPE. SIZE AS SHOWN ON PLANS.
21. COMPANION FLANGE W/BUG SCREEN.
22. FLANGE OR UNION.

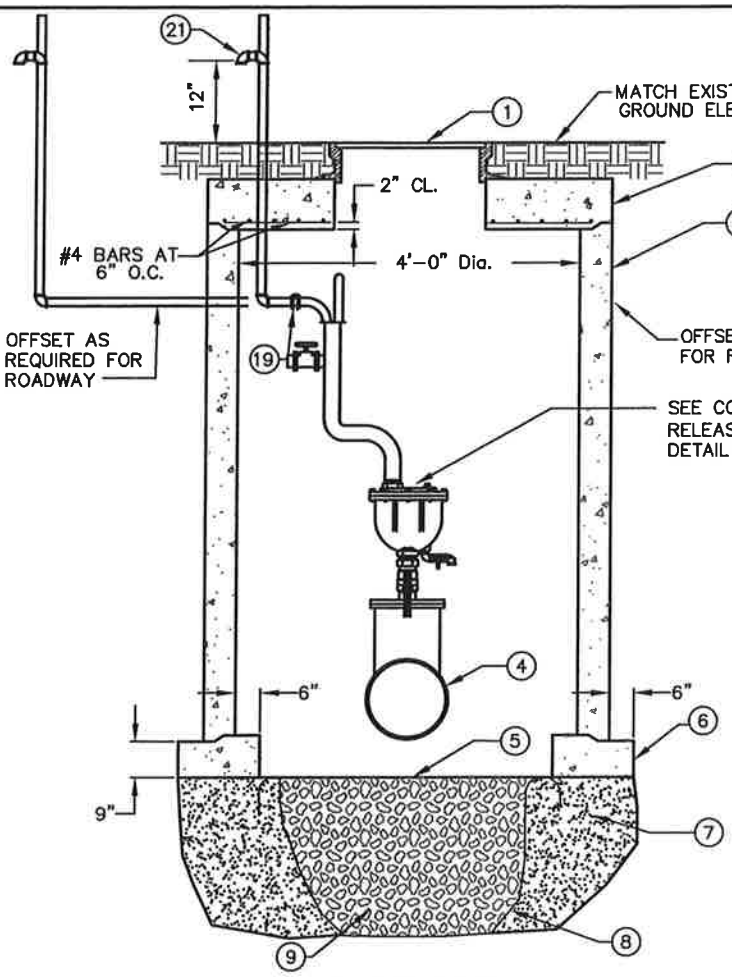


AIR RELEASE AND VACUUM VALVE DETAIL

N.T.S.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	AIR RELEASE/ VACUUM VALVE	STANDARD DRAWING NO. SD-408

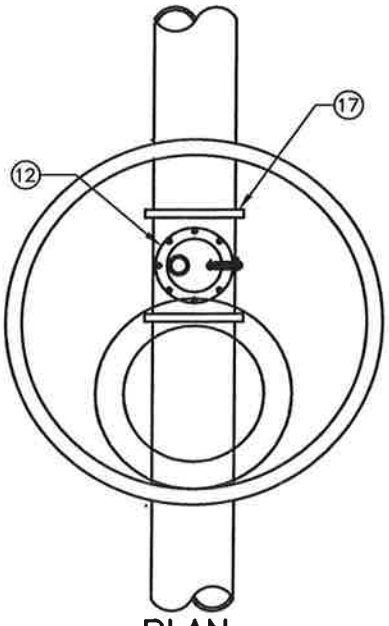


ELEVATION

N.T.S.

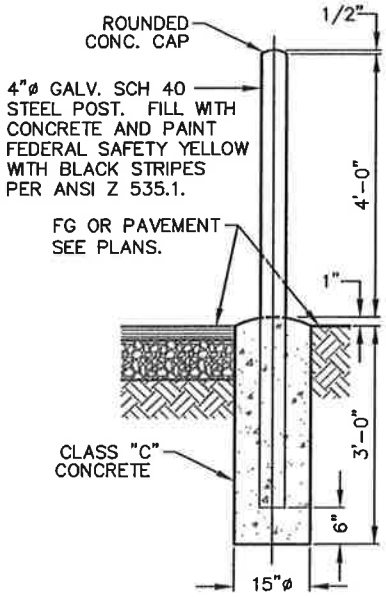
LEGEND

1. CAST IRON RING AND COVER MARKED "WATER" PER SD-507.
2. STANDARD MANHOLE SLAB.
3. MANHOLE TYPE "A" PER SD-501.
4. WATER PIPE.
5. VOLUME OF ROCK TO BE 15 CUBIC FEET MINIMUM.
6. CONCRETE FOOTING.
7. COMPACTED TYPE 1 BEDDING.
8. DRAIN ROCK ABSORPTION SUMP WITH GEOTEXTILE FABRIC.
9. 2" MINUS WASHED DRAIN ROCK.
10. SHUT OFF VALVE (TYP).
11. QUICK DISCONNECT COUPLING.
12. COMBINATION AIR RELEASE/VACUMM VALVE SIZED FOR APPLICATION.
13. GATE VALVE.
14. DRAIN VALVE.
15. THREADED CONNECTION.
16. BLIND FLANGE TAPPED FOR IPT NIPPLE.
17. CAST IRON FLANGED X FANGED TEE.
18. INLET SHUT-OFF VALVE.
19. FLANGE OR UNION.
20. BRASS NIPPLE OR C.I. SPOOL DISCHARGE PIPE. SIZE AS SHOWN ON PLANS.
21. COMPANION FLANGE W/BUG SCREEN.



PLAN

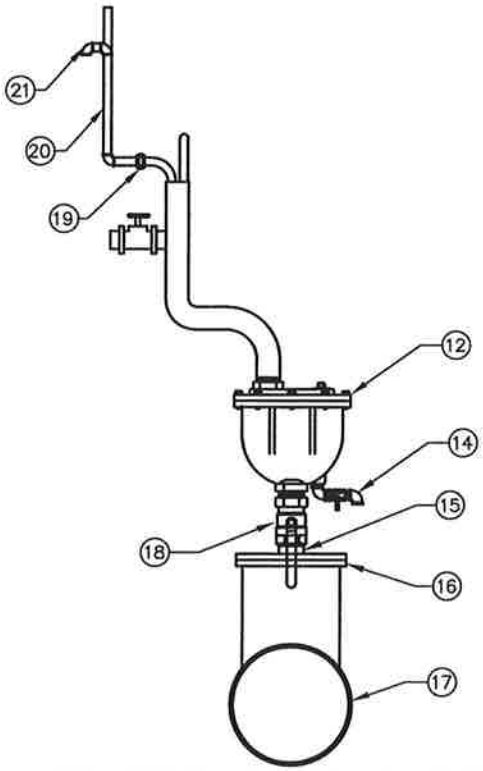
N.T.S.



GUARD POST FOR BLOWOFF

N.T.S.

NOTE: PROVIDE 3/8" EJ MATERIAL WHERE INSTALLED IN CONC PAVING.



AIR RELEASE AND VACUUM VALVE DETAIL

N.T.S.

NOTE:

(A) USE GALVANIZED STEEL FOR PIPE AND NIPPLES AND GALVANIZED MALLEABLE FITTINGS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	COMBINATION AIR RELEASE/VACUUM VALVE	STANDARD DRAWING NO. SD-408A

ISPWC – DIVISION 500

Sewer

Section 501 – Gravity Sewers
Section 502 – Manholes
Section 503 – Clean-outs
Section 504 – Sewer Services
Section 505 – Pressure Sewers
Section 506 – Plastic Liner
Section 507 – Sanitary Sewer Open Cut Repair/Rehabilitation
Section 508 – Sliplining
Section 509 – CIPP Rehabilitation
Section 510 – Pipe Bursting
Section 511 – Fold-N-Form Pipe Rehabilitation

SECTION 501

GRAVITY SEWERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gravity sewer pipe materials, installation and testing.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 304 – Trench Foundation Stabilization.

C. Section 305 – Pipe Bedding.

D. Section 306 – Trench Backfill.

E. Section 405 – Non-Potable Water Line Separation.

F. Section 506 – Plastic Liner.

1.3 REFERENCES

A. ANSI/AWWA C 151/A21.51: Ductile Iron Pipe.

B. ANSI/AWWA C 900: PVC Pressure Pipe for Water Distribution.

C. ANSI/AWWA C 905: PVC Pressure Pipe for Water Transmission.

D. ASTM C 14: Non-Reinforced Concrete Pipe.

E. ASTM C 76: Reinforced Concrete Pipe.

F. ASTM C 425: Compression Joints for Vitrified Clay Pipe and Fittings.

G. ASTM C 443: Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets.

H. ASTM C 700: Vitrified Clay Pipe.

I. ASTM C 1103: Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.

J. ASTM D 2241: PVC Pressure Rated Pipe.

K. ASTM D 2321: Underground Installation of Thermoplastic Pipe for Sewers and other Gravity Flow Application.

L. ASTM D 2412: Determination of External Loading Characteristics of Plastic Pipe by Parallel – Plate Loading.

M. ASTM D 3034: Type PSM PVC Sewer Pipe and Fittings.

N. ASTM F 477: Elastomeric Seals for Joining Plastic Pipe.

O. ASTM F 679: PVC Large Diameter Plastic Gravity Sewer Pipe and Fittings.

P. ASTM F 794: PVC Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

Q. ASTM F 894: Polyethylene Large Diameter Profile Wall Sewer and Drain Pipe.

R. ASTM F 1803: Dual wall closed profile PVC sewer pipe sizes 18” to 60”.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this section.

B. Submit manufacturer’s certification that pipe and fittings meet or exceed specified requirements including all requested test results and material identifications.

C. Submit manufacturers’ installation instructions and maintain copy at the jobsite.

D. Close circuit television inspection tapes.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of constructed pipelines and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store pipe in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from sunlight and contamination until ready for installation in the pipe.

PART 2 MATERIALS

2.1 PIPE SIZE, TYPE AND STRENGTH

A. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.

B. If type and strength classifications are not indicated in the Contract Documents, use any of the alternate pipe materials meeting the minimum requirements of this section.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 GRAVITY SEWER PIPE AND FITTINGS

A. Solid Wall PVC Pipe Sizes 4 inch to 15 inch: ASTM D 3034.

1. Minimum Wall Thickness: SDR 35.

2. Joints: Elastomeric gasket joints with ASTM F 477 elastomeric gaskets.

B. Solid Wall PVC Pipe Sizes 18 inch to 36 inch: ASTM F 679.

C. Ribbed PVC Pipe Sizes 8 inch to 48 inch: ASTM F 794.

1. Minimum Pipe Stiffness: 46 psi.

2. Ribs to be perpendicular to the axis of the pipe, unless otherwise approved by the Engineer.

D. ASTM F1803: Dual wall closed profile PVC sewer pipe sizes 18” to 60”

1. Minimum Pipe Stiffness: 46 psi.

E. Polyethylene Profile Wall Pipe 18 inch to 36 inch: ASTM F 894.

1. Ring Stiffness Constant: 160 psi.

F. Ductile Iron Pipe: ANSI/AWWA C 151/A 21.51.

1. Minimum Class: Thickness Class 50.

2. Joints: Push-on.

3. External Coating: Asphaltic coating, 1 mil thick minimum.

4. Internal Coating: 40 mils Protecto 401 ceramic epoxy coating as manufactured by Pacific States Cast Iron Pipe Co. or approved substitution.

G. Vitrified Clay Pipe 4 inch to 42 inch: ASTM C 700.

1. Strength: Extra strength.

2. Joints: ASTM C 425, Polyurethane compression joints.

H. Non-reinforced Concrete Pipe 4 inch to 36 inch: ASTM C 14.

1. Acceptance: On the basis of plant load-bearing tests, material tests, and inspection of manufactured pipe for visual defects and imperfections.

2. Minimum Class: As indicated in the Contract Documents.

3. Joints: ASTM C 443, Rubber Gasket Joints.

4. Liner: Section 506 - Plastic Liner.

I. Reinforced Concrete Pipe 30 inch to 144 inch: ASTM C 76.

1. Acceptance: On the basis of plant load-bearing tests, material tests, and inspection of manufactured pipe for visual defects and imperfections.

2. Minimum Class: As indicated in the Contract Documents.

3. Joints: ASTM C 443, Rubber Gasket Joints.

4. Liner: Section 506 - Plastic Liner.

J. Pressure Pipe for Gravity Sewers.

1. PVC Pipe: AWWA C 900 Class 100 psi or higher 4”-12”, AWWA C 905 Class 125 psi 14”-36”, or ASTM D 2241 Class 160 psi or higher. Match the inside diameter of the connecting non-pressure pipe, plus or minus 0.125 inches.

2.3 COUPLINGS FOR DISSIMILAR PIPE OR TWO PLAIN ENDS OF SIMILAR PIPE

A. Coupling for Two Pipes of Dissimilar Type or Size: Flex Seal couplers, providing for a watertight connection and a smooth pipe invert, as approved by the Engineer.

B. Coupling for Two Pipes Where Factory Bell and Spigot are not Available: Flex Seal couplers providing for a watertight connection and a smooth pipe invert, as approved by the Engineer.

C. Coupling of PVC Gravity Pipe to PVC Pressure Pipe for Gravity Sewers: Rigid PVC couplers providing for watertight connection and a smooth pipe invert, as approved by the Engineer.

D. Coupling of PVC Plain End to PVC Plain End: Bell-by-bell connection.

2.4 SOURCE QUALITY CONTROL

A. Provide test and inspection reports required by the standard for the pipe.

B. Inspect pipe markings to verify type, class, thickness and marking information required by the Standard for the pipe.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade and installation meets separation requirements per Section 405 – Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine pipe and fittings for defects or damage.

D. Verify pipe, fittings, bedding, and materials delivered to the site meet the requirements of the Contract Documents.

E. Verify utility locations, existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 PIPE INSTALLATION

A. On sewer line extensions, isolate hazardous gases and prevent groundwater and other material from entering an existing sewer line by installing a temporary air-tight plug in the first new manhole that will not restrict existing flow. The plug shall remain until the sewer has been accepted for use.

B. Prepare trench bottom as required by Section 301 – Trench Excavation.

C. Maintain groundwater 1 foot below the pipe invert and, if necessary, provide foundation stabilization in accordance with Section 304 – Trench Foundation Stabilization.

D. Provide pipe bedding and initial backfill as required by Section 305 – Pipe Bedding.

E. Install pipe in accordance with the manufacturer's recommendations.

F. Unless otherwise approved by the Engineer, install pipe upgrade with the bell-end upgrade.

G. Use standard lengths of pipe unless otherwise required for installation of tees, fittings, or manholes.

H. Utilize proper tools for cutting and beveling pipe ends and joining pipe. Use manufacturer's recommended tools designed for this task.

I. Move pipe carefully and prevent damage to pipe and manufactured ends while lowering pipe into trench.

J. Remove dirt and other foreign material from pipe.

K. Prepare pipe joint using specified gasket and manufacturer's recommended lubricant.

L. For reinforced concrete pipe, rotate pipe to correct orientation.

M. Mark, or verify that pipe ends are marked, to indicate insertion stop position (home). Ensure that pipe is inserted into bell to this mark. Push spigot into bell using methods recommended by the manufacturer. Protect the end of the pipe during "homing" and do not use excessive force that may result in over-assembled joints, dislodged gaskets, or damaged ends. If full entry is not achieved, disassemble and clean the joint and reassemble.

N. Provide sufficient restraint for the pipe to ensure that joints are held in place while bedding and initial backfill are placed and while the trench shoring system is moved.

O. Limit joint gap on clay and concrete pipe to less than 5/8 inch for pipe 4 inches through 10 inches, 7/8 inch for pipe 12 inches through 24 inches, and 1 inch for pipe 27 inches and larger.

P. When pipe installation is not in progress, block and plug the open end of the pipe to prevent creep, uplift or floating and entrance of water or other material into the pipe.

Q. Control line and grade of the pipe installation by use of a pipeline laser or other Engineer approved means. Check accuracy of laser against line and grade control hubs. Limit variance of installed pipe from line and grade as specified in the Table under Section 3.4, Testing, Subsection H, Closed Circuit Television (CCTV) Inspection.

R. When required install liner and PVC weld strips per Section 506 – Plastic Liner.

S. Install pipe anchors as necessary, per Standard Drawing SD-510 - Pipe Anchors.

T. Backfill trench as required by Section 306 – Trench Backfill.

3.3 PLUGS AND PIPE MARKERS

A. Furnish and install plugs or caps on pipe ends and stub-outs.

1. Provide shop drawings for plugs and caps on pipelines greater than 18 inches in diameter.

2. Ensure plugs and caps are easily removed and provide a bell end or joint suitable for making a gasketed connection when the pipeline is extended.

3. Fasten or block caps and plugs to ensure no displacement during testing and backfilling.

B. Furnish and install pipe markers at main line stub-outs per Standard Drawing SD-512 - Standard Service Marker.

C. Provide the Engineer with two working days notice to allow measurement of the vertical and horizontal location of pipe ends before the pipeline is covered, including service connections.

3.4 TESTING

A. Perform testing in the presence of the Engineer.

B. Visual Inspection.

1. Visually inspect the pipeline between manholes with mirrors or lights after the trench has been backfilled to check alignment and grade, and to check for pipe distortions, leaks, infiltration and other defects. Verify that a full diameter of pipe is visible from one manhole to the next. Uncover and repair leaks and defects in the pipeline. Do not reinstall damaged pipe.

C. Air Pressure Testing.

1. Low pressure air test lines that are 24 inches and smaller in diameter.

2. Provide equipment including gauges and instrumentation and calibrate the equipment at the request of the Engineer.

3. Preliminary and Final Testing:

a. Preliminary Testing: At the discretion of the Contractor, preliminary testing may be done at any time prior to installation of other utilities.

b. Final Testing: Perform final testing after backfilling and compaction and following installation of other utilities, but prior to surface restoration.

4. Test procedure.

a. Securely brace plugs to prevent unintentional release of the plug. Prohibit workers from entering a manhole where a plugged pipe is under pressure.

b. Locate pressure gauges, valves, and instrumentation required for the test and operation of the equipment at the ground surface.

c. Equip testing apparatus with a pressure release device such as a rupture disk or pressure relief valve to relieve pressure in the pipe being tested at 6 psi.

d. Measure static groundwater depth above the pipe at the low end of the pipe. If static groundwater level is below the centerline of the pipe use the test pressures noted in this section. If the groundwater is above the centerline, add 0.5 psi to the test pressure for every foot of groundwater above the centerline of the pipe. If pressure will exceed 6 psi use hydrostatic exfiltration testing.

e. Pressurize the pipe to 4.0 psi and maintain pipe pressure between 3.5 and 4.0 psi for at least 2 minutes.

f. With the pressure at exactly 3.5 psi, disconnect the air supply, start a stopwatch and record the time for pressure to drop to 3.0 psi.

g. If the pressure drops more than 0.5 psi in the pipe faster than the minimum holding time presented in the following table make the necessary corrections to reduce the leakage to acceptable limits and retest the pipe.

Table 1

TIME HOLDING CHART											
1 Pipe Dia. (in)	2 Min. Time (min: sec)	3 Length for Min. Time (ft)	4 Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	.190L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187L	4:43	4:43	4:57	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846L	3:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.537L	11:24	17:47	22:48	28:30	34:11	39:53	45:35	51:17

D. Hydrostatic Exfiltration Testing.

1. Hydrostatic exfiltration test pipes larger than 24 inches in diameter or pipes 24 inches and smaller in diameter with groundwater conditions above pipe invert.

2. Test Procedure.

a. If necessary, fill pipe with clean water 24 hours prior to the test to allow time for absorption into the pipe walls.

b. Conduct exfiltration testing with a test pressure of at least 6 feet of water column above the static water table or the crown of the pipe at the upper end of the pipe, whichever is higher.

c. If exfiltration exceeds 0.16 gallon/hour/inch of inside diameter of pipe per 100 feet of sewer main, lateral, service line and stub-out, make the necessary corrections to reduce leakage to acceptable limits and retest the pipe. If manholes are included in the test section, increase the allowable leakage by 0.1 gallon/hour/foot of manhole depth tested.

d. Minimum test time is four hours.

3. Preliminary and Final Testing:

a. Preliminary Testing: At the discretion of the Contractor, preliminary testing may be done at any time prior to installation of other utilities.

b. Final Testing: Perform final testing after backfilling and compaction and following installation of other utilities but prior to surface restoration.

E. Large Diameter Pipeline Testing – Alternative to Hydrostatic Method

1. Upon approval of the Engineer, conduct low pressure air testing on pipes 27” through 60” per UNI-BELL Specification UNI-B-6-98. Refer to that specification for complete testing details.

a. Provide for all safety measures including, but not limited to:

1) Installation of adequate plug restraint to withstand testing forces with a conservative factor of safety. Necessary calculations and design of restraint system are to be performed by a licensed Idaho PE. Submit calculations for approval by the Engineer.

2) Provide a pressure relief valve on plug to release at a minimum pressure of 6 psig.

3) Do not allow personnel in manholes or near plugs during pressurization, testing, or depressurization.

4) Provide safety requirements of the plug manufacturer.

5) Provide all other safety procedures deemed necessary.

b. Seal test pipe plugs at grade before use to ensure they hold at the maximum test pressure of 6 psig without bracing. Do not allow personnel within the alignment of the pipe ends during seal testing.

c. Prepare the line to be tested by cleaning the line, capping all service connections, and pre-wetting any lines that are made of porous pipe materials.

d. Inspect the joint at each manhole on the line to be tested to ensure its integrity prior to placing the pipe plugs, which will cover said joint.

e. Upon successful seal testing of the pipe plugs, place plugs in the line to be tested and brace the plugs. Place the upstream plug first to prevent upstream water collecting in the line.

f. Slowly inject low pressure air into the sealed line until the internal pressure reaches 4 psig greater than the average backpressure of any groundwater above the pipe invert, but not greater than 6 psig. The groundwater backpressure (measured in psig) is calculated by dividing the height of the groundwater above the pipe invert by 2.31.

g. After the target pressure is obtained, throttle the air supply to maintain that internal pressure for at least five minutes to stabilize temperatures.

h. Shut off the air supply and, prior to the reading decreasing below 3.5 psig, mark time with a stop watch, and observe the pressure gage. Acceptability of the pipe will be based on the time required for a 1.0 psig pressure drop per the following table. If the time shown on the table elapses prior to the pressure dropping 1.0 psig, the line is acceptable.

Table 2
SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015*

Pipe Diameter (in)	Minimum Time (min: sec)	Length for Minimum Time (ft)	Time for Longer Length (sec)	Specified Minimum for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
42	39:48	57	41.883 L	69:48	104:42	139:37	174:30	209:24	244:19	279:13	314:07
48	45:34	50	54.705 L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17
54	51:02	44	69.236 L	115:24	173:05	230:47	288:29	346:11	403:53	461:34	519:16
60	65:40	40	85.476 L	142:28	213:41	284:55	356:09	427:23	498:37	569:50	641:04

Note: If there has been no leakage (zero psig drop) after one hour of testing, the test section shall be accepted and the test complete.
*Q is the allowable leakage rate in $ft^3/min/ft^2$ of inside surface area of pipe.

i. If the line fails the pressure test, make required repairs and re-test at no additional cost to the Contract.

j. Provide testing results in writing to the Engineer.

2. Upon approval of the Engineer, conduct low pressure air testing on pipes larger than 60" per ASTM C 1103: Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines. Refer to that specification for complete testing details.

a. Provide for all safety measures including, but not limited to:

1) Install a pressure relief valve on plug to release at a minimum pressure of 6 psig.

2) Do not allow personnel in manholes, pipe, or near plugs during pressurization, testing, or depressurization.

3) Provide safety requirement of the joint testing system manufacturer.

4) Provide all other safety procedures deemed necessary.

b. Ensure testing apparatus is suitable for the application and has been tested to the anticipated application pressures and is fully restrained within the pipe.

c. Prepare the line by cleaning the joint to be tested and pre-wet the pipe if made of porous materials.

d. Conduct a joint-by-joint air test of the line.

1) Install joint testing apparatus.

2) Slowly inject low pressure air into the sealed line until the internal pressure reaches 3.5 psig greater than the average backpressure of any groundwater above the pipe invert, but not greater than 6 psig. The groundwater backpressure (measured in psig) is calculated by dividing the height of the groundwater above the pipe invert by 2.31.

3) Stabilize air pressure for a minimum of 5 minutes.

4) Turn off air supply and monitor pressure gage.

5) If pressure holds, or drops less than 1.0 psig in 5 seconds, the pipe joint passes.

6) If pipe joint fails, repair and retest at no additional cost to the Contract.

e. Conduct a joint-by-joint water test of the line.

1) Install joint testing apparatus.

2) Slowly inject water the sealed line until the internal pressure reaches 3.5 psig greater than the average backpressure of any groundwater above the pipe invert, but not greater than 6 psig. The groundwater backpressure (measured in psig) is calculated by dividing the height of the groundwater above the pipe invert by 2.31.

3) Turn off water supply and monitor pressure gage.

4) If pressure holds, or drops less than 1.0 psig in 5 seconds, the pipe joint passes.

5) If pipe joint fails, repair and retest at no additional cost to the Contract.

f. Provide testing results in writing to the Engineer.

F. Pipe Cleaning.

1. Prior to deflection testing and CCTV inspection, clean the completed pipeline with a hydro-cleaner, or other Engineer approved cleaning equipment, and provide a pipeline free of dirt, mud, rocks, or other material. Leave downstream plugs in place during cleaning and do not introduce foreign material into existing sewer lines. Closed Circuit Television (CCTV) Inspection.

G. Deflection Tests for Flexible Pipe.

1. Deflection test all flexible pipelines no sooner than 30 days after trench backfill and compaction is completed. Unless otherwise provided in the contract, Contractor to bear costs associated with completing surface repair or other work prior to all required testing. The maximum allowable deflection is to be 5.0% of the nominal pipe diameter.

2. Provide test mandrels with a diameter at least 95% of the actual inside diameter (ID) of the pipe. For pipes with controlled outside diameter, calculate the actual ID of the pipe by taking the average outside diameter (OD) as set by the ASTM standard and subtracting 2 times the minimum wall thickness as set by the ASTM standard. For pipes with controlled inside diameter, use the ID set by the ASTM Standard.

3. Pull the appropriate mandrel through the pipe using one of the following methods:

a. Pull the mandrel through the pipe by hand. If the pipe will not allow the mandrel to pass, repeat the test from the opposite direction to determine the limits of failure.

b. As a part of the CCTV inspection, pull the mandrel through the pipe by connecting it in front of the CCTV camera lens at a distance equal to the camera's focal length. Notify Engineer of time and date of test at least 24 hours prior to testing to allow for Engineer, at Engineer's discretion, to witness test. Provide tag line to reverse mandrel and camera should mandrel fail to pass through line. Perform test as a separate step from the CCTV inspection thus a separate VHS tape record must be made of the mandrel test. Clearly mark tape identifying project name, mandrel test, and the pipe will not allow the mandrel to pass, repeat the test from the opposite direction to determine the limits of failure.

4. Uncover and, if required by the Engineer, remove and reinstall new pipe sections for reaches with excessive deflection or recompact bedding if, in the opinion of the Engineer, existing pipe is not damaged. Retest pipe after any repair work is completed. Do not reinstall damaged pipe.

5. Use a "Go-Nogo" pin gauge instead of a mandrel if "Insta-Tap" tee fittings are used for service connections. Use test diameter per G.2 above.

6. The Owner may conduct additional deflection testing prior to expiration of the warranty period. Uncover and reinstall sections of the pipe found to have excessive deflection. Do not reinstall damaged pipe.

H. Closed Circuit Television (CCTV) Inspection.

1. Acceptance criteria:

a. If standing water is observed due to grade defects, use the following table to determine allowable depth of standing water in relationship to the design slope of pipe.

Pipeline Slope (FT/FT)	Allowable Standing Water Depth (IN)
G<0.001	≤or=5/8"
0.001≤G<0.002	≤or=1/2"
0.002≤G<0.004	≤or=3/8"
0.004≤G<0.006	≤or=1/4"
0.006≤G<0.008	≤or=1/8"
G>0.008	No standing water

b. No pipeline structural defects observed.

c. No pipeline installation defects observed.

d. No infiltration observed.

2. CCTV sewer line inspection to be performed by firms which are suitably equipped, experienced, qualified and staffed for sewer line CCTV inspection. If requested, provide a calibration video showing various water depths for the size of pipe being videoed. Calibration video must be onsite during CCTV process. Also, if requested, provide an acceptable method of measuring the depth of standing water at potential problem locations, other than the calibration tapes. A camera-mounted water depth gauge may be used upon pre-authorization of the Engineer.

3. Ensure all manhole grout work is completed prior to CCTV to prevent pipe breakage at the pipe connection to the manhole.

4. Perform CCTV inspection after backfill and prior to surface repair. Uncover and reinstall sections of the pipe found to have defects in workmanship (including standing water caused by grade defects) as directed by the Owner. After repair re-CCTV the repaired section. Do not reinstall damaged or rejected pipe.

5. Notify Engineer at least 48 hours prior to CCTV inspection to allow for Engineer, at Engineer's discretion, to witness.

6. Clean lines prior to CCTV inspection using hydro cleaner, flushing balls or other suitable means acceptable to Engineer. Remove debris from lines rather than washing them downstream.

7. Immediately prior to CCTV inspection, pour sufficient water/dye mixture in upstream manhole to produce visible flow in downstream manhole(s). Allow excess water to drain from pipe prior to commencing CCTV inspection.

8. Provide CCTV records in high quality DVD format unless otherwise directed by the Engineer.

9. Provide CCTV sewer line inspection equipment including a color camera system, DVD recording system, camera propulsion equipment and van to allow witness of CCTV by Inspector.

10. The DVDs shall include the following video and audio information:

    a. Video:

        1) Project Number & Name.

        2) Date of TV Inspection.

        3) Upstream and downstream manhole numbers.

        4) Current distance along line segment.

b. Audio:

1) Date of TV Inspection.

2) Verbal confirmation of upstream and downstream manhole numbers and/or locations.

3) Verbal description of pipe, size, type, and pipe joint length.

4) Verbal description of location of each service connection.

c. Tape Identification Tag:

1) Manhole to Manhole Designation.

11. If no defects observed, submit DVDs and logs to Engineer for review and acceptance.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Includes all labor, materials, and equipment required to perform the work as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Gravity Sewer Pipe (pipe only): By the linear foot for the type and size of pipe measured along the horizontal centerline of the pipe. Includes pipe, fittings, connections and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 501.4.1.A.1.
2. Bid Schedule Description: Gravity Sewer Pipe – size _____ - type_____(pipe only)…linear foot (LF).

3. Bid Schedule Payment Reference: 501.4.1.A.3.
4. Bid Schedule Description: Pressure Sewer Pipe – size _____ - type_____(pipe only)…linear foot (LF).

B. Gravity Sewer Pipe (including excavation, bedding and backfill): By the linear foot for the size and type of pipe measured along the horizontal centerline of the pipe from center of manhole to center of manhole. Includes pipe, fittings, connections, excavation, bedding, backfill and all other work not separately itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 501.4.1.B.1.
2. Bid Schedule Description: Gravity Sewer Pipe – size _____ - type_____(includes excavation, bedding, backfill, etc.)…linear foot (LF).

3. Bid Schedule Payment Reference: 501.4.1.B.3.
4. Bid Schedule Description: Pressure Sewer Pipe - size _____ - type_____(includes excavation, bedding, pipe, backfill, etc.)…linear foot (LF).

C. Closed Circuit Television Inspection: By the linear foot for various pipe diameters measured along the horizontal centerline of the pipe from the centerline of the downstream manhole to the centerline of the upstream manhole. Includes all materials, tools, labor and equipment necessary for cleaning and televising the pipelines and all other work not separately itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 501.4.1.C.1.
2. Bid Schedule Description: CCTV Inspection – size _____ ..linear foot (LF).

D. Concrete Pipe Anchors. Per each as listed in the Bid Schedule.

1. Bid Schedule Payment Reference: 501.4.1.D.1.
2. Bid Schedule Description: Concrete Pipe Anchors…each.

END OF SECTION

SECTION 502

MANHOLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manholes and Appurtenances.

1.2 RELATED SECTIONS

A. Section 204 – Structural Excavation and Backfill.

B. Section 305 – Pipe Bedding.

C. Section 506 – Plastic Liner.

D. Section 703 – Cast-in-Place Concrete.

E. Section 802 – Crushed Aggregates.

1.3 REFERENCES

A. ASTM A 48: Gray Iron Castings.

B. ASTM C 478: Precast Reinforced Concrete Manhole Sections.

C. ASTM C 497: Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that manholes and appurtenances meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of constructed manholes and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store manholes sections, castings, and appurtenances in a manner which prevents shock, damage or excessive exposure to weather.

B. Protect joint sealing material from sunlight and contamination until ready for installation in the manhole.

PART 2 MATERIALS

2.1 MANHOLE SIZE, TYPE AND STRENGTH

A. Comply with manhole size and type indicated in the Contract Documents.

B. Notify the Engineer if manhole type and size classifications are not indicated in the Contract Documents.

C. Notify the Engineer if installation conditions such as manhole location, invert depth, soils, and bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 MANHOLES

A. Precast Manholes: ASTM C 478 for all components except as modified herein and as shown on manhole Standard Drawings: SD-501, SD-502, SD-503, SD-504, SD-505, and SD-505 A.

B. Cast-in-Place Manholes: ASTM C 478 and Section 703 – Cast-in-Place Concrete for all materials and dimensions except as modified herein or as shown on manhole Standard Drawings: SD-501, SD-502, SD-503, SD-504, SD-505, and SD-505 A.

C. When specified, provide plastic liner for each manhole.

2.3 STEPS

A. Plastic Coated Steel.

1. Material: 1/2-inch steel reinforced bar covered with a polypropylene plastic per Standard Drawing SD-509 - Plastic Coated Manhole Steps.

2. Standard: Comply with ASTM C 478.

2.4 GRADE RINGS

A. Concrete: Class 3000 psi per Section 703 – Cast-in-Place Concrete.

B. Polyethylene: Only with pre-approval of the Engineer. Submit material specification for Engineer approval.

C. Precast concrete grade rings in conformance with ASTM C 478.

D. An HDPE form, Wirly-Gig or approved substitution, installed per manufacturer's recommendations, may be used in lieu of grade rings up to the maximum height shown on the standard drawings for manholes.

2.5 FRAMES AND COVERS

A. Size and Shape: As detailed in Standard Drawings SD-507 - Standard Manhole Cover and Frame and SD-507A - Manhole Cover and Flat Frame, unless otherwise specified in the Contract Documents.

B. Frames and Covers: ASTM A 48 Class 20 ksi cast iron, free of all defects. Plane or grind castings, if necessary, to ensure perfectly flat, smooth, even, and true surfaces.

C. Cover Marking: "Sanitary Sewer" molded into the top with letters having a minimum height of 1 inch.

D. Lock-type Castings: Provide a locking device made of corrosion resistant metal such that the cover may be readily released from the frame.

E. Watertight Covers: Provide only if specified in the Contract Documents.

2.6 COLLARS

A. Concrete Collars: Class 3000 psi per Section 703 – Cast -in-Place Concrete.

2.7 LINER

A. PVC Liner: Per Section 506 – Plastic Liner.

2.8 MORTAR AND GROUT

A. Dry Conditions: Per Section 703 – Cast-in-Place Concrete, Subsection 2.3 – Accessories.

B. Wet Conditions: Quick-setting grout – Water Plug or approved substitution.

2.9 MANHOLE JOINT SEALANT

A. Caulking: Vulkem 116, or approved substitution, upon pre-approval of the Engineer.

B. If grout begins to set prior to application, do not re-temper by adding water to return it to a workable state.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine manholes and appurtenances for defects or damage.

D. Verify manholes, castings, aggregate, and materials delivered to the site meet the requirements of the Contract Documents.

E. Verify utility locations, existing piping locations, and required separation from water line prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 PLACEMENT OF BEDDING

A. Place 4 inches of compacted Type 1 bedding on prepared subgrade as specified in Section 305 – Pipe Bedding. Extend bedding either to the limits of the excavation or at least 12 inches outside the limits of the manhole base section. Provide a minimum of 12 inches of space between outer surface of manhole and earth wall for inspection purposes.

B. Fill the balance of the excavated area with select material compacted level to the top of the bedding.

C. Grade bedding to provide a smooth and level bearing surface.

3.3 CONNECTION OF SEWER LINES TO NEW MANHOLES

A. Provide a flexible connection between manhole and pipe by one of the following methods:

1. Pipe Joint: Within 18 inches of the manhole wall.

2. Pipe Hub: Cast in the manhole wall or base.

3. Flexible Manhole Connector: KOR-N-SEAL or approved substitution.

B. Pipe hubs to be compatible with pipeline material, provide a watertight seal between the pipe or hub and the manhole by one of the following methods:

1. Ridge Type: Embed in the manhole wall.
2. Flexible O-Ring Type: Place on the exterior of the pipe installed as gaskets embedded in the concrete manhole wall.

C. If manhole is core-drilled: Use KOR-N-SEAL boot or approved substitution.

D. For HDPE profile pipe or other pipe with undular exterior, provide transition to smooth wall pipe prior to manhole.

E. Place no grout material on interior of boot until such time as the vacuum test has been successfully completed.

3.4 CONNECTION OF SEWER LINES TO EXISTING MANHOLES

A. Core drill all connections to existing manholes to provide a neat and smooth access.

B. Provide a KOR-N-SEAL flexible connector or approved substitution between the manhole and the pipe, providing a waterproof barrier and flexible joint.

C. Trim ends of pipe flush with inside walls.

D. For HDPE profile pipe or other pipe with undular exterior, provide transition to smooth wall pipe prior to manhole.

E. If the material below the existing concrete collar is disturbed during connection to the manhole, remove the replace concrete collar in conformance with the requirements of Section 502.3.13, Placement of Concrete Collars and in conformance with Standard Drawing SD-508 at no additional cost to the Contract.

F. If vacuum test is required, place no grout material on interior of boot until such time as the vacuum test has been successfully completed.

3.5 PLACEMENT OF MANHOLE BASES

A. Cast-In-place Manhole Bases.

1. For New Mains: Per ASTM C 478 except where modified by the Standard Drawings or the Contract Documents.

2. Over Existing Mains:

a. Provide a watertight seal, Ram-Nek gaskets, or approved substitution around the existing pipe at the manhole.

b. Saw cut existing main to spring line, before placing of the base. After placing of the base, slope the base floor to flow to the existing sewer line.

c. Fill all voids in the base floor and the exposed edges of the existing pipe with a non-shrink grout or mortar, allowing no deleterious material to enter the sewer system.

B. Prefabricated Manhole Bases.

1. For new mains: Per ASTM C 478 except where modified by the Standard Drawings or the Contract Documents.

2. Over Existing Mains:

a. Saw cut and remove a sufficient length of pipe to allow for placement of manhole base.

b. Reconnect existing pipes using allowable connectors.

3.6 MANHOLE INVERT CONSTRUCTION

A. Construct manhole inverts to provide smooth, flow-through characteristics and in accordance with the Standard Drawings and Contract Documents and in a manner to allow for insertion of a 6 inch diameter, 30 inches long CCTV sewer line inspection camera.

B. Grouting of inverts and sharp edges or rough sections is not permitted.

C. Construct the invert to a section identical with that of the lower half of the sewer pipe flowing through the manhole. At transitions of difference pipe diameters, construct the invert to form a smooth transition.

D. Where a full section of sewer pipe is laid through the manhole, saw cut the top portion of the pipe to or below the spring line of the pipe to provide a minimum 42 inches long opening. Provide waterproof seal, Ram-Nek gaskets (or approved substitution) around the existing pipe at the manhole base. Cover the exposed edges with mortar.

E. Slope the shelf of the manhole to drain towards the flow line as shown on the Standard Drawings. Provide a minimum manhole base diameter of 42 inches unless otherwise specified.

F. Divert flow for at least 24 hours following construction of the invert section(s).

3.7 MANHOLE BARREL AND CONE CONSTRUCTION

A. Construct cast-in-place manhole walls or place precast barrel and cone sections plumb and true per the Standard Drawings, the Contract Documents, and ASTM C 478.

B. Prior to installation of barrel sections, clean all joining surfaces thoroughly and place non-shrink grout or a mastic (Ram-Nek or approved substitution) or pre-lubricated gasket (TYLOX Super Seal or approved substitution) to the top of the concrete base providing a watertight seal. Alternatively, imbed the barrel section in the concrete base prior to the concrete curing. Any visual leakage will be cause for rejection.

C. Ensure that the top of the cone section allows for a maximum of 21" from top of the cone to the finished rim elevation.

D. Trim mastic flush with the inside wall of the manhole.

E. Do not backfill barrel until grout has set up.

F. Seal exterior manhole surface at joints with caulk (Vulkem 116 or approved substitution) per manufacturer's recommendations. Vertical annular space in the joint shall be filled with mastic and the horizontal planes shall be sealed with non-shrink grout or caulking.

3.8 PLACEMENT OF GRADE RINGS

A. Adjust frame elevations to finish grade with grade rings or by an approved cast in place adjustment method. Maximum distance from the top of the cone to finish grade shall be no more than 21".

B. Set grade rings in a bed of non-shrink grout or mortar troweled smooth with the inside of the manhole. Apply non-shrink grout between metal frame and top grade ring.

C. Do not grout until final finished grade has been established.

D. Place polyethylene grade rings in accordance with manufacturer specifications. To be used only with pre-approval of the Engineer.

3.9 INSTALLATION OF STEPS

A. Install steps in manholes greater than 4 feet in depth with locations in accordance with the Standard Drawings.

B. Cast, mortar, or attach steps by mechanical means to meet the loading and testing requirements of ASTM C 478 and Test Method ASTM C 497.

3.10 INSTALLATION OF LINER

A. When specified in the Contract Documents and per Section 506 – Plastic Liners.

1. Coverage: Interior surface of the manhole, including inverts and grade rings if not otherwise specified.

2. Isolation: Completely isolate the concrete surfaces of the manhole from the gases in the sanitary sewer atmosphere.

3. Attachment: Mechanically lock liner to the manhole interior surface by either embedding the liner or through the use of adhesives and plastic IDP insulation anchors as manufactured by HILTI, or approved substitution.

4. Bench: After lining, coat bench area with a non-skid surface per Section 506 – Plastic Liners.

B. Strong Seal coating only when pre-approved by the Engineer and in accordance with the Contract Documents.

3.11 BACKFILLING

A. Backfill around manholes per Section 306 – Trench Backfill.

3.12 TESTING

A. Unless otherwise indicated in the Contract Documents, test all manholes.

B. Testing Schedule.

1. Preliminary Testing: At the discretion of the Contractor, it is recommended that preliminary testing be done at any time prior to backfill and installation of other utilities for the repair area to be more accurately identified. A final test will still be required.

2. Final Testing: Perform final testing after backfilling and compaction and following installation of other utilities, but prior to surface restoration. If a test fails, the manhole shall be repaired and retested at no cost to the Owner.

C. Use one of the following testing methods. Test lined manholes prior to final welding of joints.

1. Hydrostatic Testing:

a. Pre-fill: Fill manhole with water 24 hours prior to the time of the test, if desired, to permit normal absorption into the walls to take place.

b. Plug Pipes: Plug all piping, inlets and outlets in the manhole.

c. Fill: Fill with water to within 1 foot of the ring elevation.

d. Requirement: An allowance of 0.1 gallon/hour for each 1 foot of manhole depth is allowed. If a test fails, repair and retest at no additional cost to the Contract.

e. Duration: Minimum time duration of test to be one continuous hour.

2. Vacuum Testing.

a. Tester: NPC Manhole Vacuum Tester, or approved substitution.

b. Procedure.

1) Plug Holes: Plug lift holes with non-shrink grout and pipes with plugs.

2) Brace Plugs: Brace plugs to prevent them from being drawn into the manhole.

3) Place Test Head: Inside of the top of the cone section and inflate seal in accordance with the manufacturer's recommendations.

4) Draw a Vacuum: To 10 inches of mercury and shut off the vacuum pump.

5) Measurement: With the valves closed, measure the time for the vacuum to drop to 9 inches.

6) Requirement: Time to be greater than those indicated in Table 1.

Table 1
MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS

Manhole Depth (ft)	**Diameter, in.**				
	48	**54**	**60**	**66**	**72**
Time, seconds					
8	40	43	46	49	53
10	45	49	53	56	61
12	50	55	59	63	69
14	55	61	66	71	77
16	60	66	72	78	87
18	60	68	75	83	90
20	60	68	75	83	90
22	60	68	75	83	90
24	60	68	78	87	97
26	64	75	85	94	105
28	69	81	91	101	113
30	74	87	98	108	121

D. Retest: If the manhole fails the initial test, make repairs and retest at no additional cost to the Contract. Drilling and injection of chemical grout for leak repair shall only be performed with pre-authorization of the Engineer and only as a last resort.

3.13 PLACEMENT OF CONCRETE COLLARS

A. Place collars in all paved areas per the Standard Drawing SD-508 - Manhole Collar, and Section 703 – Cast-in-Place Concrete. Concrete to be Class 3000 psi.

B. Finish the surface of the concrete collar with a smooth uniform lightly broomed surface 1/8 inch to 1/4 inch below the adjacent pavement.

C. Install frame and cover even with the concrete surface.

D. Allow Engineer to inspect concrete reinforcement on each collar prior to placing concrete.

3.14 CONSTRUCTION OF DROP MANHOLES

A. Construct drop manholes per the Standard Drawing SD-504 - Drop Manhole and the Contract Documents.

B. Concrete drop manhole on a firmly compacted base and place Class 3000 psi concrete to ensure firm pipe support adjacent to the manhole. Refer to Section 703, Cast-in-Place Concrete.

3.15 SPECIAL MANHOLES

A. Construct special manholes, whenever required, per requirements for standard manholes, except as otherwise called for in the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit price options as designated on the Bid Schedule. Includes furnishing and installing the manhole and appurtenances, pipe connections, core drilling, excavation, bedding, foundation, backfill, compaction, collars, testing, liner when required, and all other items not itemized on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Sanitary Sewer Manhole: Per each for the various types and sizes of manholes indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 502.4.1.A.1.
2. Bid Schedule Description: Sanitary Sewer Manhole – Type _____…each (EA).

B. Sanitary Sewer Manhole: Per each basis for depth 4 feet through 10 feet and per additional 1 foot for depths in excess of 10 feet. Measurement of manhole depths to the nearest 1 foot from invert at the center of the manhole to the top of the manhole ring and cover.

1. Bid Schedule Payment Reference: 502.4.1.B.1.
2. Bid Schedule Description: Sanitary Sewer Manhole – Type _____ 4 feet through 10 feet Vertical Depth…each (EA).

3. Bid Schedule Payment Reference: 502.4.1.B.3.
4. Bid Schedule Description: Sanitary Sewer Manhole – Type _____ Additional Depth…vertical foot (VF).

C. Plastic Lined Sanitary Sewer Manhole: Per each for the various types and sizes of manholes indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 502.4.1.C.1.
2. Bid Schedule Description: Plastic Lined Sanitary Sewer Manhole – Type _____…each (EA).

D. Drop Manhole: Per each for the type indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 502.4.1.D.1.
2. Bid Schedule Description: Drop Manhole - Type _____…each (EA).

E. Shallow Manhole: Per each for the various types and sizes of manholes indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 502.4.1.E.1.
2. Bid Schedule Description: Shallow Manhole – Type _____…each (EA).

F. Connection to Existing Manhole: Per each for the diameter indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 502.4.1.F.1.
2. Bid Schedule Description: Connection to Existing Manhole Size _____…each (EA).

END OF SECTION

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SECTION 503

CLEAN-OUTS

PART 1 GENERAL

1.1 SCOPE

A. Standard Clean-outs and Appurtenances.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 306 – Trench Backfill.

C. Section 501 – Gravity Sewer.

D. Section 802 – Crushed Aggregates.

1.3 REFERENCES

A. ASTM A 48: Gray Iron Castings.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that pipe and fittings meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of constructed clean-outs and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store clean-out pipe and appurtenances in a manner, which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from sunlight and contamination until ready for installation in the pipe.

PART 2 MATERIALS

2.1 PIPE SIZE, TYPE AND STRENGTH

A. Clean-out material to match material used for gravity sewer per Section 501 - Gravity Sewer. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.

B. Submit connection shop drawing for Engineer's approval if using clean-out material that does not match the type and strength of the gravity sewer material.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 CLEAN-OUT FRAMES AND COVERS

A. Provide size and shape as detailed on the following Standard Drawings:

SD-506 – Standard 8 inch Traffic Rated Cleanout,
SD-506A – Standard 4 inch Traffic Rated Cleanout,
SD-506B – Bolt-down Cover, 4" Cleanouts,
SD-506C – Bolt-down Cover for Backwater Valve 6 inch Diameter.

B. Provide tough, close grained, gray iron, castings free from blowholes conforming to ASTM A 48 Class 20 ksi or better.

C. Place or grind castings, if necessary, to ensure perfectly flat, smooth, even, and true surfaces.

2.3 CONCRETE COLLAR

A. Concrete to be Class 3000 psi per Section 703 - Cast-in-Place Concrete.

2.4 BACKWATER VALVE

A. Provide 4" extendable backwater valve as manufactured by Clean Check, Inc., Post Falls, Idaho, and as shown on Standard Drawing SD-506C, or approved substitution.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Verify utility locations, existing piping locations, and required separation from water line prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 PLACEMENT OF BEDDING AND BACKFILL

A. Excavate per Section 301 – Trench Excavation. Place Type I Bedding material, from the trench bottom or 6 inches below the pipe, which ever is greater, to 6 inches above the top of the main and to the bottom of the vertical riser per Standard Drawing SD-506 – "Standard 8" Traffic Rated Clean-out" and SD-506A – "Standard 4" Traffic Rated Clean-out"".

B. Compact the bedding material to completely fill and compact under the main haunches and fill voids of the clean-out. Place bedding material against undisturbed earth. Backfill per Section 306 – Trench Backfill.

3.3 JOINING PIPE AND FITTINGS

A. Per Section 501 – Gravity Sewers for the type of main pipe used unless otherwise approved.

3.4 INSTALLING RING AND COVER

A. Adjust ring to grade by the use of a 12-inch diameter, minimum 1-foot long section of PVC, ductile, or cast iron riser pipe.

B. Fill the void between the 12-inch pipe and the clean-out structure with fiber joint packing, Ram-Nek, or approved substitution.

C. Place concrete collar around the frame and cover as shown in the following Standard Drawings:

SD-506 – Standard 8 inch Traffic Rated Cleanout,
SD-506A – Standard 4 inch Traffic Rated Cleanout,
SD-506B – Bolt-down Cover, 4 inch Cleanouts,
SD-506C – Bolt-down Cover for Backwater Valve 6" Diameter.

3.5 TESTING

A. Test clean-outs per Section 501 – Gravity Sewers.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price option as designated on the Bid Schedule. If not indicated in the Bid Schedule, clean-outs are to be incidental to other Bid Items.

A. Clean-out: Per each for the size and type specified in the Bid Schedule. Includes purchasing and installing the clean-outs and appurtenances, connection, excavation, bedding, backfill, compaction, testing, and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 503.4.1.A.1.
2. Bid Schedule Description: Main Line Clean-out – Size _____…each (EA).

3. Bid Schedule Payment Reference: 503.4.1.A.3.
4. Bid Schedule Description: Service Line Clean-out – Size _____…each (EA).

5. Bid Schedule Payment Reference: 503.4.1.A.5.
6. Bid Schedule Description: Service Line Clean-out with Backwater Valve …each (EA).

END OF SECTION

SECTION 504

SEWER SERVICES

PART 1 GENERAL

1.1 SCOPE

A. Sewer service lines, main connections, terminations, including appurtenances and testing.

1.2 RELATED SECTIONS

A. Section 405 – Non-Potable Water Line Separation.

B. Section 501 – Gravity Sewer.

1.3 REFERENCES

A. ANSI/AWWA C 151/A21.51: Ductile Iron Pipe.

B. ANSI/AWWA C 900: PVC Pressure Pipe for Water Distribution.

C. ASTM C 425: Compression Joints for Vitrified Clay Pipe and Fittings.

D. ASTM C 700: Vitrified Clay Pipe.

E. ASTM D 2241: PVC Pressure Rated Pipe.

F. ASTM D 3034: Type PSM PVC Sewer Pipe and Fittings.

G. ASTM F 477: Elastomeric Seals for Joining Plastic Pipe.

H. ASTM F 794: PVC Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

I. AWWA C 110: Ductile-Iron and Gray-Iron Fittings for Water.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that pipe and fittings meet or exceed specified requirements, including all requested test results and material identifications.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of constructed service lines and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion including service line termination location and elevation.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store pipe in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from sunlight and contamination until ready for installation in the pipe.

PART 2 MATERIALS

2.1 PIPE SIZE, TYPE AND STRENGTH

A. Comply with pipe size, type, and strength classifications indicated in the Contract Documents. Use materials similar to main sewer and one type of pipe throughout service.

B. Use any of the alternate pipe materials meeting the minimum requirements of this section, if type and strength classifications are not indicated in the Contract Documents.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 PIPE AND FITTINGS

A. PVC Sewer Pipe and Fittings: ASTM D 3034.

1. Minimum Wall Thickness: SDR 35.

B. PVC Pressure Rated Pipe and Fittings: ASTM D 2241.

1. Pressure Class: 160 psi per ASTM D 2241 with minimum HDB of 4000 psi.

2. Alternate: Encase gravity sewer pipe with concrete a minimum of 4 inches thick measured at the bell and placed per Type 1C Bedding.

C. Vitrified Clay Pipe and Fittings: ASTM C 700.

1. Classification: Extra Strength.

2. Standard: Pipe Institute West Coast Standards.

D. Ductile Iron Pipe and Fittings: AWWA C 151 and AWWA C 110.

1. Minimum Class: Thickness Class 50.

2. Joints: Push-on.

3. External Coating: Asphaltic coating, 1 mil thick minimum.

4. Internal Coating: 40 mils Protecto 401 ceramic epoxy coating as manufactured by Pacific States Cast Iron Pipe Co. or approved substitution.

E. Service Connection Tee or Wyes Fittings.

1. Tees or Wyes: Consistent with main and service lines.

2. Fasteners: All clamps, straps, nuts, bolts and washers to be solid stainless steel.

3. Tee Fittings: Inserta-Tee, Insta-tap, Kor-N-Tee or approved substitution.

F. Service Saddle Connections:

1. Saddles: Romac "CB", Fernco EZ tap, Saddle by NDS, or approved substitution.

2.3 SERVICE LINE MARKERS

A. Mark service line ends with a 2 inch x 4 inch wooden marker or 4 inch to 5 inch round "Peeler Core" wooden marker. Use No. 12 AWG galvanized finder wire. Refer to Standard Drawing SD-512 - Standard Service Marker.

2.4 SERVICE LINE CAPS OR PLUGS

A. Cap or plug all inactive service lines with gasketed material consistent with the adjacent pipe joints, or fit ends with a mechanical stopper with solid stainless steel bolts, Grade 316.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade per Standard Drawing SD-306 - Utility Trench, and installation complies with Section 405 - Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine service pipe, fittings, and appurtenances for defects or damage.

D. Verify service pipe, fittings, and materials delivered to the site meet the requirements of the Contract Documents.

E. Verify utility locations, existing piping locations and structures and buildings where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 GENERAL

A. Perform excavation, bedding placement, pipe installation, backfill, and surface restoration in accordance with the Contract Documents. Install service pipe and fittings per Section 501 – Gravity Sewers and Standard Drawing SD-511 - Standard Sewer Service Lines and SD-511A - Standard Sewer Service Connection for New Development Projects.

B. Unless otherwise indicated, provide a minimum slope of 0.02 foot/foot with all bends no greater than forty five degrees (45°) (bell by bell connection) with a minimum of 2 feet between all bends.

C. Allow Engineer to make field measurements prior to backfilling.

D. Place cap or plug in the end of the sewer service in a manner that cap or plug can be removed for extending the line without damage to the pipe.

3.3 CONNECTION TO MAIN

A. Connections for new main pipelines or pipeline replacement.

1. Solid wall PVC 8 inch through 15 inch: PVC tee.

2. Solid wall PVC 18 inch or greater: PVC tee or tee fitting

3. Ribbed PVC: Per manufacturer’s recommendation with pre-approval of Engineer.

4. VCP 8 inch through 15 inch: VCP Tee or service saddle.

5. VCP 18 inch or greater: VCP tee, tee fitting, or service saddle.

6. Ductile iron 8 inch through 15 inch: Tee (cast iron).

7. Ductile iron 18 inch or greater: Tee (cast iron) or tee fitting.

8. Concrete pipe 8 inch through 15 inch. Tee only.

9. Concrete pipe 18 inch or greater. Tee or tee fitting.

B. Connection to Existing Pipelines.

1. All Sizes: Tee fitting.

2. All Sizes, VCP: Tee fitting or service saddle.

C. Tee Fittings and Saddle Installation.

1. Standard: Per Section 501 – Gravity Sewer.

2. Core Drill: Service line hole in the sewer pipe preventing all debris and core material or groundwater from entering the sewer line.

3. Retain Core: Present to Engineer and allow inspection of connection prior to backfilling.

3.4 CONNECTION TO EXISTING MANHOLES

A. Core drill connections to existing manholes (no jack hammering is allowed).

B. Use Kor-N-Seal flexible pipe connector or approved substitution.

C. Notify the Engineer one working day in advance before making a connection to an existing manhole. Schedule work to hold the interruption of sewer flow to a minimum.

3.5 SERVICE LINE CAPS OR PLUGS

A. Install cap or plug to withstand all test pressures applied to the main sanitary sewer system without leaking.

3.6 INSTALLATION OF SERVICE LINE MARKERS

A. Install service line markers per Standard Drawing SD-512 - Standard Service Marker.

B. Extend marker 1 foot above the ground surface and paint exposed portion green.

C. Indicate the depth of the service pipe to the nearest inch on the marker. The depth shall be as measured at the end of the service pipe or for new development markers, at the 45-degree bend.

D. Connect the finder wire to the bottom of the wooden marker and not to the pipe.

E. In developed areas, cut service line markers flush with the ground surface after the locations have been recorded by the Engineer.

F. Permit the continuation of the pipe installation with jointing similar to the joints in the already installed sewer service line.

3.7 SURFACE REPAIR

A. Perform surface repair per Section 307 – Street Cuts and Surface Repair.

3.8 TESTING

A. Test service lines with the gravity sewer pipe per Section 501 – Gravity Sewers.

B. When service lines are not tested in conjunction with the main sewer, seal off and pressure test each service individually in accordance with Engineer's direction.

3.9 PRIVATE SERVICE LINES

A. If the Contract Documents call for construction of lines on private property, do not extend service line onto private property prior to completion and acceptance of the main line.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Includes pipe fittings, connections, excavation, bedding, backfill, end markers, plugs, testing, surface repair beyond street pavement, and all appurtenances not itemized in the Bid Schedule. Excluded under these items is Type "P" Surface Restoration. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Sewer Service Line: By the linear foot for the type and size of pipe measured along the horizontal centerline of the pipe from the main line to the end of the service.

1. Bid Schedule Payment Reference: 504.4.1.A.1.
2. Bid Schedule Description: Sewer Service Line Size _____…linear foot (LF).

3. Bid Schedule Payment Reference: 504.4.1.A.3.
4. Bid Schedule Description: Sewer Service Line (Pressure Pipe) - Size _____…linear foot (LF).

B. Sewer Service Line: Per each for the type and size of pipe indicated in the Bid Schedule including all appurtenances.

1. Bid Schedule Payment Reference: 504.4.1.B.1.
2. Bid Schedule Description: Sewer Service Line - Size _____…each (EA).

C. Sewer Service Connection to Manhole: Per each for the type and size of connection indicated in the Bid Schedule including excavation, core drilling, pipe, fittings, grouting, backfill, compaction, testing, surface repair, and all appurtenances.

1. Bid Schedule Payment Reference: 504.4.1.C.1.
2. Bid Schedule Description: Sewer Service Connection to Manhole – Size _____…each (EA).

D. Sewer Service Connection to Main: Per each for the type and size of connection indicated in the Bid Schedule including excavation, core drilling, pipe, fittings, grouting, backfill, compaction, testing, surface repair, and all appurtenances.

1. Bid Schedule Payment Reference: 504.4.1.D.1.
2. Bid Schedule Description: Sewer Service Connection to Main – Size _____…each (EA).

END OF SECTION

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SECTION 505

PRESSURE SEWERS

PART 1 GENERAL

1.1 SCOPE

A. Pressure Sewers and Appurtenances.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 401 – Water Pipe and Fittings.

C. Section 402 – Hydraulic Valves.

D. Section 405 – Non-Potable Water Line Separation.

E. Section 703 – Cast-in-Place Concrete.

1.3 REFERENCES

A. ANSI/AWWA C 104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.

B. ANSI/AWWA C 105: Polyethylene Encasement for Ductile Iron Pipe Systems.

C. ANSI/AWWA C 110: Ductile Iron and Gray-Iron Fittings for Water and Other Liquids.

D. ANSI/AWWA C 111: Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

E. ANSI/AWWA C 115: Flanged Ductile Iron Pipe with Threaded Flanges.

F. ANSI/AWWA C 151: Ductile Iron Pipe.

G. ANSI/AWWA C 153: Ductile Iron Compact Fittings.

H. ANSI/AWWA C 600: Installation of Ductile Iron Water Mains and their Appurtenances.

I. ANSI/AWWA C 605: Installation of Polyvinyl Chloride Pressure Pipe and Fittings.

J. ANSI/AWWA C 900: PVC Pressure Pipe for Water Distribution.

K. ANSI/AWWA C 905: PVC Pressure Pipe for Water Transmission.

L. ANSI/AWWA C 906: PE Pressure Pipe for Water Distribution.

M. ANSI/AWWA C 907: PVC Pressure Fittings for Water.

N. ASME B 16.3: Malleable Iron Threaded Fittings.

O. ASTM A 53: Pipe, Steel, Black and Hot Dipped Zinc Coated (Galvanized), Welded and Seamless.

P. ASTM D 1784: Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

Q. ASTM D 1785: Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

R. ASTM D 2774: Installation of Ductile Iron Pipe and Appurtenances.

S. ASTM D 3261: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

T. ASTM F 477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that pipe and fittings meet or exceed specified requirements including all requested test results and material identifications.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of constructed sewer force mains and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion including force main location and elevations.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, foundation strength and bedding conditions do not match conditions contemplated by the Contract Documents.

1.6 DELIVERY STORAGE AND HANDLING

A. Handle and store pipe in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from damage, sunlight and contamination.

PART 2 MATERIALS

2.1 PIPE SIZE, TYPE AND STRENGTH

A. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.

B. Use any of the alternate pipe materials meeting the minimum requirements of this section, if type and strength classifications are not indicated in the Contract Documents.

2.2 PVC PIPE AND FITTINGS

A. PVC Water Class Pipe: ANSI/AWWA C 900.

1. Class: As indicated in the Contract Documents.

2. Joints: Factory installed rubber gaskets conforming to ASTM F 477 and bell and spigot ends.

3. Markings: If used to convey reclaimed municipal wastewater, pipe to be purple in color and stamped “Non-Potable Water”.

4. Cell wall classification: 1234-B per ASTM D 1784.

B. PVC Water Class Pipe: AWSI/AWWA C 905.

1. Class: As indicated in the Contract Documents.

2. Joints: Factory installed rubber gaskets.

3. Markings: If used to convey reclaimed municipal wastewater, pipe to be purple in color and stamped “Non-Potable Water”.

4. Cell wall classification: 1234-B per ASTM D 1784.

C. PVC Pipe: ASTM-D1785.

1. Class: Schedule 40.

2. Joints: Solvent weld joints and fittings conforming to ASTM D 2466, or as called for on the Contract Documents.

3. Markings: If used to convey reclaimed municipal wastewater, pipe to be purple in color and stamped “Non-Potable Water”.

4. Cell wall classification: 1234-B per ASTM D 1784.

2.3 POLYETHYLENE PIPE AND FITTINGS.

A. PE Pressure Pipe and Fittings for Water Distribution: ANSI/AWWA C 906

1. Standard PE Designation: PE 3406.

2. Outside Diameter Base: Steel pipe (IPS).

3. Dimension Ratio: As indicated in the Contract Documents.

4. Fittings: PE 3406, thermal butt-fusion welded per ASTM D 3261.

5. Markings: If used to convey reclaimed municipal wastewater, pipe to be purple in color and stamped “Non-Potable Water”.

2.4 DUCTILE IRON AND PIPE FITTINGS

A. Per Section 401 – Water Pipe and Fittings with the following modifications.

1. External Coating: Asphaltic coating, 1 mil thick minimum.

2. Internal Coating: 40 mils Protecto 401 ceramic epoxy coating as manufactured by Pacific States Cast Iron Pipe Co. or approved substitution.

2.5 THRUST BLOCKS AND PIPE ANCHORS

A. Thrust blocks per Section 401 – Water Pipe and Fittings and Standard Drawing SD-403 - Thrust Block and Anchor Details.

B. Pipe Anchors as required per Standard Drawing SD-510 - Pipe Anchors.

2.6 VALVES

A. Per Section 402 – Hydraulic Valves with the following modifications. Install air release/vacuum valve per Standard Drawing SD-513 - Air Release/Vacuum Valve.

1. Material: Valve to resist corrosion from contact with a sanitary sewerage environment.

2.7 PIPE LOCATING WIRE AND MARKING TAPE

A. Locating wire per Section 401 – Water Pipe and Fittings.

B. Marking tape.

1. Material: 3 inch green 4 mil polyethylene.

2. Labeling: "Caution - Buried Sewer Line Below" in 1-1/2 inch minimum black lettering.

2.8 LOCATING WIRE BOXES

A. Frame and Cover: Rich Series 921 or 926, or approved substitution.

B. Risers: PVC AWWA C 900 pipe sized to fit inside the locating wire box without slipping. Refer to Standard Drawing SD-514 - Location Wire Box Detail.

C. Collar: Class 3000 psi Concrete per Section 703 – Cast-in-Place Concrete.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify trench excavations are to required alignment and grade per Section 301 – Trench Excavation, and installation meets the requirements of Section 405 – Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine pipe and fittings for defects or damage.

D. Verify all pipe, fittings, bedding, and all materials delivered to the site meet the requirements of these Contract Documents.

E. Verify utility locations, existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 INSTALLATION OF PRESSURE SEWERS

A. Per Section 401 – Water Pipe and Fittings.

B. Where pipe line and grades are indicated or depicted, lay pipe so the maximum elevation variance from the design grade does not exceed 2 inches and the horizontal alignment does not vary by more than 12 inches from the design alignment.

C. Provide a minimum cover over the force main of 48 inches unless otherwise indicated in the Contract Documents.

D. When pipeline grades are not indicated lay the pipe at uniform grades to avoid high and low points in the pipeline.

E. Lay pipe at least 10 feet horizontally from all potable water mains. Provide a minimum of 18 inch vertical separation from all potable water lines.

3.3 FLUSHING AND TESTING

A. Flush and test per Section 401 – Water Pipe and Fittings with the following modifications.

1. Pressure Test Duration: 1.5 hour minimum.

2. Disinfection: Not required.

3.4 INSTALLATION OF LOCATING WIRE AND MARKING TAPE

A. Attach locating wire to the crown of the pipe using electrical tape taking care to repair damage to the wire.

B. Provide a minimum of 12 inches of slack wire above ground at each location of wire box.

C. Install locating tape during backfilling at 18 inches to 24 inches above the crown of the pipe.

D. Test for and ensure continuity.

3.5 INSTALLATION OF LOCATING WIRE BOXES

A. Place per Standard Drawing SD-514 - Location Wire Box Detail, flush with finish grade, pavement, or concrete.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Pressure Sewer Pipe (pipe only): By the linear foot for the type and size of pipe measured along the horizontal centerline of the pipe. Includes pipe, fittings, connections, thrust blocks, markers, testing, and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 505.4.1.A.1.
2. Bid Schedule Description: Pressure Sewer Pipe – Size _____ (pipe only)…linear foot (LF).

B. Pressure Sewer Pipe (including excavation, bedding and backfill): By the linear foot for the size and type of pipe measured along the horizontal centerline of the pipe. Includes pipe, fittings, connections, thrust blocks, markers, testing, excavation, bedding, backfill and all other work not separately itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 505.4.1.B.1.
2. Bid Schedule Description: Pressure Sewer Pipe – Size _____ (includes excavation, bedding, backfill, etc.)...linear foot (LF).

C. Pressure Sewer Cleanout: Per each for the size and type of pipe. Includes all fittings, vault and ancillary items.

1. Bid Schedule Payment Reference: 505.4.1.C.1.
2. Bid Schedule Description: Pressure Sewer Cleanout....each (EA).

END OF SECTION

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SECTION 506

PLASTIC LINER

PART 1 GENERAL

1.1 SCOPE

A. Plastic liners for concrete sewers, manholes, structures, and appurtenances.

1.2 RELATED SECTIONS

A. Section 501 – Gravity Sewer.

B. Section 502 – Manholes.

1.3 REFERENCES

A. ASTM D 412 – Test Methods for Thermoplastic Elastomers – Tension.

B. ASTM D 543 – Evaluating the Resistance of Plastics to Chemical Reagents.

C. ASTM D 638 – Tensile Properties of Plastic.

D. ASTM D 2240 – Rubber Property – Durometer Hardness.

1.4 SUBMITTALS

A. Submit manufacturer's data for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that liner system meets or exceeds specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record locations where liners are installed.

B. Provide copy of record documents to Owner prior to issuance of substantial completion including locations and types of liners installed.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store liner and appurtenances in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect liner from damage, sunlight and contamination until ready for installation.

PART 2 MATERIALS

2.1 LINER SYSTEM TYPE

A. Comply with liner system classification indicated in the Contract Documents.

B. Notify Engineer if liner classifications are not indicated in Contract Documents.

C. Notify the Engineer if installation conditions such as dimensions, surface conditions, or installation environment do not match conditions contemplated by the Contract Documents.

2.2 GENERAL

A. Use plastic liner sheet, joint, corner, and weld strips manufactured from high molecular weight PVC resin to make a permanently flexible material suitable for use as protective liner in pipe or other structures.

B. PVC resin to constitute not less than 99% by weight of the resin used in the formulation. Copolymer resins will not be permitted.

C. The Engineer may sample sheets, strips or welded joints for testing.

D. Changes in formulation will be permitted upon approval of the Engineer and demonstration that liner will meet all requirements specified herein for chemical resistance and physical properties.

2.3 PROPERTIES

A. Provide plastic liner sheets, locking extensions, all joint, corner, and welding strips that are free of defects. The Engineer may authorize the repair of such defects by approved methods.

B. Material characteristics as listed in Table 1.

Table 1
MATERIAL CHARACTERISTICS

Property	Initial	Exposure(1)
Tensile Strength	2,200 psi min.	2,100 psi min.
Elongation at Break	200% min.	200% min.
Shore Durometer, Type D	Within 1 sec. 50-60 10 sec. 35-50	±5 (with respect to ±5 initial test result)
Weight Change	--	±1.5%

(1) For 112 days in chemical solutions listed in Table 2.

2.4 LINER MATERIAL TESTING

A. General.

1. Tensile Strength and Elongation: ASTM D 412 using Die B.

2. Indentation Hardness: ASTM D 2240 using a Type D Durometer with single thickness material.

3. Specimen Size: 1 inch x 3 inch x thickness of the sheet or strip.

B. Measure initial physical properties for tensile strength, weight, elongation, and indentation hardness prior to chemical resistance tests.

C. Chemical Resistance Tests (Pickle Jar Test).

1. Testing: Determine the physical properties of the specimens after exposure to chemical solutions listed in Table 2 for 112 days at 77°F ± 5°F.

2. Seal Coat: Only 2 of 4 edges and no coating of the inner or outer surfaces.

3. Conditioning: Condition specimens to constant weight at 110°F before and after submersion.

4. Chemical solutions:

Table 2
CHEMICAL SOLUTIONS

Chemical Solution	Concentration
Sulfuric acid	20%
Sodium hydroxide	5%
Ammonium hydroxide	5%
Nitric acid	1%
Ferric chloride	1%
Sodium Hyperchlorite	1%
Soap	0.1%
Detergent (LAS)	0.1%
Bacteriological	BOD not less than 700 mg/l

D. Volumetric % of reagents of C.P. grade.

1. Sampling: At 28-day intervals remove and test specimens from each chemical solution.

2. Failure: If any specimen fails to meet the 112-day requirements before completion of 112-day exposure.

2.5 PULL TEST FOR LOCKING EXTENSIONS

A. Testing criteria for extensions embedded in concrete.

1. Force: Pull of at least 100 pounds/linear inch, applied perpendicularly to the concrete surface.

2. Duration: 1 minute without rupture of the locking extensions or withdrawal from embedment.

3. Temperature: Between 70°F to 80°F inclusive.

2.6 TEST FOR SHOP WELD JOINTS

A. Provide shop-welded joints used to fuse individual sections of liner at least equal to the minimum requirements of the liner for thickness, corrosion resistance, and impermeability.

1. Tensile Strength Test: ASTM D 412 using Die B to show no cracks or separations and a minimum tensile strength of 2,000 psi.

2. Temperature: 77°F ± 5°F.

3. Measurement: Use minimum width and thickness of the reduced section.

2.7 SPARK TEST

A. Shop test all sheets for holes with a spark tester set to provide 15,000 to 20,000 volts minimum.

B. Repair holes via certified welder prior to shipment.

2.8 LINER DETAILS AND DIMENSIONS

A. Provide liner sheet, strip and other accessory pieces conforming to the Contract Documents and applicable provision of the Standard Drawings.

B. Material Thickness.

1. Sheet, Integral Locking Extensions: 0.065 inches.

2. Sheet, Plain: 0.094 inches.

3. Joint Strip: 0.075 inches.

4. Weld Strip: 0.094 inches.

C. Material Sizes.

1. Pipe and Structure Liner Sheets: Sized to provide full internal coverage.

2. Joint Strip: 4 inches ± 0.25 inch in width with edges beveled prior to application.

3. Welding Strips: 1 inch ± 0.125 inch in width with edges beveled at time of manufacture.

D. Locking Extensions.

1. Use: Use on all liner to be imbedded in concrete. Bond liner to concrete surfaces with an adhesive and plastic anchors.

2. Material: Same material as the liner and integrally molded or extruded with the sheets having an approved cross section with a minimum height of 0.375 inch and a minimum web thickness of 0.085 inch.

3. Function: When embedded in concrete, the liner will be held permanently in place.

4. Continuity: Parallel and continuous except where interrupted for joint flaps, weep channels, strap channels and others permitted by the Engineer.

5. Edges: The liner sheet edge not to extend beyond the base of the final locking extension by more than 3/8 inch.

2.9 STRAP CHANNELS

A. Design: Liner required to be secured to the inner form with straps to have strap channels at not more than 20 inches on center perpendicular to the locking extensions.

B. Forming: 1-inch wide maximum formed by removing the locking extensions at strap locations so that a maximum of 3/16 inch of the base remains in the strap channel.

C. Terminal Edge: Do not provide strap channels in the final 2 locking extensions adjacent to the terminal edge of the liner coverage.

D. Flaps.

1. Design: Fabricated by removing locking extensions so that a maximum of 1/32 inch of the base of the locking extensions remains on the sheet.

E. Adhesive Products.

1. Product: Provide and install adhesive per Manufacturer's recommendations and approved by the Engineer prior to use.

2. Flammability: Adhesive products to be non-flammable.

F. Cleaners: Non-flammable, water soluble and not detrimental to the liner. Cleaner to be approved by the Engineer prior to use.

G. Product: Provide and use cleaners per manufacturer's recommendations and approved by the Engineer prior to use.

H. Material: Non-flammable, water soluble or water dispersible, and not detrimental to the plastic liner.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Examine liner and appurtenances for defects or damage.

B. Verify liner and appurtenances delivered to the site meet the requirements of the Contract Documents.

C. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 PLACING LINER

A. Place liner in accordance with the Contract Documents and manufacturer's recommendations.

B. Apply and secure liner to the forms, inspected, and approved by the Engineer prior to placement of reinforcing steel. Forms in contact with plastic liner need not be oiled.

C. Coverage.

1. Circumferential Coverage for Pipe: As indicated in the Contract Documents with the offset of each longitudinal terminal edge of sheet on adjoining pipe no greater than 1-1/2 inches.

2. Precast or Cast-In-Place Structures: As indicated in the Contract Documents with no lower terminal edge offset permitted.

3. Locking Extension: Provided along all sloping lower terminal edges of liner plate.

D. Positioning Liner.

1. Pipe Installations:

a. Positioning: Locking extensions are parallel to the axis of the pipe.

b. Centering: With respect to the "T" of the pipe when the inner form is positioned.

c. Pipe Joints: Set flush with inner edge of the socket end and extend either to the spigot end or beyond as required for the type of liner joint to be made.

2. Pre-cast or Cast–In-Place Structures.

a. Positioning: Locking extensions parallel to direction of flow.

b. Fitting: Closely fitted to inner forms.

c. Curved Surfaces: Cut to fit using a minimum of separate pieces.

d. Layout: Prior to installation, indicate to the Engineer the proposed layout of liner sheets including the location and type of all field welds for approval.

3. Transverse Joints: The space between ends of locking extensions, measured longitudinally, to be less than 4 inches. Where sheets are cut and joined for the purpose of fitting irregular surfaces, this space to be less than 2 inches.

E. Securing Liner in Place.

1. Cast-In-Place Structures:

a. Forms: Hold liner snugly in place against inner forms.

b. Penetrations: Where form ties or form stabilizing rods pass through liner, maintain the liner in close contact with the forms during concrete placement.

c. Placing Concrete: Prevent concrete from flowing around the edges of sheets at joints by welding a weld strip over the back of the joint.

2. Pipes: Use light steel banding straps placed in strap channels at a spacing not to exceed 20 inches or other means approved by the Engineer.

3.3 WEEP CHANNELS

A. Place at each pipe joint and at transverse joints in cast-in-place structures.

B. Channels to be a gap not less than 2 inches nor greater than 4 inches left in all locking extensions.

C. If locking extensions are removed to provide a weep channel at joints, the base of the extension left on the sheet to not exceed 1/32 inch.

D. Provide intermediate weep channels at a maximum spacing of 8 feet. If locking extensions are removed to provide intermediate weep channels, the base of the extension left on the sheet to not exceed 1/16 inch.

E. Provide additional weep channels 2 inches wide by cutting away locking extensions at areas not served by weep channels. Provide for drainage of water accumulation behind the liner of concrete structures into the weep channels.

F. Provide transverse weep channels at approximately 12 inches away from each liner return where surfaces lined with plastic liner join surfaces which are not so lined.

G. Clear all weep channels of obstructions which would interfere with their proper function.

3.4 LINER RETURNS

A. Install wherever surfaces lined with plastic liner joint surfaces which are not lined.

B. Returns to be a separate strip of liner at least 3 inches wide joined at right angles to the main liner by means of approved corner strips.

C. Corner strips to be welded continuously to the return and to the main liner and applied wherever possible from the back of the lining.

D. Provide locking extensions returns of plastic-lined structures. Locking extensions are not required on lined precast concrete pipe.

E. Seal each liner return by means of a compound approved by the Engineer.

F. If the joint space is too wide or the joint surfaces too rough to permit the use of the compound, fill the joint space with 2 inches of densely caulked cement mortar, lead wool, or other caulking material approved by the Engineer, and finished with a minimum of 1 inch of an approved corrosion resistant material.

3.5 CONCRETE OPERATIONS

A. Concrete Placement.

1. Vibration: Avoid damage to the liner and produce dense concrete securely anchoring the locking extensions into the concrete. Use both external and vibrators, particularly along the lower terminal edge of the liner.

2. Stiffeners: Withdraw completely during the placement of concrete in the forms. Revibrate to consolidate the concrete in the void spaces caused by the withdrawal of the stiffeners.

B. Removing Forms.

1. Protection: Protect liner from damage. Do not use sharp instruments to pry forms from lined surfaces.

2. Nails: Pull nails that remain in the liner plate without tearing the liner. Mark resulting holes.

3. Form Tie Holes: Mark before ties are broken off and mark all areas of abrasion of the liner.

C. Following form removal, clean liner in pipe and structures for inspection at the direction of the Engineer. Complete repairs to the liner in pipe prior to shipment.

D. Remove banding straps used in securing liner to forms for pipe and cast-in-place structures. Fill voids left in the invert at the edge of the liner with cement mortar or other material approved by the Engineer.

3.6 FIELD JOINTING

A. General.

1. Timing: Ensure lined pipe or structure has been backfilled and 7 days has elapsed after the flooding or jetting has been completed.

2. Groundwater: Do not joint until ground water pumping has been discontinued for at least 7 days and no visible leakage is evident at the joint.

3. Preparation: Ensure liner at joints are free of all mortar and other foreign material and are clean and dry before joints are made.

4. Hot Joint Compound: Do not bring in contact with liner.

5. Coating: Apply no coating of any kind to joints, corners, or welding strips, except where non-skid coating is applied to liner surfaces.

B. Field Joints in Pipe Installation.

1. Type P-1 Joint: 4 inch joint strip, centered over the mortared pipe joint and secured along each edge to adjacent liner by means of a welding strip.

2. Type P-2 Joint: Integral joint flap with locking extensions removed, extending 4 inches ± 1/4 inch beyond the spigot end of the pipe.

   a. On beveled pipe, overlap flap and weld to the lining of the adjacent pipe section with a weld strip.

   b. Protect the flap from damage avoiding excessive tension and distortion in bending the flap back to laying mortaring joints.

   c. Allow flap which has been bent back and held to return to its original shape and flatness well in advance of making the liner joint.

3. Curing Mortar: At least 48 hours prior to jointing.

4. Pipe / Structure Jointing: Either Type C-1 or Type C-2 specified herein.

C. Field Joints in Cast-In-Place Structures.

1. Type C-1 Joint: Same as Type P-1 joint except the width of space between adjacent sheets is not to exceed 1/2 inch. This is the only type of joint permitted at transverse contraction joints in concrete. Its only other use is for joints between pipes and cast-in-place structures.

2. Type C-2 Joints: Overlap sheets not less than 1-1/2 inches and secure by means of a welding strip with upstream overlapping downstream sheets. The part of the overlapping sheet not having locking extensions is not to exceed 4 inches. Apply a welding strip to the back of the joint. Use this joint at transverse joints other than those at transverse contraction joints and for longitudinal joints in concrete.

3. Type C-3 Joint: Butt sheets of liner together and apply a welding strip over the back of the joint before concrete is placed, and apply a welding strip over the front of the joint after concrete is in place. Not for use at transverse joints which extend to a lower terminal edge of liner or at any joint where the gap between adjoining sheets of liner exceeds 1/8 inch.

3.7 INSTALLATION OF WELDING STRIPS

A. Fusion weld strips to join strips and liner by qualified welders using only approved methods and techniques.

B. Use hot air welding guns providing clean effluent air at constant pressure to the surfaces to be joined within a temperature range between 500°F and 600°F.

C. Provide a continuous welding operation until joint has been completed.

D. Maintain adequate ventilation in confined spaces during welding operations.

E. Center the welding strip over the cleaned surfaces to be joined and fuse across its entire width. Incomplete fusion, charred, or blistered welds will be rejected. After repairs have been made, defective welds will be re-inspected and tested.

3.8 JOINT REINFORCEMENT

A. Place a 12-inch long welding strip across each transverse joint and weep channel which extends to the lower terminal edge of liner.

B. Center these reinforcement strips over the joint being reinforced and locate as close to the lower edge of liner as practicable.

C. Weld reinforcement strips after the transverse welding strips have been installed.

3.9 APPLICATION OF LINER TO EXISTING CONCRETE SURFACES

A. Etch the concrete surface by sandblasting to develop a slightly granular surface. When permitted by the Engineer, the concrete surface may be acid etched in lieu of sandblasting.

B. Thoroughly clean surface of dust (for sandblast etching) or wash and completely dry (for acid etching) prior to applying primer.

C. Apply 2 brush coats of an approved primer to the concrete.

1. Coverage: Do not exceed 250 square feet/gallon for each coat.

2. First Primer Coat: Thin with an equal amount of approved thinner and allow to dry for 2 hours before the application of the second primer coat.

3. Second Primer Coat: Apply unthinned and permit to dry for 4 hours.

D. Apply 2 coats of approved adhesive to the concrete surface and the back surface of the liner.

1. Drying: Allow 2 hours drying time between application of these coats.

2. Coverage: Do not exceed 250 square feet/gallon for each coat.

E. Apply one coat of an approved activator to both the adhesive coat on the liner and the adhesive coated concrete.

1. Amount: Limit application to a liner amount that can be completed within a 20-minute period.

2. Method: Apply evenly by brushing.

3. Coverage: Do not exceed 500 square feet/gallon.

F. When the surface of the adhesive is barely tacky to the touch, position the liner with one edge firmly pressed down then roll the liner into place avoiding the formation of air pockets.

G. Install tight fitting butt joints and rub the surface of the liner vigorously to secure the liner plate firmly in place. Position corner and welding strips over all joints and weld in place.

H. Install plastic anchors with rubber washers in a checker board pattern at eighteen inches apart.

3.10 TEE LOCK LINER SYSTEM

A. Use of Tee Lock style PVC liner system to be upon approval of Engineer.

B. Install per manufacturer's directions. Submit installation procedures to the Engineer for review.

3.11 NON-SKID SURFACES

A. In non-skid areas, treat surface of liner prior to installation.

1. Preparation: Clean, dry, and spray liner with an adhesive coating recommended by the manufacturer of the liner plate.

2. Application of Grit: Liberally sprinkle clean, dry, well-graded quartz sand (all of which will pass a No. 30 sieve, but be retained on a No. 70 sieve) onto the liner.

3. Finishing: After the sanded surface has thoroughly dried, brush all excess sand and spray a seal coat over the sand in sufficient quantity to coat and bond the sand to the liner plate. Dry the coated sand surface before handling.

3.12 APPLICATION OF LINER TO STEEL

A. Complete fabrication and welding of steel before the liner is installed except for field welding.

B. Sandblast steel surfaces free of mill scale, rust, grease, moisture, and other substances. Grind all interior weld metal smooth and remove weld spatter so welds project more than 1/16 inch above the pipe surface.

C. In the event that field welding is required, install the plastic liner no closer than 12 inches to the weld. Install plastic liner in the weld area after welding on the steel has been completed.

D. Application of primer, adhesive, activator, liner, butt joints and welding strips to conform to bonding of liner plate to concrete surfaces with adhesive.

3.13 PROTECTION AND REPAIR OF LINER

A. Repair all damage to installed liner plate by patching.

1. Nail and Tie Holes, Cut, Torn, and Seriously Abraded Areas: Use patches made entirely with welding strip fused to the liner over the entire patch using a single welding strip. The use of parallel, overlapping, or adjoining welding strips will not be permitted.

2. Large Patches: Place smooth liner over the damaged area and cover edges with welding strips fused to the patch and to the liner adjoining the damaged area. The size of a single patch is limited to a width of 4 inches.

3. Other Repairs: Whenever liner is not properly anchored to concrete, or wherever patches larger than those permitted above are necessary, repair as directed by the Engineer.

3.14 FIELD TESTS

A. Upon completion of the installation, clean liner surface and permit visual inspection by the Engineer and spark test. Repair and retest all areas of liner plate failing to meet the field test or inspection.

B. Provide all material, equipment and personnel required in the inspection and spark testing and provide adequate ventilation, ladders for access, barricades or other traffic control devices. Open and close entrances and exits.

PART 4 MEASUREMENT AND PAYMENT

4.1 Include payment for plastic liner materials and installation in the price bid for the pipe or structure to which they are applied, unless otherwise specified in the Contract Documents and the Bid Schedule.

END OF SECTION

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SECTION 507

SANITARY SEWER OPEN CUT REPAIR/REHABILITATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. "Open Cut" gravity sewer pipe repair / rehabilitation including materials, installation and testing.

1.2 RELATED SECTIONS

A. Section 301 - Trench Excavation

B. Section 305 - Pipe Bedding

C. Section 306 - Trench Backfill

D. Section 307 - Street Cuts and Surface Repairs

E. Section 501 -Gravity Sewers

F. Section 504 - Sewer Services

G. Section 1101 - Construction Traffic Control

1.3 REFERENCES

A. ANSI/AWWA C 900: PVC Pressure Pipe for Water Distribution

B. ANSI/AWWA C 905: PVC Pressure Pipe for Water Transmission

C. ANSI/AWWA C 151/A21.51: Ductile Iron Pipe

D. ASTM C 425: Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings

E. ASTM C 700: Vitrified Clay Pipe

F. ASTM D 3034: Type PSM PVC Sewer Pipe and Fittings

G. ASTM D 2241: Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-rated Pipe (SDR Series)

H. ASTM F 477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

I. ASTM F 679: PVC Large Diameter Plastic Gravity Pipe & Fittings

J. ASTM F 794: PVC Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

K. ASTM F 1803: Dual Wall Closed Profile PVC Sewer Pipe.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this Section.

B. Submit manufacturer's certification that pipe and fittings meet or exceed specified requirements including all requested test results and material identifications.

C. Submit manufacturer's installation instructions and maintain copy at the jobsite.

D. If pipe removal and replacement required, submit sewer bypass plan to Engineer for review prior to preconstruction conference. Plan approval required prior to construction.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of repaired pipelines and other encountered utilities in relation to existing center of upstream manhole.

B. Provide copy of record documents to Engineer prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store pipe/appurtenances in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

PART 2 MATERIALS

2.1 PIPE SIZE, TYPE AND STRENGTH

A. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.

B. Unless otherwise indicated in Contract Documents main line pipe repair material shall be as shown in the table below and as described in Subsection 2.2 below:

Table 1

EXISTING PIPE	**REPLACEMENT PIPE (FULL SEGMENT, MH TO MH REPLACEMENT)**	**REPLACEMENT PIPE (PARTIAL SEGMENT REPLACEMENT)**
Asbestos Cement (AC)	**PVC** ASTM D 3034 (15") ASTM F 679 (15") ASTM F 794 (30") ASTM F 1803 (30")	**PVC** - AWWA C 900 4”-12” **PVC** – AWWA C 905 14”-36”
Concrete Pipe (CP) or **Reinforced Concrete Pipe** (RCP)	**PVC** ASTM D 3034 (15") ASTM F 679 (15") ASTM F 794 (30") ASTM F 1803 (30") **VCP** - ASTM C 700	**VCP** - ASTM C 700
Polyvinyl Chloride Pipe (PVC)	**PVC** ASTM D 3034 (15") ASTM F 679 (15") ASTM F 794 (30") ASTM F 1803 (30")	**PVC** ASTM D 3034 (15") ASTM F 679 (15") ASTM F 794 (30") ASTM F 1803 (30")
Vitrified Clay Pipe (VCP)	**PVC -** ASTM D 3034 or ASTM F 679 or **VCP** - ASTM C 700	**VCP** - ASTM C 700 **PVC** – AWWA C 900 200 psi

C. Unless otherwise indicated in the Contract Documents, service line replacement pipe shall be PVC conforming to ASTM D 3034.

D. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 GRAVITY SEWER PIPE AND FITTINGS

A. Solid Wall PVC Pipe Sizes 4 inch to 15 inch: ASTM D 3034

1. Minimum Wall Thickness: SDR 35.

2. Joints: Elastomeric gasket joints with ASTM F 477 elastomeric gaskets

B. Solid Wall PVC Pipe Sizes 18 inch to 36 inch: ASTM F 679 Annex

1. Minimum Wall Thickness: T-1 or T-2.

C. Vitrified Clay Pipe 4 inch to 42 inch: ASTM C 700.

1. Strength: Extra Strength

2. Joints: ASTM C 425, Polyurethane compression joints

D. Pressure Pipe for Gravity Sewers

1. PVC Pipe: AWWA C 900 Class 100 psi or higher 4”-12”, AWWA C 905 Class 100 psi 14”-36”, or ASTM D 2241 Class 160 psi or higher. Match the inside diameter of the connecting non-pressure pipe, plus or minus 0.125 inches.

E. Ribbed PVC Pipe Sizes 30 inch: ASTM F 794

1. Minimum Pipe Stiffness: 46 psi

2. Ribs to be perpendicular to the axis of the pipe unless otherwise approved by the Engineer.

F. Dual wall closed profile PVC sewer pipe 30 inch to 60 inch, ASTM F 1803.

1. Minimum Pipe Stiffness: 46 psi

G. Ductile Iron Pipe : ANSI/AWWA C 151/A 21.51

1. Minimum Class: Thickness Class 50

2. Joints: Push-on

3. External Coating: Asphaltic coating, 1 mil thick minimum

4. Internal Coating: 40 mils Protecto 401 ceramic epoxy coating as manufactured by Pacific States Cast Iron Pipe Co. or approved substitution

2.3 COUPLINGS

A. Couplings for connecting two pipes of dissimilar type or size: Non-shear couplings with appropriate bushings providing for a watertight connection, a smooth pipe invert, corrosion resistant connection. Flex Seal couplers made by Mission Clay Products of Corona, California, or DFW couplers made by NDS (National Diversified Sales) of Lindsay, California or approved substitution.

B. Couplings for two plain end pipes of similar material where factory bell by bell couplings are not available: Non-shear couplings providing for a watertight connection, a smooth pipe invert, corrosion resistant connection. Flex Seal couplers made by Mission Clay Products of Corona, California, or DFW couplers made by NDS (National Diversified Sales) of Lindsay, California or approved substitution.

C. Coupling of PVC Gravity Pipe to PVC Pressure Pipe for Gravity Sewers: Rigid PVC bell by bell couplers manufactured by Head Manufacturing, Preston, Idaho, or approved substitution providing for watertight connection and a smooth pipe invert.

D. Coupling of PVC Plain End to PVC Plain End: Rigid PVC bell-by-bell coupler.

E. Metal straps, bolts, nuts and other metal hardware used on couplings, service connection fittings and other fittings shall be Grade 304 stainless steel.

2.4 FULL CIRCLE REPAIR CLAMPS

A. As manufactured by Romac Industries, Bothell, Washington Style SS-1 or SS-2 or as manufactured by Smith-Blair Inc. Texarkana, Arkansas Model 226 or 227 or approved substitution. Metal straps, bolts, nuts and other metal hardware shall be Grade 304 stainless steel.

2.5 SOURCE QUALITY CONTROL

A. Provide test and inspection reports required by the standard for the pipe.

B. Inspect pipe markings to verify type, class, thickness and marking information required by the Standard for the pipe.

2.6 NON SHRINK GROUT

A. “Waterplug” as manufactured by Thoro System Products of Jacksonville, Florida or “Speed Crete Red Line” as manufactured by Tamms Industries of Kirkland, Illinois or approved substitution.

PART 3 WORKMANSHIP

3.1 NOTIFICATIONS / PERMITS

A. Notify Engineer at least two working days (48 hours) in advance of mobilizing to a line segment for repair.

B. Notify Local One Number Locator Service at least two working days (48 hours) in advance of excavation.

C. If access to private property will be impacted, notify affected property owner(s) at least two working days (48 hours) in advance of mobilizing to a line segment for repair. Make suitable arrangements for property owner access to property.

D. Obtain all necessary permits including right-of-way permits.

3.2 EXAMINATIONS

A. Verify utility locations, existing piping locations and structure where repairs are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. If necessary, allow 4 hours for the Engineer to modify the design without Owner incurring increased project cost.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine pipe and fittings for defects or damage.

D. Verify pipe, fittings, bedding, and materials delivered to the site meet the requirements of the Contract Documents.

3.3 SEGMENT MOBILIZATION

A. Place Construction Traffic Control Devices in accordance with Section 1103 - Construction Traffic Control.

B. Move necessary equipment and materials to site.

C. After completion of repair and surface restoration, remove equipment and excess material from site. Dispose of removed sewer materials at landfill. Provide final clean up of site. Remove Construction Traffic Control Devices.

3.4 SEWER FLOW MAINTENANCE

A. Prior to pipe removal, implement bypass flow procedures in accordance with approved plan.

B. Wastewater not permitted to flow in open trench.

C. If bypass pumping, provide back up capabilities for mechanical failure.

D. Monitor flow levels in pipeline to ensure not backing up to unacceptable levels such as flooding basement floor drains. Contractor responsible for damage resulting from backing up flow.

E. Acceptable methods of bypass pumping include temporary or permanent structures, tees, and/or pumps.

F. All materials and equipment used to control and/or divert flow, including, but not limited to pumps, plugs, and pipes, shall be designed and made of materials compatible with and capable of handling sewage flows without leaks or contamination of surrounding soils or surface property.

G. Bypass pumping plan to be approved by the Engineer.

3.5 REPAIR PIPE

A. Perform excavation in accordance with Section 301 - Trench Excavation.

B. Expose pipe to locate defect.

C. Notify Engineer to allow for confirmation of defect and repair method.

D. Install full circle repair clamp of sufficient width to overlap defect by at least one-third the pipe diameter on each side of defect.

E. If full circle repair clamp not wide enough or if defect larger than anticipated, proceed with removing and replacing pipe segment with length as determined by Engineer as outlined in these specifications under Subsection 3.6.

F. Notify Engineer for payment quantity confirmation.

G. Place pipe bedding in accordance with Section 305 - Pipe Bedding.

H. Place backfill in accordance with Section 306 - Trench Backfill. Place and maintain suitable temporary surface until final surface restoration completed.

I. Unless otherwise specified in contract documents, within 30 days of starting excavation for repair but following successful Engineer CCTV inspection, whichever comes later, complete surface restoration in accordance with Section 307 - Street Cuts and Surface Restoration.

3.6 REPLACE PIPE

A. Implement Sewer Flow Maintenance Procedures as outlined above.

B. Excavate to expose and remove pipe to limits designated in the Contract Documents or if replacement length greater than 20 feet, may expose each end of repair prior to removing pipe.

C. Notify Engineer to allow for inspection to concur with limits of pipe removal necessary. Adjust limits if directed by Engineer.

D. Establish line and grade of replacement using “straight line” connection between each end of exposed pipe or between manholes, if full segment replacement.

E. Remove existing pipe.

F. Provide pipe bedding and initial backfill as required by Section 305 - Pipe Bedding.

G. Connect new pipe to existing pipe using appropriate type of coupler as specified above under Part 2 - Materials. If connecting to existing manhole, connect in accordance with applicable portions of Section 502 - Manholes.

H. Install pipe in accordance with Section 501 - Gravity Sewers.

I. Replace existing service connections in accordance with Section 504 - Sewer Services and as outlined in these specifications under Repair Service Connection/Replace Service Line. Reconnect to existing service line using appropriate type of coupler as specified above under Part 2 - Materials. Replace service line to right of way or edge of easement if 1) directed by Engineer or 2) required by Contract Documents or 3) existing service line in disrepair or constructed of materials not meeting the requirements of Section 504-Sewer Services.

J. Notify Engineer for payment quantity confirmation.

K. Backfill trench as required by Section 306 - Trench Backfill. Place and maintain suitable temporary surface until final surface restoration completed.

L. Unless otherwise specified in contract documents, within thirty (30) days of starting excavation for repair but following successful Engineer CCTV inspection, whichever comes later, complete surface restoration in accordance with Section 307 - Street Cuts and Surface Restoration.

3.7 REPAIR SERVICE CONNECTION/REPLACE SERVICE LINE

A. Excavate to expose defective service connection and or service pipe as designated in the Contract Documents.

B. Notify Engineer to allow for inspection to concur service repair connection method and limits of service line pipe removal and replacement necessary. Adjust limits if directed by ENGINEER.

C. Notify affected property owner of sewer service interruption. Perform repair in manner such that sewer service interruption limited to less than one (1) hour.

D. Service Connection Repair: At the direction of the Engineer, either remove segment of existing mainline pipe containing faulty connection and replace mainline pipe with new service connection fitting in accordance with Subsection 3.6 above and in accordance with Section 504 - Sewer Service or, if possible, core drill or re-core drill pipe to allow for suitable connection in accordance with Section 504. If pipe is replaced, a minimum of 3 feet of mainline pipe shall be installed, mainline pipe and couplings will be paid under separate bid items.

E. Replace Service line: Remove existing service line from mainline to edge of right-of-way or easement unless otherwise indicated in contract documents. Install new service line pipe as specified in Section 504 - Sewer Service. Connect new pipe to existing pipe using appropriate type of coupler as specified above under Part 2 - Materials. If connecting to existing manhole, connect in accordance with applicable portions of Section 502 - Manholes.

F. Notify Engineer for payment quantity confirmation.

G. Place backfill as required by Section 306 - Trench Backfill. Place and maintain suitable temporary surface until final surface restoration completed.

H. Unless otherwise specified in contract documents, within 30 days of starting excavation for repair, complete surface restoration in accordance with Section 307 - Street Cuts and Surface Restoration.

3.8 TESTING

A. Unless otherwise specified in Contract Documents, Air Testing and Deflection Testing will not be required for repair acceptance except as provided below.

B. Engineer reserves right to require Air Testing and Deflection Testing of repairs if CCTV Inspection and/or Visual Inspection indicates possibility of faulty workmanship, in which case cost of testing will be negotiated with Contractor by Engineer. If test(s) pass, Owner responsible for testing cost. If any test fails on a line segment, Contractor responsible for testing costs including compensation to Owner for Engineer time witnessing tests and any subsequent retesting costs associated with faulty repair. All inspection and testing shall be in accordance with Section 501 – Gravity Sewers.

3.9 REMOVE MANHOLE/FLUSH TANK

A. Implement Sewer Flow Maintenance Procedures as outlined above.

B. Excavate to expose and remove manhole/flush tank.

C. Neatly saw cut existing pipes entering and exiting structure within 2 feet of structure. Notify Engineer to allow for inspection to concur with limits of pipe removal necessary. Adjust limits if directed by Engineer.

D. If structure to be replaced with pipe, install pipe in accordance with Subsection 3.6 - Replace Pipe.

E. If manhole is to be replaced, install new manhole in accordance with Section 502-Manholes. Connect to existing pipes using appropriate type of couplers and pipe as specified above under Part 2 - Materials.

F. Notify Engineer for payment quantity confirmation.

G. Backfill as required by Section 306 - Trench Backfill. Place and maintain suitable temporary surface until final surface restoration completed.

3.10 RECHANNEL MANHOLE

A. Carefully chip out existing manhole base to a depth of at least 2 inches beyond finish grade of new channel.

B. Reconstruct channel to dimensions (shapes) as shown on Standard Drawing SD-502 using non shrink grout.

3.11 RECHANNEL MANHOLE (NEW CONNECTION)

A. Core drill manhole wall for connection of new pipe.

B. Continue coring through manhole base to depth of core drill tool.

C. Carefully break out core to allow for continued coring to existing receiving channel.

D. If new pipe springline above manhole shelf, build up manhole shelf with non-shrink grout such that new channel has depth of one half of the new pipe diameter or insert new pipe through wall to existing channel and cut top half of pipe off inside manhole.

E. If new pipe springline below manhole shelf, saw cut sides of core drilled channel above springline such that channel walls are vertical.

3.12 RAISE MANHOLE TO GRADE

A. Refer to Section 2030 – Utility Adjustments.

PART 4 MEASUREMENT AND PAYMENT

4.1 Sanitary Sewer Open Cut Repair/Rehabilitation to be measured in accordance with one or more of the following methods outlined below and identified in the Bid Schedule. Payment includes full compensation for all materials, labor, tools and equipment necessary to perform repair/rehabilitation. If required and not specifically indicated in the Bid Schedule, surface restoration or other items are incidental to other Bid Items.

A. Segment Mobilization: On a per each basis for mobilization to perform repair work on a line segment (i.e. all repair work located between two manholes). Only one Segment Mobilization will be paid per line segment. Includes traffic control, moving material and equipment to and from the site and site cleanup.

1. Bid Schedule Payment Reference: 507.4.1.A.1.
2. Bid Schedule Description: Segment Mobilization. . .each (EA)

B. Point Excavation: On a per each basis for excavation to expose up to ten feet of mainline pipe. Includes backfill and surface restoration. Excavation beyond ten-foot limits paid for under Trench Excavation.

1. Bid Schedule Payment Reference: 507.4.1.B.1.
2. Bid Schedule Description: Point Excavation (Asphalt Surfacing). . .each (EA)

3. Bid Schedule Payment Reference: 507.4.1.B.3.
4. Bid Schedule Description: Point Excavation (Non-Asphalt). . .each (EA)

C. Trench Excavation: By the linear foot measured on a horizontal basis along the center of the mainline pipe through and including all manholes, tees and fittings, but not including excavation paid under Point Excavation. Includes backfill and surface restoration.

1. Bid Schedule Payment Reference: 507.4.1.C.1.

2. Bid Schedule Description: Trench Excavation (Asphalt Surfacing).. .linear foot (LF)

3. Bid Schedule Payment Reference: 507.4.1.C.3.
4. Bid Schedule Description: Trench Excavation (Non-Asphalt). . .linear foot (LF)

D. Install Coupling/Full Circle Repair Clamp: On a per-each basis for purchase and installation of couplings and full circle repair clamps of the size indicated in the Bid Schedule.

1. Bid Schedule Payment Reference: 507.4.1.D.1.
2. Bid Schedule Description: Install ____"Coupling. . .each (EA)

3. Bid Schedule Payment Reference: 507.4.1.D.3.
4. Bid Schedule Description: Install___"Full Circle Repair Clamp. . .each (EA)

E. Replace Pipe: By the linear foot of the size indicated in the Bid Schedule measured on a horizontal basis along the center of the mainline pipe through and including all manholes, tees and fittings. Includes removal and disposal of pipe.

1. Bid Schedule Payment Reference: 507.4.1.E.1.
2. Bid Schedule Description: Replace ___" Dia. Pipe. . .linear foot (LF)

F. Repair Service Connection: On a per-each basis for repair/replacement of service connection. Also includes new connections required to be replaced as a result of mainline pipe replacement.

1. Bid Schedule Payment Reference: 507.4.1.F.1.
2. Bid Schedule Description: Repair Service Connection. . .each (EA)

3. Bid Schedule Payment Reference: 507.4.1.F.3.
4. Bid Schedule Description: Core Drill Sewer Main. . .each (EA)

G. Replace Service Line: By the linear foot of the size indicated in the Bid Schedule measured on a horizontal basis along the center of the service line from the mainline to the end of the service pipe through and including all fittings. Includes trench excavation, backfill, surface restoration and removal and disposal of pipe.

1. Bid Schedule Payment Reference: 507.4.1.G.1.
2. Bid Schedule Description: Replace ___" Dia. Service Line (Asphalt Surfacing). . .linear foot (LF)

3. Bid Schedule Payment Reference: 507.4.1.G.3.
4. Bid Schedule Description: Replace ___" Dia. Service Line (Non-Asphalt). . .linear foot (LF)

H. Remove Manhole/Flush Tank: On a per each basis for excavation, removal and disposal including surface restoration.

1. Bid Schedule Payment Reference: 507.4.1.H.1.
2. Bid Schedule Description: Remove Manhole. . .each (EA)

3. Bid Schedule Payment Reference: 507.4.1.H.3.
4. Bid Schedule Description: Remove Flush Tank. . . each (EA)

I. Rechannel Manhole: On a per each basis.

1. Bid Schedule Payment Reference: 507.4.1.I.1.
2. Bid Schedule Description: Rechannel Manhole. . .each (EA)

3. Bid Schedule Payment Reference: 507.4.1.I.3.
4. Bid Schedule Description: Rechannel Manhole (New Connection). . .each (EA)

J. Raise Manhole: On a vertical foot basis, including removal and replacement of frame, cover, grade rings, cone section, excavation and backfill.

1. Bid Schedule Payment Reference: 507.4.1.J.1
2. Bid Schedule Payment Description: Install 1 foot Manhole Barrel Section. . .each (EA)

K. Sewage Flow Control: On a lump sum basis for the maintenance of sewage flow around the construction area, including, but not limited to, pumps, piping, plugs, tees, and structures, and the removal thereof.

1. Bid Schedule Payment Reference: 507.4.1.K.1
2. Bid Schedule Description: Sewage Flow Control. . .lump sum (LS)

END OF SECTION

SECTION 508

SLIPLINING

PART I GENERAL

1.1 SECTION INCLUDES

A. "Slipline" of gravity sewer pipe for pipeline rehabilitation including materials, installation, and testing.

1.2 RELATED SECTIONS

A. Section 301 - Trench Excavation

B. Section 305 - Pipe Bedding

C. Section 306 - Trench Backfill

D. Section 307 - Street Cuts and Surface Repairs

E. Section 501 - Gravity Sewers

F. Section 504 - Sewer Services

G. Section 1103 - Construction Traffic Control

1.3 REFERENCES

A. ASTM C 109: Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (2 in cubes)

B. ASTM C 138: Standard Test Method for Unit Weight, Yield and Air Content (Gravimetic) of Concrete

C. ASTM C 403: Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance

D. ASTM C 939: Standard Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method)

E. ASTM D 714: Specifications for Polyethylene Plastic Pipe Based on Outside Diameter

F. ASTM D 2657: Standard Practice for Heat Fusion Joining at Polyolefin Pipe and Fitting

G. ASTM D 3034: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

H. ASTM D 3262: Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Sewer Pipe

I. ASTM D 3350: Specifications for Polyethylene Plastic Pipe and Fitting

J. ASTM F 477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

K. ASTM F 585: Standard Practice for Installation of Flexible Polyethylene Pipe into Existing Sewers

L. ASTM F 1803: Standard Specification for Poly (Vinyl Chloride) PVC Closed Profile Gravity Pipe and Fittings Based on Controlled Inside Diameter.

1.4 SUBMITTALS

A. Submit manufacturer’s technical literature for pipe materials to be installed or furnished under this Section.

B. Submit manufacturer’s certification that pipe and fittings meet or exceed specified requirements including all requested test results and material identifications.

C. Submit manufacturer’s installation instructions and maintain copy at the job site.

D. If pipe removal and replacement or if flow is restricted by the sliplining operation, submit sewer bypass plan to Engineer for review prior to preconstruction conference. Plan approval required prior to construction.

E. Submit Annular Space Grouting Plan - Method and Procedures.

F. Submit Grout Mix Design addressing the following:

1. Grout density and viscosity,

2. Initial set time of grout,

3. 24-hour and 28-day minimum grout compressive strengths,

4. Grout working time before a 15-percent change in density or viscosity occurs,

5. Maximum injection pressures,

6. Proposed grout stage volumes,

7. Bulkhead designs and locations,

8. Buoyant force calculations during grouting,

9. Pressure gauge, recorder and field equipment certification (calibration by a certified lab),

10. Vent locations, and

11. Written confirmation the Contractor has coordinated grouting procedures with grout installer and the line pipe manufacturer.

Items A-D to be derived from trial grout batches by an approved, independent testing laboratory.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of repaired pipelines and other encountered utilities in relation to existing center of upstream manhole.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store pipe/appurtenances in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

PART 2 MATERIALS

2.1 PIPE SIZE, TYPE AND STRENGTH

A. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.

B. Unless otherwise indicated in the Contract Documents, service line replacement pipe to be PVC conforming to ASTM D 3034.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 SLIPLINE SEWER PIPE AND FITTINGS

A. Solid Wall PE Pipe Sizes 8 inch to 16 inch: ASTM D 3350

1. Minimum Wall Thickness: SDR 21 or as specified in the Contract Documents

2. Joints: Heat Fusion Joining ASTM D 2657

B. “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe: ASTM D 3262

1. Pipe: Type, Grade, Liner Class and Hydrostatic Design Basis Category as indicated in the Contract Documents

2. Joints: Coupling type per ASTM D 3262 with ASTM F 477 elastomeric gaskets

C. Poly (Vinyl Chloride) PVC Closed Profile Gravity Pipe 18 inch to 60 inch: ASTM F 1803

1. Waterway Minimum Wall Series 46 - ASTM F 1803 Table Number 1

2. Elastomeric Gaskets ASTM F 477

2.3 COUPLINGS

A. Couplings for connecting two pipes of dissimilar type or size: Non-shear couplings with appropriate bushings providing for a watertight connection, a smooth pipe invert, corrosion resistant connection. Flex Seal couplers made by Mission Clay Products of Corona, California, or DFW couplers made by NDS (National Diversified Sales) of Lindsay, California or approved substitution.

B. Couplings for two plain end pipes of similar material where factory bell by bell couplings are not available: Non-shear couplings providing for a watertight connection, a smooth pipe invert, corrosion resistant connection. Flex Seal couplers made by Mission Clay Products of Corona, California, or DFW couplers made by NDS (National Diversified Sales) of Lindsay, California or approved substitution.

C. Metal straps, bolts, nuts and other metal hardware used on couplings, service connection fittings and other fittings to be Grade 304 stainless steel.

2.4 FULL CIRCLE REPAIR CLAMPS

A. As manufactured by Romac Industries, Bothell, Washington Style SS-1 or SS-2 or as manufactured by Smith-Blair Inc. Texarkana, Arkansas Model 226 or 227. Metal straps, bolts, nuts and other metal hardware to be Grade 304 stainless steel.

2.5 SOURCE QUALITY CONTROL

A. Provide test and inspection reports required by the standard for the pipe.

B. Inspect pipe markings to verify type, class, thickness and marking information required by the Standard for the pipe.

2.6 NON SHRINK GROUT

A. “Waterplug” as manufactured by Thoro System Products of Jacksonville, Florida or “Speed Crete Red Line” as manufactured by Tamms Industries of Kirkland, Illinois or approved equal.

2.7 ANNULAR SPACE GROUT MATERIALS

A. Grout to consist of portland cement, portland cement and fly ash and/or additives, all being non-biodegradable. Foaming agents to conform to ASTM C 796.

B. Minimum penetration resistance to be 100 psi in 24 hours per ASTM C 403. Slipliner pipe manufacturer to confirm and certify the minimum compressive strength per ASTM C 403 and maximum specific density of grout and provide calculations justifying mix design. Minimum compressive strength at 28 days must exceed 100 psi per ASTM C 495 OR C 109.

C. Mix design based upon:

1. Size of the annular space or void,

2. Void (size) of surrounding soil,

3. Absence or presence of groundwater,

4. Provide adequate retardation,

5. Provide less than 1% shrinkage by volume,

6. Apparent viscosity not to exceed 20 seconds per ASTM C 939,

7. The slipliner manufacturer or contractor to propose a density sufficient to displace water in the annular space without floating the carrier pipe, and

8. Equipment size and capacity to be used for various stages, capable of changing placement densities and viscosities as dictated by field conditions.

PART 3 WORKMANSHIP

3.1 NOTIFICATIONS/PERMITS

A. Notify Engineer at least two working days (48 hours) in advance of mobilizing to a line segment for sliplining.

B. Notify Local One Number Locator Service at least two working days (48 hours) in advance of excavation.

C. If access to private property will be impacted, notify affected property owner(s) at least two working days (48 hours) in advance of mobilizing to a line segment for repair. Make suitable arrangements for property owner access to property.

D. Obtain all necessary permits including right-of-way permits.

3.2 EXAMINATIONS

A. Verify utility locations, existing piping locations and structure where sliplining is to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. If necessary, allow 4 hours for the Engineer to modify the design without OWNER incurring increased project cost.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine pipe and fittings.

D. Verify pipe, fittings, bedding, and materials delivered to the site meet the requirements of the Contract Documents.

3.3 SEGMENT MOBILIZATION/DEMOBILIZATION

A. Place construction traffic control devices in accordance with Section 1103-Construction Traffic Control.

B. Move necessary equipment and materials to site.

C. After completion of sliplining, grout, if required and perform surface restoration, remove equipment and excess material from site. Dispose of removed sewer materials at landfill. Provide final clean up of site. Remove construction traffic control devices.

3.4 SEWER FLOW MAINTENANCE

A. Prior to pipe removal, implement bypass flow procedures in accordance with approved plan.

B. Wastewater not permitted to flow in open trench.

C. If bypass pumping, provide back up capabilities for mechanical failure.

D. Notify affected property owner(s) of impending sewer service interruption, unless otherwise approved by the Engineer limit service interruptions to less than two (2) hours.

E. Monitor flow levels in pipeline to insure not backing up to unacceptable levels such as flooding basement floor drains. Contractor responsible for damage resulting from backing up flow.

3.5 PIPE INSERTION

A. Perform excavation of insertion pit in accordance with Section 301-Trench Excavation and ASTM F 585.

B. Perform excavation to expose existing main at each service connection.

C. Perform heat fusion of PE pipe unless segmented liner pipe utilized.

D. Clean existing sewer line, dispose of debris.

E. CCTV existing sewer line to ensure complete removal of all debris. (Reclean and ReCCTV if debris is in existing line).

F. Remove existing pipe to springline within insertion pit.

G. Install downhole rollers.

H. String pulling cable, attach pulling head to slipline string.

I. Pull/push liner pipe into existing pipe.

J. Perform pressure test if required in Contract Documents.

K. Reconnect services as outlined below.

L. Allow 24 hour relaxation period for PE pipe prior to grouting annular space.

3.6 SERVICE RECONNECTION TO SLIPLINED PIPE/REPLACE SERVICE LINE

A. Notify Engineer to allow for inspection to concur service reconnection method and units of service line removal and replacement necessary. Adjust limits if directed by Engineer.

B. Remove existing sewer main and service to expose new slipline pipe.

C. Core drill slipline pipe.

D. Install service tee fitting connection in accordance with Section 504.

E. Construct concrete encasements at service reconnection with vent tubes and grouting ports as required by grouting plan.

F. If directed by Engineer: Remove existing non-conforming service line to edge of right-of-way or easement line unless otherwise indicated in the Contract Documents. Install new service line pipe as specified in Section 504-Sewer Services. Connect new pipe to service connection and to existing service pipe using appropriate type couplers as specified above under Subsection 2 - Materials.

G. Notify Engineer for payment quantity confirmation.

H. Place backfill as required by Section 306-Trench Backfill. Place and maintain suitable temporary surface until final surface restoration completed.

I. Unless otherwise specified in the Contract Documents, within thirty (30) days of starting excavation for repair, complete surface restoration in accordance with Section 307-Street Cuts and Surface Restoration.

3.7 ANNULAR SPACE, GROUTING FOR SLIPLINING SYSTEMS

A. Submit detailed plan to Engineer to hold sliplined pipe on invert for a period of time long enough to allow grout to set where buoyant uplift is a factor.

B. Demonstrate to the Engineer the capabilities of the workers in filling the annular space in conformance with the Plans and Specifications.

C. Establish bulkheads per submitted plan to withstand loads imposed by grout and groundwater, locations of vents relative to pipe diameter, stiffness and sewer flow.

D. Provide sufficient gauges, monitoring devices to test the effectiveness of grouting operation and ensure compliance with the slipline pipe specifications and design parameters.

E. Pump grout material into annular space at required pressure.

F. Establish manhole to slipline pipe connection as specified in the Contract Documents.

3.8 TESTING

A. Unless other wise specified in Contract Documents, air testing and deflection testing will not be required for slipline acceptance except as provided below.

B. Engineer reserves right to require air testing and deflection testing of slipline if CCTV inspection and/or visual inspection indicates possibility of faulty workmanship in which case cost of testing will be negotiated with Contractor by Engineer. If test(s) pass, Owner will be responsible for testing cost; if any test fails on a line segment, Contractor will be responsible for testing costs including compensation to Owner for Engineer time witnessing tests and any subsequent retesting costs associated with faulty slipline. All inspection and testing shall be in accordance with Section 501 – Gravity Sewers.

PART 4 MEASUREMENT AND PAYMENT

4.1 Sliplining rehabilitation to be measured in accordance with one or more of the following methods outlined below and identified in the Bid Schedule. Payment includes full compensation for all materials, labor, tools and equipment necessary to perform the sliplining rehabilitation. If not specifically indicated in Bid Schedule, surface restoration is incidental to the Bid Item.

A. Slipline Segment Mobilization: On a per each basis for mobilization to perform sliplining work on a line segment between two manholes. Only one sliplining segment mobilization will be paid per line segment. Includes moving material and equipment to and from the site, insertion pits including excavation, shoring, foundation stabilization, utility protection, removal of pipe to springline, bedding material if required, backfill and surface restoration.

1. Bid Schedule Payment Reference: 508.4.1.A.1
2. Bid Schedule Description: Slipline Segment Mobilization...each (EA)

B. Slipline Pipe: By the linear foot of the size indicated in the Bid Schedule measured on a horizontal basis along the centerline of the sliplined pipe from manhole edge to manhole edge.

1. Bid Schedule Payment Reference: 508.4.B.1
2. Bid Schedule Description: Slipline _____ Pipe into ___ Pipe…linear foot (LF)

C. Grouting Annular Space: On a lump sum basis for pressure grouting of the annular space between the host pipe and new slipline pipe. Including grout mix designs, bulkheads, vent pipes, gauges, monitoring equipment, calibration of equipment, and proving grout.

1. Bid Schedule Payment Reference: 508.4.1.C.1
2. Bid Schedule Description: Grouting of Annular Space____ Dia in ____ Dia...lump sum (LS)

D. Service Line Reconnection: On a per each for excavation to locate expose the existing service to main connection, removal of existing pipe, purchase and installation of sewer connection to the new slipline pipe of the size indicated upon the Bid Schedule.

1. Bid Schedule Payment Reference: 508.4.1.D.1
2. Bid Schedule Description: Install ___ x _____ Service Line Reconnection… each (EA)

END OF SECTION

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SECTION 509

CIPP REHABILITATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cured-in-place pipe (CIPP) rehabilitation of existing sanitary sewer, storm sewer, or gravity irrigation pipe including materials, installation and testing.

1.2 RELATED SECTIONS

A. Section 401 – Water Pipe and Fittings

B. Section 501 – Sanitary Sewer

C. Section 601 – Culvert, Stormdrain, and Gravity Irrigation

D. Section 1101 – Construction Traffic Control

1.3 REFERENCES

A. ASTM D 543 – Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.

B. ASTM D 578 - Specifications for Glass Fiber Strands

C. ASTM D 638 - Test Method for Tensile Properties of Plastics

D. ASTM D 732 - Standard Test Method for Shear Strength of Plastics by Punch Tool

E. ASTM D 790 - Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

F. ASTM D 883 - Terminology Relating to Plastics

G. ASTM D 1600 - Terminology for Abbreviated Terms Relating to Plastics

H. ASTM D 2990 - Tensile, Compressive and Flexural Creep and Creep-Rupture of Plastics

I. ASTM D 5813 – Specification for Cured-in Place Thermosetting Resin Sewer Pipe

J. ASTM F 1216 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of Resin-Impregnated Tube

K. ASTM F 1743 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in- Place Thermosetting Resin Sewer Pipe.

L. ASTM F 2019 – Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pull-in-Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP)

1.4 SUBMITTALS

A For Category B Bidding Only: Submit a complete work history for the field superintendent and key personnel for approval, as stated below. Should the Contractor's proposed superintendent, foreman or key personnel fail, in the opinion of the Engineer, to meet the minimum experience requirements, provide for proper personnel at no additional cost (or delay) to the contract. The Engineer will be the sole judge in determining if the prospective superintendent and/or key personnel meet the following experience requirements:

1. Project Superintendent: This individual must have at least three years experience managing CIPP liner and wastewater rehabilitation projects of similar size, and successfully completed four projects in this time span. This person is to be on site for the duration of the project, managing the liner operation and coordinating the activities of all the Subcontractors.

2. Liner Foreman: The foreman's installation experience is to be with the specific liner system and type proposed:

   a. Four successfully completed projects within the past two years amounting to at least 7,500 lineal feet of 8" and larger pipe per project totaling 30,000 ft, of which at least 10,000 ft shall be for 30" and larger

   b. Performed or supervised at least 50 successful internal lateral cuttings

   c. At least five projects involving sewage bypass field experience in the last three years.

3. Lateral Cutter: Internal reinstatement of laterals is to be performed by a qualified individual with the following experience: performed at least 75 successful internal lateral cuttings within the past year.

B. Letter from liner manufacturer approving contractor and staff listed above as being qualified to perform project (for Category B Bidding only).

C. Letters of qualification by the liner manufacturer(s) and the resin supplier(s) certifying the fitness of their products for use in the CIPP process, stating the history of successful application of these products in the CIPP process, and stating that these products have been supplied to and successfully used by the installation contractor (for Category B Bidding only).

D. Examples of forms and quality records used throughout their process to demonstrate effective application of quality control methods and verification checks. These forms and quality records are subject to approval by the Engineer.

E. Brochures for all items to be furnished including information on the cured-in-place pipe intended for this installation.

F. Engineering design calculations on the thickness of lining and the quantity of resin used for installation of the CIPP. Include hydraulic calculations illustrating the impact to hydraulic capacity that are stamped by a Registered Professional Engineer of the State of Idaho.

G. Submit the following product and installation information:

1. Contractor's description of all equipment and materials to be used during the rehabilitation.

2. Contractor's description of the proposed rehabilitation lining methodology, including a detailed plan for maintaining sewer service to each lateral connection.

3. Contractor's description of the proposed procedures for removal of any existing blockages in the pipelines, e.g. protruding service taps, roots, etc., as well as method for sealing the liner to the manhole.

4. Letter to Owner/Engineer stating that the Contractor has viewed the television inspection videotape and that the sewer is in a condition suitable for effective application of a cured-in-place pipe and/or list and detail any conditions which may affect the quality of the final product or why the location and existing conditions would preclude installation of the selected product.

5. Material Test reports.

6. Felt and Fabric Tube Data:

    a. Specific Gravity (Density) of the felt fiber.

    b. Nominal void volume content in the felt.

    c. Nominal thickness of the flexible membrane material(s).

    d. Specific Gravity (Density) of the flexible membrane material(s).

    e. Certified information from the felt manufacturer on the nominal void volume in the felt fabric that will be filled with resin.

7. Resin Solution and Cured Resin Data:

    a. Baseline IR Spectrum on 8-½" x 11" format.

b. Specific Gravity (Density) of the liquid resin solution.

c. Specific Gravity (Density) of the cured neat resin.

d. Resin and catalyst ratios or proportions.

e. A list of all other admixtures added to the resin and/or catalyst.

f. Nominal resin polymerization shrinkage.

8. Resin/Felt Composite:

a. Specific Gravity (Density) of the cured composite that has all of the voids in the felt filled with resin.

b. The proper quantity (volume or weight plus the specific gravity of the resin) needed to fill all of the felt voids plus the targeted additional resin quantity to compensate for polymerization shrinkage and migration, in a unit length of each diameter and thickness of installed and cured CIPP to be supplied on this project.

c. Resin colorant type or brand name.

d. Colorant information and sample color card.

e. Colorant level (proportion) to be used based on the percent of resin weight.

f. A procedure for adding the colorant to the resin.

g. At time of relining, a certified copy of the wetout sheet (batch ticket) for each liner delivered to the site and installed. The wetout sheets shall certify that for each length of a diameter and thickness, the information is truthful and accurate. Include the information on the wetout sheet: resin identification, the quantity of resin placed and retained in the felt, a nominal yield calculation, catalyst and promoters used, and their proportions, fabric tube identifier, fabric tube length wetout and the roller gap dimension.

9. Manufacturers' shipping, storage and handling recommendations for:

a. Fabric Tubes.

b. Resin.

c. Catalysts.

d. Promoters.

e. End Seal Materials.

10. Certified Test Results for the Resin and Fabric Tubes that show the materials conform to the applicable requirements.

11. Roller Gap Dimension Calculation for each Diameter, Thickness, Flexible Membrane Perimeter and Additional Resin Targeted Amount showing the proper quantity of resin as submitted above.

12. The manufacturer's recommended cure schedule for each diameter and thickness, showing estimated ground temperatures, soil moisture content and thermal conductivity of the soil and their effect on the interface temperature, and the cure schedule adjusted accordingly.

13. A cure water circulation system listing the pump size(s), hose diameter(s) and number(s), flow rates, heating source information, and an engineering calculation that shows that the resulting system flow rate and heat source are sufficient to heat distribution from top to bottom and from end to end. Any layflat hose proposing to use holes is to be specifically engineered for each hose diameter, length, hole diameters and spacing, and pump performance curve, that shows adequate flow reaches the far end. The calculation should also show the limit for that set of parameters, the limit it would be effective for.

14. Certified copies of all cure logs submitted each week with the CIPP field samples.

15. The resin manufacturer's cool down recommendation.

16. Flat Plate or Restrained ClPP samples for testing.

H. Submit a sewage bypass pumping and/or diversion plan for review by the Engineer at least seven days prior to pipe installation.

1. The sewage bypass pumping and/or diversion plan is to include an emergency response plan to be followed in the event of failure of the bypass pumping and/or diversion system.

2. Proposed methods to notify the Owner, impacted property Owners, and affected agencies, and Engineer 48 hours prior to commencing bypass pumping operations.

3. Engineer shall approve the plan for sewage bypass pumping and/or diversion prior to commencing sewage bypass pumping and/or diversion.

I. Submit CCTV tapes and video logs of cleaned host pipe condition prior to installation as well as CCTV tape and logs of the completed installation. CCTV work to be per Section 501.3.H.

1.5 QUALITY ASSURANCE

A. Products and product manufacturers seeking approval to be considered for use on this project must meet all of the following criteria to be deemed Commercially Acceptable and shall document so within their signed bid to the satisfaction of the Owner.

1. Product must have been utilized in a minimum of 250,000 linear feet of successful wastewater collection system installations in the U.S. within the last five (5) years.

2. Utilize staff properly licensed and trained, who must have had at least five (5) years active experience in the commercial installation of the product bid (Category B Bidding only).

3. Contractor to provide documentation of successful installation of at least 25,000 feet of the product bid in wastewater collection systems (Category B Bidding only).

4. Provide proof that both the rehabilitation manufacturing and installation processes will operate under a quality management system which is third-party certified to ISO 9000 or other internationally recognized organization standards.

5. Must satisfy all insurance, financial, and bonding requirements of the Owner.

1.6 USE OF SEWERS PRIOR TO COMPLETION

A. The Owner reserves the right to make use of any portion of the Work prior to completion of the entire Contract without invalidating the Contract and without constituting acceptance of any of the Work.

1.7 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of constructed pipelines and service reconnections in relation to existing permanent benchmarks.

B. Submit drawings showing accurate dimensions, elevations, details of pipe and appurtenances including reconnection locations to the Engineer within 30 days of completion of project.

1.8 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load CIPP materials and ancillary items in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fabric Tube

1. The fabric tube for the felt system is to consist of one or more layers of absorbent non-woven or woven felt fabric and meet the requirements of ASTM F 1216, ASTM F 1743, Section 5 and ASTM D 5813 Sections 5, 6 and 8.

2. The fabric tube of the fiberglass system is to consist of at least two separate tubes made of corrosion resistant (E-CR) glass fibers meeting the requirements of ASTM F 2019.

3. The fabric tube construction is to be sufficient to withstand installation pressures, have sufficient strength to bridge missing pipe segments, and stretch to fit irregular pipe sections.

4. The wetout fabric tube is to meet ASTM F 1216, 7.2 or ASTM F 1743, 6.2 or ASTM F 2019, 6.3 as applicable with a uniform thickness and excess resin distribution that, when compressed at installation pressures, will meet or exceed the design thickness after cure.

5. The fabric tube is to be manufactured to a size that, when installed, will tightly fit the internal circumference, meeting ASTM D 5813, 6.3.1 standards or better, and the length of the original pipe. Allow for circumferential stretching during installation.

6. The outside layer of the fabric tube (before inversion, as applicable) is to be coated with an impermeable, flexible membrane that will contain the resin and facilitate vacuum impregnation and monitoring of the resin saturation during the resin impregnation (wetout) procedure.

7. The fabric tube felt is to be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layer. The fabric tube is to contain no material that may cause de-lamination in the cured CIPP. No dry or unsaturated layers are acceptable upon visual inspection as evident by color contrast between the felt fabric and the activated resin containing a colorant.

8. The wall color of the interior pipe surface of ClPP after installation is to be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made. The hue of the color is to be dark enough to distinguish a contrast between the fully resin saturated felt fabric and dry or resin lean areas.

9. Seams in the fabric tube are to be equal to or greater in strength than the un-seamed felt fabric.

10. The outside of the fabric tube is to be marked with the name of the manufacturer.

11. The minimum length of the fabric tube is that which is deemed necessary by the installer to effectively span the distance from the starting manhole to the terminating manhole or access point, plus that amount required to run-in and run-out for the installation process, unless otherwise specified.

12. The nominal fabric tube wall thickness is to be constructed to the nearest 1.5 mm increment, rounded up from the design thickness for that section of installed CIPP. Wall thickness transitions, in 1.5 mm increments or greater as appropriate, may be fabricated into the fabric tube between installation entrance and exit access points. The quantity of resin used in the impregnation is to be sufficient to fill all of the felt voids for the nominal felt thickness.

B. Resin

1. A corrosion-resistant polyester, vinyl ester or epoxy resin and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F 1216 or ASTM F 1743, the physical properties herein, and those, which are to be utilized in the design of the ClPP for the project.

2. The resin is to produce CIPP that will comply with the structural and chemical resistance requirements of this specification.

3. The activated resin is to contain a colorant compatible with the resin, organic peroxides and the installation and curing process, such as CreaNova(r) CHROMOCHEM 844-7260 Phthalo-Blue, or equivalent, at a level of 0.01-0.035 % by the weight of the resin. The colorant is to be added concurrently with the organic peroxide activator solution, or immediately after adding to it to the resin, to serve as a multi-purpose visual quality assurance indicator.

C. Structural Requirements

1. Design the CIPP per ASTM F 1216, Appendix X.1 assuming no bonding to the existing pipe wall.

2. As determined by ASTM D 790 test method, de-rate the design flexural modulus from the laboratory values (published by the resin supplier) by an amount that reflects confidence in field sampling method and that takes into reasonable account field conditions that are less ideal than the laboratory environment.

3. Use a value of 7 for the Enhancement Factor, “K”, to be used in 'Partially Deteriorated' design conditions. Application of Enhancement (K) Factors in excess of 7 is to be substantiated through independent test data.

4. There is to be no disbondment of the layers of felt in the ClPP. Upon discovery of disbondment, Engineer will direct areas of repair or replacement at his sole discretion. Complete repair at no cost to the Owner.

5. The cured pipe material (CIPP) is to conform to the following structural properties:

   a. Minimum Physical Properties

Property	**Test Method**	**Cured Composite Per ASTM F 1216**
Flexural Modulus of Elasticity	ASTM D 790 (short term)	250,000 psi
Flexural Strength	ASTM D 790	4,500 psi

   b. The required structural CIPP wall thickness is to be based on, as a minimum, the physical properties in this Section and in accordance with the Design Equations in the appendix of ASTM F 1216 for Partially Deteriorated Pipe, and the following design parameters:

Design Safety Factor	2.0
Retention Factor	50%
Ovality	2% minimum or actual if $\geq$2%
Modulus of passive soil reaction	1,000 psi
Groundwater Depth	Ground surface unless otherwise shown on Plans
Soil Depth (above the crown)	Refer to Plans
Live load	H-20 highway
Soil Load (assumed)	120 lb/cu. ft.
Minimum service life	50 years

Note: For any pipe reach that is fully deteriorated, the required CIPP wall thickness for that segment shall be in accordance with the Fully Deteriorated Pipe equations in ASTM F 1216.

6. Measure the inside diameter of the existing pipe in the field after cleaning so that the correct liner size can be ordered to result in a tight fitting condition.

D. Testing Requirements

1. Chemical resistance

a. ASTM F 1216, Appendix X.2 or ASTM F 1743.

b. Test ClPP samples of the fabric tube and the specific resin proposed for actual construction.

c. ClPP samples without plastic coating must meet these chemical testing requirements.

2. Hydraulic Capacity

a. The hydraulic profile must be maintained as large as possible.

b. The CIPP must have a minimum of the full flow capacity of the original pipe before rehabilitation.

c. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

3. CIPP Field Samples

a. Submit test results from three (3) field installations in the USA of the same resin system and tube materials as proposed for the actual installation.

b. Test data is to be from projects performed within the last year.

c. Field sampling procedure must be in accordance with ASTM F 1216 or ASTM F 1743 and in accordance with ASTM D 5813.

4. An IR sample of the resin may be taken from the resin at the wetout facility or from an available access point of the installed wetout fabric tube by an Owner's representative at their choosing. The IR sample will be sent to a testing laboratory capable of doing IR scans, and the result shall be compared to the baseline IR fingerprint.

PART 3 EXECUTION

3.1 NOTIFICATIONS/PERMITS

A. Notify Engineer at least two working days (48 hours) in advance of mobilizing to a line segment for CIPP rehabilitation.

B. Notify Local One Number Locator Service at least two working days (48 hours) in advance of any excavation that may be required.

C. If access to private property will be impacted, notify affected property Owner(s) at least two working days (48 hours) in advance of mobilizing to a line segment for repair. Make suitable arrangements for property Owner access to property.

D. Notify property owners of limited use of their sanitary facilities as identified in 3.4.D. Obtain all necessary permits including right-of-way permits.

E. Obtain all necessary permits including right-of-way permits.

3.2 EXAMINATIONS

A. Verify utility locations, existing piping locations and structure where CIPP rehabilitation is to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. If necessary, allow 4 hours for the Engineer to modify the design without OWNER incurring increased project cost.

B. If available, review owners CCTV inspection records prior to ordering material.

C. Examine existing pipe and fittings to ensure correct CIPP sizing prior to ordering CIPP materials.

D. Verify materials delivered to the site meet the requirements of the Contract Documents.

3.3 SEGMENT MOBILIZATION/DEMOBILIZATION

A. Place construction traffic control devices in accordance with Section 1103 - Construction Traffic Control.

B. Move necessary equipment and materials to site.

C. After completion of CIPP rehabilitation, perform surface restoration, remove equipment and excess material from site. Dispose of any removed materials at landfill. Provide final cleanup of site. Remove construction traffic control devices.

3.4 PREPARATION

A. Use any of the existing manholes in the project area as manhole access points.

B. Clean the interior of the existing host pipe of debris, roots, etc. prior to installation of the CIPP liner and remove all debris and obstructions to the Engineer's satisfaction. Conduct CCTV inspection of the sewer and provide tapes to the Engineer for review and approval of host pipe condition, per Section 501.3.H. A final pre-lining cleaning shall be performed no longer than two hours prior to installing the liner.

1. Carefully inspect the interior of the pipeline inspected to determine the location of any conditions which may prevent proper installation of CIPP into the pipelines, such as protruding service taps, collapsed or crushed pipe, and reduction in the cross sectional area by more than 30%.

2. Note problem areas and notify the Engineer in writing so they can be corrected.

C. If a street or driveway must be closed to traffic because of the work, provide traffic control measures as required per local jurisdiction and secure required permits. Maintain driveway access to the homes during the bypass operation, which may necessitate the need for ramps over the bypass piping. The piping shall be adequately protected from traffic.

D. Maintain sewer service usage throughout the duration of the project. Implement a public notification program for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted and when and how long the sewer will be off-line. Also provide to impacted entities:

1. Written notice to be delivered to each name or business the day prior to the beginning of work being conducted on the section.

2. A local telephone number of the Contractor.

3. Unless otherwise approved, limit service disruptions to no longer than six hours.

During the CIPP process when service connections are plugged, provide separate portable toilets (exclusive of those used by the workers) for use by the residences.

Monitor levels in upstream sewers. If sewage backup occurs and enters a facility, provide clean-up repair, property damage costs, and claims at no cost to the Owner.

E. Install and test mainline sewer bypass to the acceptance of the Engineer prior to beginning CIPP installation. Maintain bypass until the lining is fully cured, cooled down and the ends finished.

1. Maintain sewer flow all times around the construction operations by plugging the line under construction at the upstream manhole and pumping the flow into a downstream manhole or adjacent system.

2. Size the pump and bypass piping to adequately handle all bypass sewage flows.

3. Pump the sewage back into the sanitary sewer system. Other alternatives will not be allowed.

4. Incorporate redundancy in the bypass plan for pumps. If pumping is required on a 24-hour basis or after 8:00 P.M., equip engines in a manner to keep noise to a minimum.

5. Do not leave pumps unattended during bypass pumping.

6. Show that the piping and pumping operation have no leaks of effluent to public or private property. Take responsibility for any leakage, including any necessary environmental cleanup resulting from the bypass operation.

F. Confirm locations of all lateral service connections prior to installing and curing the CIPP.

3.5 RESIDENTIAL ACCOMMODATIONS

A. The acceptable time periods for CIPP work where services are interrupted are listed in the Contract Documents.

B. If the contractual time periods are to be breached for any reason, notify impacted households in advance and provide a motel accommodation for the night or $100.00 cash to compensate them for their inconvenience – at no additional cost to the Owner. Provide an accounting to the Owner of those households who have accepted the motel accommodation or cash on daily basis.

3.6 LINER INSTALLATION

A. Manufacture and install the CIPP liner with materials and methods, that when installed, will provide a jointless and continuous structurally sound liner able to withstand all imposed static and dynamic loads on a long-term basis.

B. Install and cure the CIPP liner in the host pipe per the manufacturer's instructions, following the methods indicated in the materials submitted under this specification. Install ClPP in accordance with ASTM F 1216, Section 7, or ASTM F 1743, Section 6, or ASTM F 2019, as applicable, except as modified herein.

C. Resin Impregnation

1. Provide a sufficient quantity of resin for tube impregnation to fill the volume of all voids in the tube material with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall.

2. Calculate the volume of resin required to meet the conditions listed above for the diameter, thickness and targeted additional allowance of each diameter and thickness of CIPP liner per unit length, typically, per foot, and submitted to the Engineer for review.

3. Exceed the amount of resin used over the calculated value by ten percent (10%) to fill the voids in the annulus between the CIPP and the existing pipe due to possible structural deterioration of the existing pipe.

4. Submit certified wetout sheet that shows the quantity of resin placed into the fabric tube, and certifies that the information is accurate and the resin was distributed uniformly throughout the fabric tube, as noted. Use a vacuum impregnation process.

5. To ensure thorough resin saturation throughout the length of the felt tube coordinate the level of the vacuum and the speed of the resin advance so that white spots (dry areas) at the inside surface of the flexible membrane shall be small, shallow, less than 10% of the fabric tube wall thickness or 3 mm, whichever is less, and be less than 1 % of the volume of the resin per unit length.

6. Unless otherwise approved, the wetout process is to take place at the manufacturer's factory, or other approved facility, under controlled conditions and not at the site. Transport and store the wetted out tube system in a refrigerated truck until installed. Comply with submittals for transport and storage time and submit a log of liner temperatures during transport and storage.

D. Roller System

1. Use a roller system to uniformly distribute the resin throughout the tube.

2. Calculate the roller gap dimension by a method that determines the correct volume of resin/felt per unit length (foot, yard or meter), contained within the confining perimeter of the flexible membrane. Submit a gap dimension calculation for Engineer approval based on the parameters such as diameter, cut size, nominal felt void percentage, nominal resin polymerization shrinkage, the design thickness, and whether the flexible membrane will end up as the ID of the CIPP as with inversion, or the OD as with a pull-in method. The arbitrary, but common, rule-or-thumb gap dimension of 2t +2 mm (2t is twice the design or twice the nominal fabric tube wall thickness) is not allowed.

3. If the Installer uses an alternate method of resin impregnation and resin distribution, the method must produce the same results. The Owner must approve any alternate resin impregnation method.

E. Wetout Tube

1. Pull-in or invert the wetout tube all through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.

2. If a pulling method is used, string a cable through the existing pipe to be rehabilitated and attached to the liner through an existing manhole or access point. Pull the liner through the existing manhole and through the existing pipe by this cable.

3. Take care not to damage the deformed pipe or existing sewer lines or manholes during the installation.

4. Use appropriate sleeves and rollers to protect the liner.

5. Use a sliding foil, per ASTM F 2019, for the fiberglass CIPP system.

F. Prior to installation, place remote temperature gauges (typically thermocouple probes) inside the host pipe at the invert level of each end to monitor the temperatures during the cure cycle. Monitor liner and host pipe interface temperature and log data during cure and cool down.

G. Curing

1. Accomplish curing utilizing hot water under hydrostatic pressure in accordance with the manufacturer's recommended cure schedule or steam.

2. Monitor and log the heat source in and output temperatures during the cure and cool down cycles.

3. Submit the manufacturer recommended cure schedule for each line segment installed. Account for the liner wall thickness, the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per ASTM F 1216, 7.6.1.2 or ASTM F 1743, 6.6.1.2 as applicable. Certified copies of all cure logs shall be submitted for each installation to the Owner's representative weekly.

4. Obtain and pay for cure water from local water purveyor or otherwise supply the source of water.

5. Dispose of cure water in an approved discharge location.

H. Cool Down

1. Cool the CIPP in accordance with the approved manufacturer recommendations, which have been submitted to the Owner for review.

2. Perform cooling without pressure interruption and with either water or air. Finish the processing when the exterior "skin" (interface) temperature on both ends reaches 100^0 F and is held for the appropriate period of time, as listed in the product submittal. The equipment may then be disconnected.

3. Monitor and log temperatures throughout the installation process to ensure that each phase of the process is achieved at the approved manufacturer's recommended temperature. Submit temperature records for each cure Engineer on a weekly basis, as a minimum.

I. Finish

1. Provide a finished lining that is continuous over the entire length of an installation run and be free from visual defects such as foreign inclusions, dry spots, pinholes, and delamination. The lining is to be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe.

2. Repair any defect, which will or could affect the structural integrity or strength of the linings at your expense. Propose the repair method for Engineer approval prior to proceeding.

3. Remove all portions of the inner foil for pulled-in-place installation methods.

4. Anchor the beginning and end of the CIPP liner at manholes. Extend the pipe into the manholes for enough distance to allow sealing and trimming. Provide sealing material compatible with the pipe end to provide a long term watertight seal. The preferred liner end seal material is composed of an extended hydrophilic rubber compounded from chloroprene (neoprene) rubber and a hydrophilic resin which expands upon contact with water. The seal is to mold itself to completely fill all gaps and exert pressure evenly to ensure a watertight seal. Submit the proposed sealing material to the Engineer for approval.

5. Wrinkles in the finished liner pipe which exceed 2% of the pipe diameter are unacceptable. Remove either the liner or the wrinkled segments which exceed 2% of the pipe diameter. Repair the removed sections at contractor’s expense.

3.7 LATERAL REINSTATEMENT

A. Determine the exact location and number of service connections from the television inspection records. Accurately field locate all existing service connections, whether in service or not.

B. Reconnect all service connections to the liner after testing unless noted otherwise on the Plans or directed otherwise in writing by the Engineer.

C. Use robotic cutting from pipe interior; however, on larger sewers man-entry may be utilized if all safety, including “Confined Space”, requirements are strictly met.

D. Restore service connections to not less than 100% capacity and provide a smooth flow line. Remove rough edges, strings or other pipe defects that would prevent solids from free flowing.

E. Restore/correct, without any delay, all missed or faulty reconnections, as well as any damages to property owners for not reconnecting the services.

3.8 PROTRUDING SERVICE TAPS

A. If required, use a robotic cutting method from pipe interior. Submit exact method for approval.

3.9 TESTING

A. Conduct testing after the replacement pipe has been installed but before it has been sealed in place at the manholes and any service reconnections have been made. The purpose of this test is to verify that the pipe liner has not been damaged during installation. For larger than 24" lines, the hydrostatic exfiltration test is to be used.

B. Low Pressure Air Test Procedure

1. Plug plugged at each manhole with pneumatic plugs.

2. Plug design is to hold against the test pressure without requiring external blocking or bracing.

3. Introduce low pressure air into the sealed line until the internal air pressure reaches 4.0 psi greater than the average back pressure (the design groundwater pressure) on the pipe. Allow at least five minutes to elapse to allow the pressure to stabilize.

4. The time required for internal pressure to decrease from 3.5 to 2.5 psi greater than the average back pressure (groundwater pressure) on the pipe, is not be less than the time shown in the following table for the given pipe diameter:

New Pipe Diameter	Minimum Elapsed Time
8 inch and smaller	4 minutes
10 inch	5 minutes
12 inch	6 minutes
15 inch and larger	7 minutes

C. Hydrostatic Exfiltration Test Procedure

1. Conduct the leakage test per ASTM F 1216, 8.2 with an allowable exfiltration of 50 U.S. gallons per inch diameter per mile per day. Perform the test for a minimum of one hour.

D. Prepare a minimum of two ClPP samples for testing in accordance with ASTM F 1216 or F 1743. Provide one sample from each of the following two methods.

1. Cut the sample from a section of cured CIPP at an intermediate manhole or at the termination point that has been inverted through a like diameter pipe which has been held in place by a suitable heat sink, such as sandbags.

2. Fabricate the sample from material taken from the tube and the resin/catalyst system used and cured in a clamped mold placed in the down tube.

E. The samples for each of these cases should be large enough to provide a minimum of three specimens. An approved independent third-party testing laboratory is to conduct the tests, the certified results of which are to be submitted to the Engineer. Perform the following test procedure after the sample is cured and removed:

1. Short-Term Flexural (Bending) Properties. Measure the initial tangent flexural modulus of elasticity and flexural stress measured for gravity and pressure pipe applications in accordance with ASTM D 790. Meet the following requirements:

a. Flexural Strength Minimum Value: 4,500 psi

b. Flexural Modulus Minimum Value: 250,000 psi

2. Wall thickness at any point is not to be less than 87.5% of the design thickness.

3.10 POST INSTALLATION TELEVISION INSPECTION

A. After lateral reinstatement and final connection to manholes, perform a post-installation television inspection of the installed replacement pipe in accordance with Section 3.4.B.

B. Verify the location of all service laterals and that the liner was not damaged during installation.

C. Submit all post-installation television inspection logs and records weekly to the Engineer for final approval.

D. Any additional work to reconnect services or repair damaged CIPP shall be conducted by the contractor at no additional cost to the Owner.

E. Based on the results of the CCTV inspection and at the option of the Engineer, conduct mandrel testing, in accordance with Section 501 – Gravity Sewers, to verify that wrinkles do not exceed 2% of pipe diameter at no additional cost.

F. Any defects in the liners which will affect the integrity or strength of the liners, in the opinion of the Engineer, shall be repaired by the Contractor at no expense to the Owner in a manner satisfactory to the Engineer.

3.11 CLEAN-UP

A. Upon acceptance of the installation work and testing, restore the project area affected by the operations to a condition at least equal to that existing prior to the work or as otherwise shown on the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 CIPP rehabilitation to be measured in accordance with one or more of the following methods outlined below and identified in the Bid Schedule. Payment includes full compensation for all materials, labor, tools and equipment necessary to perform the CIPP rehabilitation and related work as described in the Contract Documents - including any rents or royalties from patented products. If not specifically indicated in Bid Schedule all items required to perform the work, including segment mobilization and bypass pumping, are incidental to the Bid Item.

A. CIPP Segment Mobilization: On a per-each basis for mobilization to perform CIPP work on a line segment or segments at each geographic area within the project. Only one CIPP segment mobilization will be paid per each geographic area. Includes moving material and equipment to and from the site.

1. Bid Schedule Payment Reference: 509.4.1.A.1.
2. Bid Schedule Description: CIPP Segment Mobilization...each (EA)

B. ClPP Rehabilitation: By the linear foot for the pipe size indicated measured on a horizontal basis based on the indicated Plan Quantity for each manhole-to-manhole reach (from edge of MH to edge of MH). Includes moving equipment from reach to reach within each geographic area within the project, set up for installation, pre-cleaning, pre- and post-CCTV documentation, materials, labor, tools, testing, surface restoration, and related work.

1. Bid Schedule Payment Reference: 509.4.1.B.1.
2. Bid Schedule Description: CIPP Liner ___ ...linear foot (LF).

C. Cut Off Protruding Services: On a per-each basis for removing protruding service connections. Includes moving equipment from reach to reach, set up for removal, labor, tools, clean-up and disposal and related work. If removals of the potential protruding services are not required for the lining, no payment will be made for the Bid Item.

1. Bid Schedule Payment Reference: 509.4.1.C.1.
2. Bid Schedule Description: Cut Off Protruding Services…each (EA).

D. Reconnect Service Line/Reinstatement: On a per-each basis for internally reinstating laterals on the main line. Includes moving equipment from reach to reach, set up for reinstatement, pre-construction logging of service locations, labor, tools, clean-up and disposal, and related work.

1. Bid Schedule Payment Reference: 509.4.1.D.1.
2. Bid Schedule Description: Reconnect Service Line…each (EA).

E. Bypass Sewage Pumping: On a lump sum basis for providing bypass sewage pumping and additional items as required to maintain continuous operation of the collection system. Includes equipment, power supply, mobilization from reach to reach, labor, ancillary controls, coordination with the Owner and affected property Owners, monitoring, and all related work.

1. Bid Schedule Payment Reference: 509.4.1.E.1.
2. Bid Schedule Description: Bypass Sewage Pumping…lump sum (LS).

F. Residential Accommodations for CIPP Work: On a lump sum basis for providing residential accommodation as described in the Contract Documents.

1. Bid Schedule Payment Reference: 509.4.1.F.1.
2. Bid Schedule Description: Residential Accommodations for CIPP Work…lump sum (LS)

END OF SECTION

SECTION 510

PIPE BURSTING

PART IGENERAL

1.1 SECTION INCLUDES

A. "Pipe Bursting" gravity sewer or stormdrain pipe repair / rehabilitation method including materials, installation and testing.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation

B. Section 306 – Trench Backfill

C. Section 307 – Street Cuts and Surface Repairs

D. Section 501 – Gravity Sewers

E. Section 601 – Culvert, Stormdrain, and Gravity Irrigation

F. Section 1101 – Construction Traffic Control

1.3 REFERENCES

A. ASTM F 714: Polyethylene Plastic Pipe Based on Outside Diameter

B. ASTM D 1248: Polyethylene Plastics Molding and Extrusion Materials

C. ASTM D 2657: Standard Practice for Heat Fusion Jointing of Polyethylene Pipe and Fittings

D. ASTM D 3034: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings

E. ASTM D 3350: Extra High Molecular Weight, High Density Polyethylene Pipe

F. AWWA C 906: High Density Polyethylene Pipe for Water Distribution

1.4 SUBMITTALS

A. Submit the following information for Engineer's approval prior to work:

1. Qualifications of the Pipe Bursting Contractor (Category B Bidding only):

   a. Name, business address and telephone number of the Pipe Bursting Contractor including certification by the Pipe Bursting System Manufacturer that the Contractor is a licensed installer of their system and the designated installer has been trained on the fusion equipment required for the Work.

   b. Name(s) of all supervisory personnel to be directly involved with pipe bursting for the project.

   c. Sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel for the pipe bursting method will be directly involved with and used on the project. Substitutions of personnel and/or methods are not allowed without written authorization of the Engineer.

2. Construction Procedures

   a. Written descriptions of the construction method(s), materials, and equipment to be used and pit dimensions and locations required for equipment and material access.

   b. Written descriptions of the construction method(s) and equipment to be used to penetrate blockages and/or partially collapsed sections of the host conduit. Such work to be accomplished without excavation from the surface unless written authorization is obtained from the Engineer for surface excavations to remove blockages.

   c. Detailed descriptions of the methods of modifying existing manholes to accept bursting head and pipe.

   d. Descriptions of methods for making a water-tight seal between new pipe and existing manholes.

3. Submit traffic control plans and obtain permits as required by local jurisdiction.

4. Submit a sewage bypass pumping and/or diversion plan for review by the Engineer at least seven days prior to initiating bypass pumping or diversion.

a. The sewage bypass pumping and/or diversion plan is to include an emergency response plan to be followed in the event of failure of the bypass pumping and/or diversion system.

b. Proposed methods to notify the Owner, impacted property owners, and affected agencies, and Engineer 48 hours prior to commencing bypass pumping operations.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of constructed pipelines and service reconnections in relation to existing permanent benchmarks.

B. Submit drawings showing accurate dimensions, elevations, details of pipe and appurtenances including reconnection locations to the Engineer within 30 days of completion of project.

1.6 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load pipe and ancillary items in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

PART 2 PRODUCTS

2.1 PIPE SIZE, TYPE AND STRENGTH

A. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.

B. Notify the Engineer if installation conditions such as soils do not match conditions contemplated by the Contract Documents.

2.2 PIPE BURSTING PIPE

A. Solid Wall High Density Polyethylene (HDPE) Pipe Sizes 8 inch to 16 inch: ASTM D 3350.

1. Minimum Wall Thickness: SDR 17 or as specified in the Contract Documents and as required to accommodate hammer-head.

2. Cell Classification: 345434C - use color designation D (“natural” with UV blocker) when specified by the Engineer.

3. Joints: Heat Fusion Joining ASTM D 2657.

B. Solid Wall High Density Polyethylene (HDPE) Pipe Sizes 4 inch to 63 inch: AWWA C 906

1. Minimum Wall Thickness: SDR 17 or as specified in the Contract Documents and as required to accommodate hammer-head.

2. Cell Classification: PE 3408.

3. Joints: Heat Fusion Joining ASTM D 2657.

2.3 SERVICE LINE AND SERVICE CONNECTIONS

A. Unless otherwise indicated in the Contract Documents, service line replacement pipe to be PVC conforming to ASTM D 3034.

B. Inserta Tee, or approved substitution.

C. Heat fusion weld saddle/tee may be used with Engineer approval.

D. Size to match existing service line.

2.4 MANHOLE CONNECTIONS

A. Kor-N-Seal manhole adapter or approved substitution.

PART 3 EXECUTION

3.1 NOTIFICATIONS / PERMITS

A. Notify Engineer at least two working days (48 hours) in advance of mobilizing to a line segment for pipe bursting.

B. Notify Local One Number Locator Service at least two working days (48 hours) in advance of any excavation.

C. If access to private property will be impacted, notify affected property owner(s) at least two working days (48 hours) in advance of mobilizing to a line segment for repair. Make suitable arrangements for property owner access to property.

D. Obtain all necessary permits including right-of-way permits.

3.2 EXAMINATIONS

A. Verify utility locations, existing piping locations and structure where pipe bursting is to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. If necessary, allow 4 hours for the Engineer to modify the design without OWNER incurring increased project cost.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine pipe and fittings.

D. Verify pipe, fittings and materials delivered to the site meet the requirements of the Contract Documents.

E. Where indicated on the Plans, expose crossing utilities and support in accordance with purveyor requirements. Protect all utilities unless otherwise noted.

3.3 SEGMENT MOBILIZATION/DEMOBILIZATION

A. Place construction traffic control devices in accordance with Section 1103-Construction Traffic Control.

B. Move necessary equipment and materials to site.

C. After completion of pipe bursting, perform surface restoration, remove equipment and excess material from site. Dispose of any removed materials at landfill. Provide final clean up of site. Remove construction traffic control devices.

3.4 SEWER FLOW MAINTENANCE

A. Prior to pipe bursting, implement bypass flow procedures in accordance with approved plan.

B. Wastewater not permitted to flow in open trench.

C. If bypass pumping, provide back up capabilities for mechanical failure.

D. Notify affected property owner(s) of impending sewer service interruption, unless otherwise approved by the Engineer limit service interruptions to less than two (2) hours.

E. Monitor flow levels in pipeline to insure not backing up to unacceptable levels such as flooding basement floor drains. Contractor responsible for any damage resulting from backing up flow.

3.5 PRE PIPE BURSTING OPERATIONS

A. Pre-Excavation of Service Connections

1. Conduct pre-excavation of service connections only when specifically required in the Contract Documents.

a. Locate, excavate and expose all service connections before pipe bursting operations commence.

b. Completely disconnect and isolate all service connections attached to the host conduit before pipe bursting operations commence.

c. Do not reconnect service to the replacement pipe until installation and testing are complete.

B. Existing Manholes

1. If the pipe bursting tool and the replacement pipe is to traverse any existing manhole which is to remain in-place without interruptions during the pipe bursting operation (as shown on Plans), open the conduit entrances and exits to the existing manhole to the required dimensions and modify the manhole invert before the pipe bursting operations commence.

C. Cleaning and CCTV

1. Clean the host conduit per Section 501.3.H.6 to prior to commencing pipe bursting operations.

2. When specified, provide CCTV of the existing line per Section 501.3.H and verify location of services.

D. Site Documentation

1. When specified, provide photographic or video documentation of existing improvements along the area to be pipe bursted to verify that damage has not occurred as a result of work.

2. When specified, install survey hubs and provide elevations along the pipe bursting route to verify that soil heaving has not occurred.

3.6 PIPE BURSTING OPERATIONS

A. General

1. Carry out operations in strict accordance with all applicable OSHA Local, and State Safety Standards.

2. Do not change any material, thickness, design values or procedural matters stated in the submittals, without the prior knowledge and approval of the Engineer.

3. At the receiving manhole, verify that existing manhole can withstand the winching force needed for operation of the pipe bursting tool.

B. Pit Locations

1. If the locations of pits are shown on the Plans, submit any proposed revisions to the planned locations and reasons for relocation to the Engineer for review and approval prior to construction. Include any appropriate sketches deemed necessary by the Engineer.

2. If pit locations are not shown on the Plans, submit proposed locations and dimensions to the Engineer for review and approval prior to construction.

3. Obtain all necessary permits for work on the final pit locations.

C. Staging

1. If not indicated on the Plans, delineate the proposed staging area and submit to the Engineer for review and approval.

2. Secure required approvals and permits for assembly and storage of pipe materials in the staging areas.

3. Transport pipe materials to the job site and assemble as close to the work area as practicable. Provide protection to pipe if dragging more than 300 feet to the insertion point. Replace pipe that has been damaged in the opinion of the Engineer.

D. Operation of Pipe Bursting Machine and Installation of Replacement Pipe

1. Install the specific type of replacement pipe material in the locations as shown on the Plans. Allow for expansion and shrinkage to provide the correct length of pipe from manhole to manhole.

2. Limit vibrations transmitted to the surrounding soils to a peak particle velocity at the ground of 0.5 inches per second.

3. As the pipe bursting tool is advanced though the host conduit, advance the replacement pipe directly behind the tool to fill the void left by the fragmented host conduit.

4. Limit the length of continuous replacement pipe assembled on the surface and pulled into the insertion to a maximum of three-hundred (300) feet or provide calculations that show additional length can be installed without damage to pipe or receiving manhole. When requested, provide measurement information to the Engineer documenting compliance with this requirement.

5. Fuse pipe segments together per ASTM D 2657 or use heat fusion couplings as approved by the Engineer.

6. Remove internal bead so weld is flush with pipe interior surface.

7. After pipe bursting, seal each point that the annular space between the host pipe and bursting pipe is exposed by soaking dry oakum in 3M CR 202 and inserting this in the annular space for a distance of 18 inches along the pipe until the space is completely filled.

E. Connections to Manholes

1. Allow main line to acclimate to new temperature for a time recommended by the pipe manufacturer but not less than four hours prior to final finishing of manhole connections.

2. Connect replacement pipe to new manholes using a Kor-n-seal manhole adaptor.

3. Grout any removed portions of the manhole barrel or invert that was removed to allow pipe bursting activities.

3.7 SERVICE CONNECTIONS

A. Reconnect all active existing service lines, as indicated on the Plans or as identified in CCTV taping, after the replacement pipe has been completely installed and tested.

B. Allow main line to acclimate to new temperature for a time recommended by the pipe manufacturer but not less than four hours prior to reconnecting any service lines.

C. Provide couplings as required to make a watertight connection between the tee and the service line. Refer to Section 504.

3.8 FIELD QUALITY CONTROL

A. Testing

1. General

a. Testing is required after the replacement pipe has been installed but before it has been sealed in-place at the manholes and any service reconnections have been made. The purpose of this test is to check the integrity of the joints that have been made and to verify that the replacement pipe has not been damaged during installation.

2. Testing

a. After a manhole-to-manhole section of the existing host conduit has been replaced, and prior to any service lines being connected to the replacement pipe, test pipe per Section 501.3.4.

b. If test fails, make necessary repairs and retest at no additional cost to the Contract.

B. Inspection

1. After main line pipe passes and service lines and manholes are connected, perform a post-installation television inspection of the installed replacement pipe in accordance with Section 501.3.4.H.

2. An acceptable installation is to be a fully round pipe that is free of dimples, creases and welding beads greater than 1/16 of an inch.

3.9 CLEANING AND SURFACE RESTORATION

A. Upon completion of the pipe bursting operations, restore all areas disturbed by operations in accordance with the Plans. If not specifically indicated, restore all areas to pre-project conditions.

PART 4 MEASUREMENT AND PAYMENT

4.1 Pipe bursting rehabilitation to be measured in accordance with one or more of the following methods outlined below and identified in the Bid Schedule. Payment includes full compensation for all materials, labor, tools and equipment necessary to perform the pipe bursting rehabilitation. Payment includes any rents or royalties from patented products. If not specifically indicated in Bid Schedule, surface restoration is incidental to the Bid Item.

A. Pipe Bursting Segment Mobilization: On a per each basis for mobilization to perform pipe bursting work on a line segment or segments located in one particular geographic location. Only one pipe bursting segment mobilization will be paid per geographic location of the project. Includes moving material and equipment to and from the site, insertion pits including excavation, shoring, foundation stabilization, utility protection, manhole modifications as required, bedding material if required, backfill and surface restoration.

1. Bid Schedule Payment Reference: 510.4.1.A.1.
2. Bid Schedule Description: Pipe Bursting Segment Mobilization...each (EA)

B. Pipe Bursting: By the linear foot of the size indicated in the Bid Schedule measured on a horizontal basis along the centerline of the pipe bursting pipe from manhole edge to manhole edge. Includes moving operations from one reach to another within a specific geographic location.

1. Bid Schedule Payment Reference: 510.4.1.B.1
2. Bid Schedule Description: Pipe Burst _____ Pipe through ___ Pipe…linear foot (LF)

C. Service Line Reconnection: On a per each for excavation to locate expose the existing service to main connection, removal of existing pipe, purchase and installation of sewer pipe and fitting for connection to the new pipe bursting pipe of the size indicated upon the Bid Schedule including excavation, shoring, foundation stabilization, utility protection, bedding, backfill and surface restoration as required.

1. Bid Schedule Payment Reference: 510.4.1.C.1
2. Bid Schedule Description: Install ___ x _____ Service Line Reconnection… each (EA)

END OF SECTION

SECTION 511

FOLD-N-FORM PIPE REHABILITATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rehabilitation of gravity sewer lines by insertion of a folded PVC or PE pipe liner into an existing sewer line and reformation of pipe liner into a circular pipe liner conforming to shape of existing pipe.

1.2 RELATED SECTIONS

A. Section 501 - Gravity Sewers

B. Section 504 - Sewer Services

C. Section 507 - Sanitary Sewer open Cut Repair/Rehabilitation

D. Section 1103 - Construction Traffic Control

1.3 REFERENCES

A. ASTM D 1783: Specifications for Rigid PVC Compounds and CPVC Compounds.

B. ASTM D 2122: Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

C. ASTM D 2152: Test Methods for Extrusion Quality using Acetone Immersion.

D. ASTM D 2444: Test Method for Impact Strength.

E. ASTM D 2657: Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.

F. ASTM D 3034: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

G. ASTM D 3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

H. ASTM F 585: Standard Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers.

I. ASTM F 1533: Standard Specification for Deformed Polyethylene (PE) Liner.

J. ASTM F 1606: Standard Practice for Rehabilitation of Existing Sewers and Conduit with Deformed Polyethylene (PE) Liner.

K. ASTM F 1803: Standard Specification for Poly (Vinyl Chloride)(PVC) Closed Profile Gravity Pipe and Fittings Based on Controlled Inside Diameter.

L. ASTM F 1867: Standard Practice for Installation of Folded/Formed Poly (Vinyl Chloride) (PVC) Pipe Type A for existing Sewer and Conduit Rehabilitation.

M. ASTM F 1871: Standard Specification for Folded/Formed Poly (Vinyl Chloride Type A for Existing Sewer and Conduit Rehabilitation).

N. ASTM F 1947: Standard Practice for Installation of Folded Poly (Vinyl Chloride) (PVC) Pipe into existing sewer and conduits.

O. ASTM F 5104: Standard Specification for Folded Poly (Vinyl Chloride) (PVC) Pipe for Existing Sewers and Conduit Rehabilitation.

1.4 SUBMITTALS

A. Submit manufacturer's technical literature for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that materials meet or exceed specified requirements including all requested test results and material identifications.

C. Submit manufacturer's installation instructions as recommended and maintain a copy at the job site.

D. Submit sewer bypass plan to Engineer for review prior to preconstruction meeting.

E. Submit qualifications of the fold-n-form installation Contractor (Category B Bidding only):

1. Name, business address and telephone number of the Pipe Bursting Contractor including certification by the Pipe Bursting System Manufacturer that the Contractor is a licensed installer of their system.

2. Name(s) of all supervisory personnel to be directly involved with pipe bursting for the project.

3. Documentation showing that the Contractor has successfully installed at least 25,000 feet of the product and has a minimum of five (5) years active experience in the commercial installation of the product in wastewater collection systems.

4. Sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel for the pipe bursting method will be directly involved with and used on the project. Substitutions of personnel and/or methods are not allowed without written authorization of the Engineer.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual service line locations

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store material in compliance with the manufacturer's recommendations and in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

PART 2 MATERIAL

2.1 PIPE SIZE, TYPE AND STRENGTH

A. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.

B. Unless otherwise indicated in the Contract Documents, service line replacement pipe to be PVC conforming to ASTM D 3034.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 FOLD-N-FORM SEWER PIPE AND FITTINGS

A. Solid Wall PE Pipe Sizes 8 inch to 16 inch: ASTM D 3350.

1. Minimum Wall Thickness: SDR 21 or as specified in the Contract Documents.

2. Joints: Heat Fusion Joining ASTM D 2657.

B. Poly (Vinyl Chloride) PVC Closed Profile Gravity Pipe 18 inch to 60 inch: ASTM F 1803:

1. Waterway Minimum Wall Series 46 – ASTM F 1803 Table No. 1.

C. Characteristics:

1. Provide pipe liner capable of expanding to dimensions of existing pipe.

2. Provide pipe liner capable of lining bends without splitting, rupturing or wrinkling of the pipe liner material.

3. Provide pipe liner with no degradation of the liner's physical properties during and dimensionally stable immediately after cool down.
4. Provide pipe liner that resists splitting during remote control service connection reinstatement.

D. Markings:

1. Provide pipe liner marked in 5' intervals indicating the manufacture, size (diameter and SDR), material and production lot number.

E. Dimensions:

1. Provide a liner with an outside diameter manufactured to a size that when installed will fit flush with the internal circumference of the host pipe.

2. When feasible, provide pipe liner continuously extruded at the factory to the minimum specified length that will effectively span the distance between manholes.

F. Material Testing:

1. Provide pipe liner with each production lot inspected and tested at the time of manufacture in accordance with ASTM D 2444, ASTM D 2122, and ASTM D 2152. Provide pipe liners homogeneous, uniform in color, free of cracks, holes, foreign material, blisters and deleterious faults.

2.3 COUPLINGS

A. Couplings for connecting two pipes of dissimilar type or size: Non-shear couplings with appropriate bushings providing for a watertight connection, a smooth pipe invert, corrosion resistant connection. Flex Seal couplers made by Mission Clay Products of Corona, California, or DFW couplers made by NDS (National Diversified Sales) of Lindsay, California, or approved substitution.

B. Couplings for two plain end pipes of similar material where factory bell by bell couplings are not available: Non-shear couplings providing for a watertight connection, a smooth pipe invert, corrosion resistant connection. Flex Seal couplers made by Mission Clay Products of Corona, California, or DFW couplers made by NDS (National Diversified Sales) of Lindsay, California or approved substation.

C. Metal straps, bolts, nuts and other metal hardware used on couplings, service connection fittings and other fittings to be Grade 304 stainless steel.

D. For Service Line Couplers: Use InsertaTee 3, or approved substitution.

2.4 FULL CIRCLE REPAIR CLAMPS

A. As manufactured by Romac Industries, Bothell, Washington, Style SS-1 or SS-2 or as manufactured by Smith-Blair, Inc., Texarkana, Arkansas, Model 226 or 227. Metal straps, bolts, nuts and other metal hardware to be Grade 304 stainless steel.

2.5 SOURCE QUALITY CONTROL

A. Provide test and inspection reports required by the standard for the pipe.

B. Inspect pipe markings to verify type, class, thickness and marking information required by the Standard for the pipe.

PART 3 WORKMANSHIP

3.1 NOTIFICATIONS / PERMITS

A. Notify Engineer at least two working days (48 hours) in advance of mobilizing to a line segment for fold-n-form.

B. Notify Local One Number Locator Service at least two working days (48 hours) in advance of excavation.

C. If access to private property will be impacted, notify affected property owner(s) at least two working days (48 hours) in advance of mobilizing to a line segment for repair. Make suitable arrangements for property owner access to property.

D. Obtain all necessary permits including right of way permits.

3.2 EXAMINATIONS/PREPARATION

A. Prior to Bid, Bidder shall:

1. Review any CCTV tapes provided by Owner.

2. Make note of all areas that will require additional repairs as part of the bid process.

B. Prior to commencement of work, Contractor shall verify utility locations, existing piping locations and structure where Fold-n-form is to be installed prior to beginning work. Notify the Engineer if field or existing pipe conditions are different from the Contract Documents. If necessary, allow 4 hours for the Engineer to modify the design without OWNER incurring increased project cost.

C. Cleaning: Contractor shall clean sewer line.

D. CCTV and Preliminary Repairs:

1. Contractor will CCTV after cleaning and repair any deficiencies found by CCTV that would prevent the installation of the fold-n-form liner by a point repair excavation in accordance with ISPWC Section 507. After repair, the line segment will be re-televised to verify the elimination of deficiencies that may cause installation problems.

2. No infiltration is allowed prior to pipe insertion. Band or grout leaks and show leak is fixed prior to insertion.

E. Bypass Pumping: Bypass pumping shall consist of devices to maintain the existing flows and service in accordance with ISPWC Section 507.3.4.

F. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

G. Examine pipe and fittings.

H. Verify pipe, fittings, bedding, and materials delivered to the site meet the requirements of the Contract Documents.

I. Confined Space Entry: All entries into a live manhole shall be in accordance with Confined Space Entry procedures.

3.3 SEGMENT MOBILIZATION/DEMOBILIZATION

A. Place construction traffic control devices in accordance with ISPWC Section 1103 – Construction Traffic Control. Traffic Control – An approved traffic control plan shall be in place and utilized.

B. Move necessary equipment and materials to site.

C. After completion of fold-n-form installation, perform surface restoration, remove equipment and excess material from site. Dispose of removed sewer materials at landfill. Provide final clean-up of site. Remove construction traffic control devices.

3.4 SEWER FLOW MAINTENANCE

A. Prior to commencement of pipe installation, implement bypass flow procedures in accordance with approved plan.

B. Wastewater not permitted to flow in open trench.

C. If bypass pumping, provide backup capabilities for mechanical failure.

D. Notify affected property owner(s) of impending sewer service interruption, unless otherwise approved by the Engineer limit service interruptions to less than two (2) hours.

E. Monitor flow levels in pipeline to ensure not backing up to unacceptable levels such as flooding basement floor drains. Contractor responsible for any damage resulting from backup flow.

3.5 PIPE INSERTION

A. If required, perform excavation of insertion pit in accordance with Section 301 – Trench Excavation and ASTM F 585.

B. Follow manufacturer's installation procedures/recommendations and instructions.

C. Take care to ensure that the leading edge of the host pipe is covered to prevent damage to the pipe liner.

D. Take precautions to protect the new pipe liner and existing host pipe from damage during installation.

E. Follow the manufacturer's instruction and procedures during the reformation process.

F. Through the use of heat and pressure, unfold the pipe liner and expand sufficiently to press against the wall of the host pipe, lock into the joints and form dimples at the locations of the service connections.

G. Continually monitor and record all temperature settings and pressure settings within the manufacturer's recommended range.

H. Allow for sufficient cooling (manufacturer's specified temperature) of the pipe liner before releasing air pressure.

I. Reconnect services as outlined below.

J. Provide watertight seal at the insertion and termination points of manholes. Submit method of sealing to Engineer for review and approval prior to installation.

3.6 SERVICE LINE CONNECTION

A. Locate service locations by the dimpling effect of the new pipe liner and the TV logs for the mainline.

B. After the pipe liner has reformed and cooled, reconnect the services using a remote control cutting device. Cut service lines in a manner that will leave no jagged edges for paper and other debris to hang-up on.

C. If directed by Engineer: Remove existing non-conforming service line to edge of right-of-way or easement line unless otherwise indicated in the Contract documents. Install new service line pipe as specified in Section 504 - Sewer Services. Connect new pipe to service connection and to existing service pipe using appropriate type couplers as specified above under Subsection 2 – Materials.

D. Notify Engineer for payment quantity confirmation.

E. Place backfill as required by Section 306 - Trench Backfill. Place and maintain suitable temporary surface until final surface restoration is completed.

F. Unless otherwise specified in the Contract Documents, within thirty (30) days of starting excavation for repair, complete surface restoration in accordance with Section 307 - Street Cuts and Surface Restoration.

3.7 TESTING AND ACCEPTANCE CRITERIA

A. The finished pipe shall be continuous tightly fit, free of folds and tears over the entire length.

B. Contractor shall CCTV line after service connections are completed.

C. Unless otherwise specified in Contract Documents, air testing and deflection testing will not be required for fold-n-form acceptance except as provided below.

D. Engineer reserves the right to require air testing and deflection testing of liner if CCTV inspection and/or visual inspection indicates possibility of faulty workmanship in which case cost of testing will be negotiated with Contractor by Engineer. If test(s) pass, Owner will be responsible for testing cost. If any test fails on a line segment, Contractor will be responsible for testing costs including compensation to Owner for Engineer time witnessing tests and any subsequent retesting costs associated with faulty fold-n-form installation. All inspection and testing shall be in accordance with Section 501 – Gravity Sewers.

PART 4 MEASUREMENT AND PAYMENT

4.1 Fold-n-form rehabilitation to be measured in accordance with one or more of the following methods outlined below and identified in the Bid Schedule. Payment includes full compensation for all materials, labor, tools and equipment necessary to perform the fold-n-form rehabilitation including cleaning and CCTV inspection. If not specifically indicated in Bid Schedule, surface restoration is incidental to the Bid Item.

A. Fold-n-Form Segment Mobilization: On a per-each basis for mobilization to perform work on a line segment or segments located in a specific geographic location within the project. Only one fold-n-form segment mobilization will be

paid per remobilization to each geographic location. Includes moving material and equipment to and from the site, bypass pumping where necessary.

1. Bid Schedule Payment Reference: 511.4.1.A.1
2. Bid Schedule Description: Fold-N-Form Segment Mobilization……each (EA)

B. Fold-n-Form: By the linear foot of the size indicated in the Bid Schedule measured on a horizontal basis along the centerline of the Fold-n-Form from manhole to manhole. Includes movement between segments within each geographic location.

1. Bid Schedule Payment Reference: 511.4.1.B.1
2. Bid Schedule Description: Fold-N-Form _____Pipe into _____Pipe…..linear foot (LF)

C. Service Line Reconnection: On a per-each for internal cutting of main pipe by remote control methods as approved by manufacturer or as otherwise approved by the Engineer to expose existing service connection.

1. Bid Schedule Payment Reference: 511.4.1.C.1
2. Bid Schedule Description: Install ___ x ___ Service Line Reconnection……each (EA)

D. Service Line Replacement: On a per-each for excavation to locate expose the existing service to main connection, removal and replacement of existing pipe, purchase and installation of service connection fitting for connection to the new Fold-N-Form pipe of the size indicated upon the Bid Schedule.

1. Bid Schedule Payment Reference: 511.4.1.D.1
2. Bid Schedule Description: Install ___ x ___ Service Line Replacement. each (EA)

END OF SECTION

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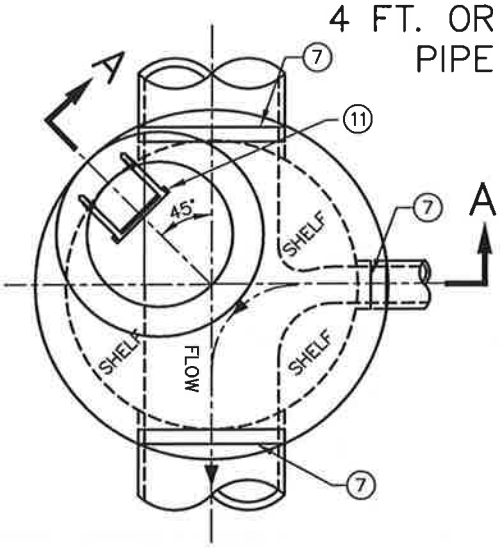
ISPWC - DIVISION 500

Sewer

Standard Drawings

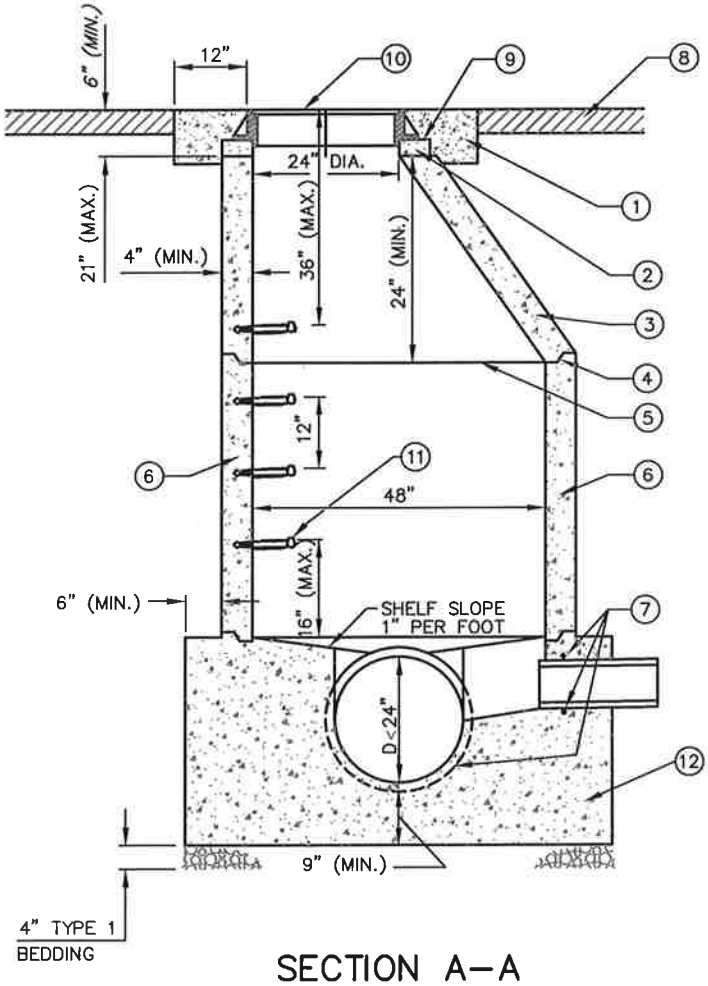
SD-501 – Standard Manhole Type A
SD-501A – Standard Manhole Precast Base Type A
SD-502 – Standard Manhole Type B
SD-502A – Standard Manhole Precast Base Type B
SD-503 – Standard Manhole Type B, Deep
SD-504 – Drop Manhole
SD-505 – Standard Shallow Manhole
SD-505A – Shallow Manhole Type 1
SD-506 – Standard 8” Traffic Rated Clean-out
SD-506A – Standard 4” Traffic Rated Clean-out
SD-506B – Bolt Down Cover Details – 4” Cleanouts
SD-506C – Bolt Down Cover Detail For Backwater Valve – 6” Dia.
SD-507 – Standard Manhole Cover and Frame
SD-507A – Manhole Cover and Flat Frame
SD-508 – Manhole Collar
SD-509 – Plastic Coated Manhole Steps
SD-510 – Pipe Anchors
SD-511 – Standard Sewer Service Lines
SD-511A – Standard Sewer Service Connection for New Development Projects
SD-511B – Standard Deep Sewer Service for Existing Development, Type J
SD-512 – Standard Service Marker
SD-513 – Air Release / Vacuum Valve
SD-513A – Combination Air Release/Vacuum Valve
SD-514 – Location Wire Box Detail
SD-515 – Pressure Sewer Cleanout

4 FT. OR GREATER DEPTH, PIPE DIA. ≤ 24"



PLAN

N.T.S.



SECTION A–A

N.T.S.

LEGEND

(1) CONCRETE COLLAR IN PAVED STREET SECTIONS PER SD–508.

(2) GRADE RINGS GROUTED WATERTIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.

(3) PRECAST MONOLITHIC ECCENTRIC CONE SECTION. (REBAR NOT SHOWN).

(4) RAMNEK OR APPROVED GASKETS ALL JOINTS.

(5) PROPERLY ALIGN ALL INTERIOR JOINTS.

(6) PRECAST CONCRETE MANHOLE–BARREL SECTION (REBAR NOT SHOWN).

(7) PRECAST GASKETED HUB RING OR RUBBER GASKETED COLLAR–FLEXIBLE AND WATER TIGHT.

(8) REPLACEMENT SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).

(9) FRAME TO BE GROUTED TO GRADE RINGS.

(10) FRAME AND COVER PER SD–507.

(11) MANHOLE STEPS.

(12) CAST IN PLACE MANHOLE BASE. SEE SD–501A FOR PREFABRICATED BASE.

NOTES:

(A) OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–501A.

(B) PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

(C) FOR DIAMETER, D, GREATER THAN 24", SEE SD–502 OR SD–503.

(D) MANHOLE FRAME AND COVER:
- A. REFER TO DRAWING NO. SD–507.
- B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.

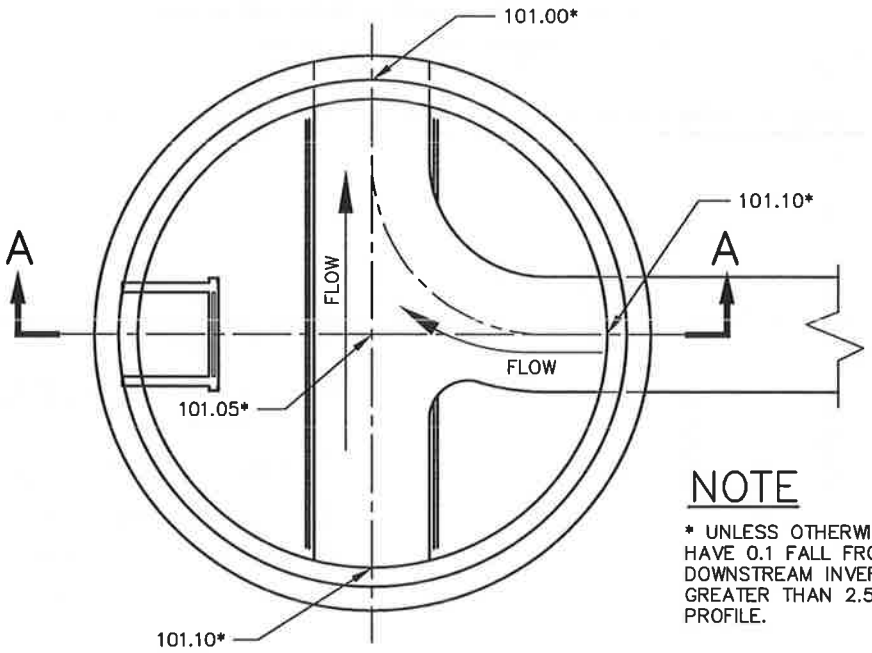
(E) WHERE PVC PIPE IS UTILIZED, INSTALL A RUBBER RING OR GASKET COLLAR WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

(F) EITHER BASE ON SD–501 OR SD–501A MAY BE USED WITH ANY MANHOLE DESIGN.

(G) PROVIDE MANHOLE CONCRETE REINFORCING TO ACCOMMODATE TRAFFIC LOADINGS.

2015

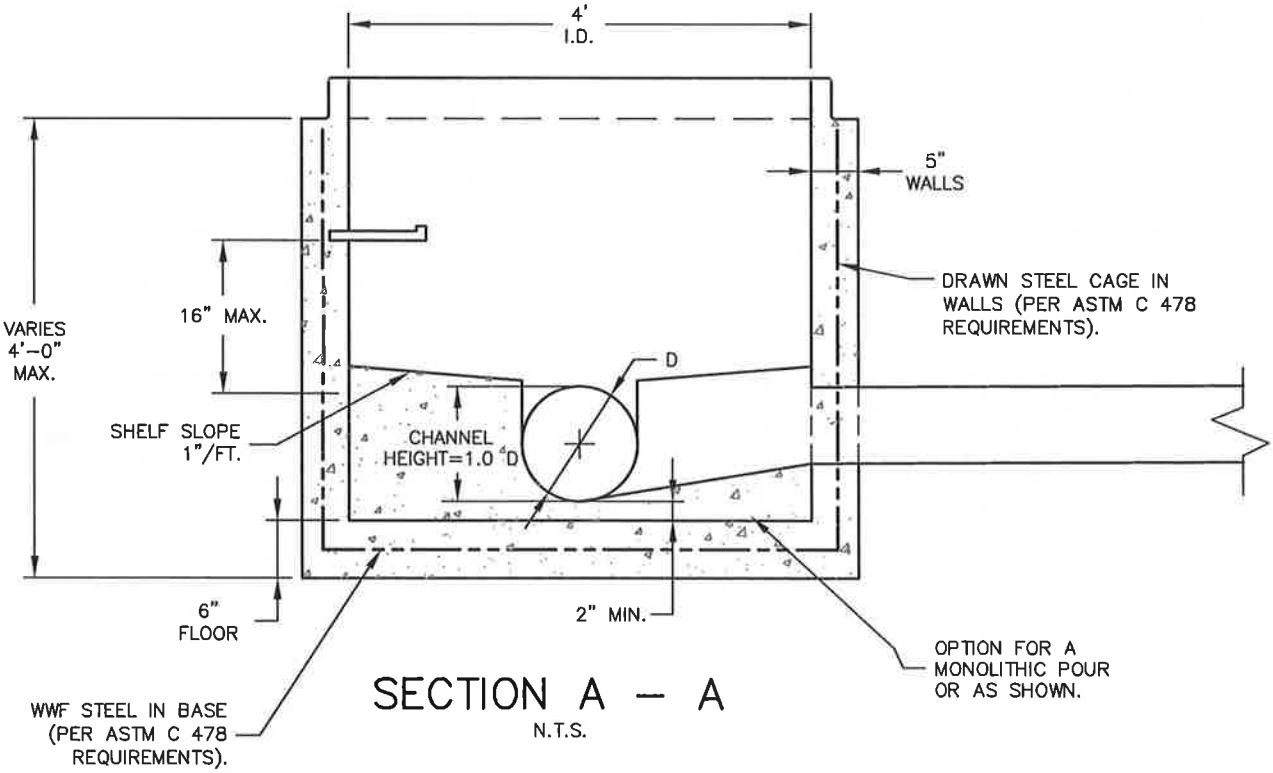
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE TYPE A	STANDARD DRAWING NO. SD–501



NOTE

* UNLESS OTHERWISE SHOWN, MANHOLES SHALL HAVE 0.1 FALL FROM UPSTREAM INVERT TO DOWNSTREAM INVERT. FOR PIPE SLOPES GREATER THAN 2.5% SLOPE, SEE PLAN AND PROFILE.

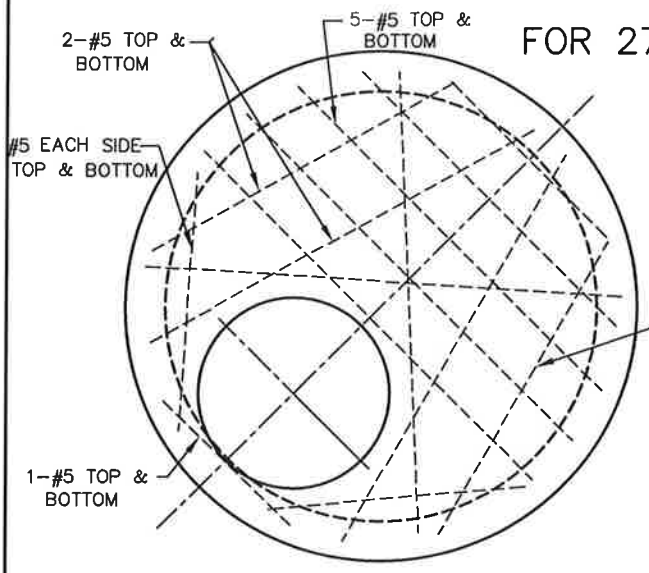
PLAN VIEW
48" ID CHANNELED BASE
N.T.S.



SECTION A – A
N.T.S.

2015

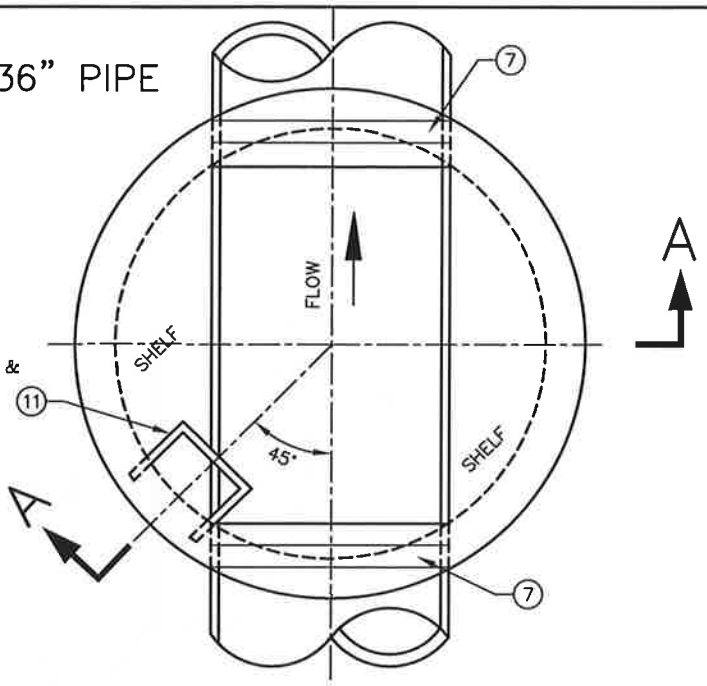
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE PRECAST BASE TYPE A	STANDARD DRAWING NO. SD-501A



FOR 27" – 36" PIPE

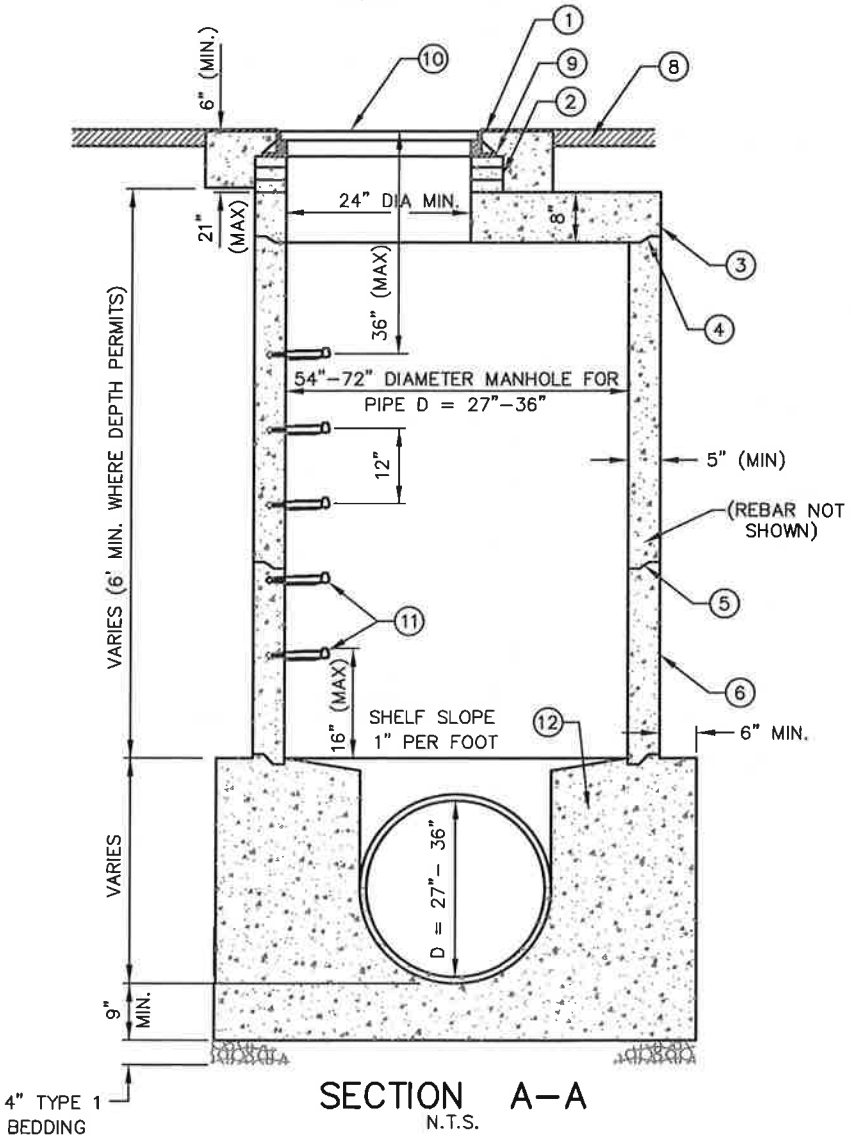
STANDARD SLAB TOP DETAILS

N.T.S.



PLAN

N.T.S.



SECTION A–A

N.T.S.

LEGEND

1. CONCRETE COLLAR IN PAVED AND GRAVEL AREAS PER SD–508.
2. GRADE RINGS GROUT WATERTIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.
3. REINFORCED CONCRETE REDUCER SLAB.
4. RAMNEK OR APPROVED GASKET AT ALL JOINTS.
5. PROPERLY ALIGN ALL INTERIOR JOINTS.
6. PRECAST CONCRETE MANHOLE BARREL SECTION (REBAR NOT SHOWN), 54"–72" RCP.
7. PRECAST GASKETED HUB RING OR RUBBER GASKETED COLLAR–FLEXIBLE AND WATER TIGHT.
8. REPLACEMENT SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).
9. FRAME TO BE GROUTED TO GRADE RINGS.
10. FRAME AND COVER PER SD–507 OR SD–507A.
11. MANHOLE STEPS.
12. CAST–IN–PLACE MANHOLE BASE. SEE SD–502A FOR PREFABRICATED BASE.

NOTES:

(A) OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–502A.

(B) PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

(C) FOR EXTRA DEPTH MANHOLE, SEE SD–503 "STANDARD MANHOLE TYPE B, DEEP".

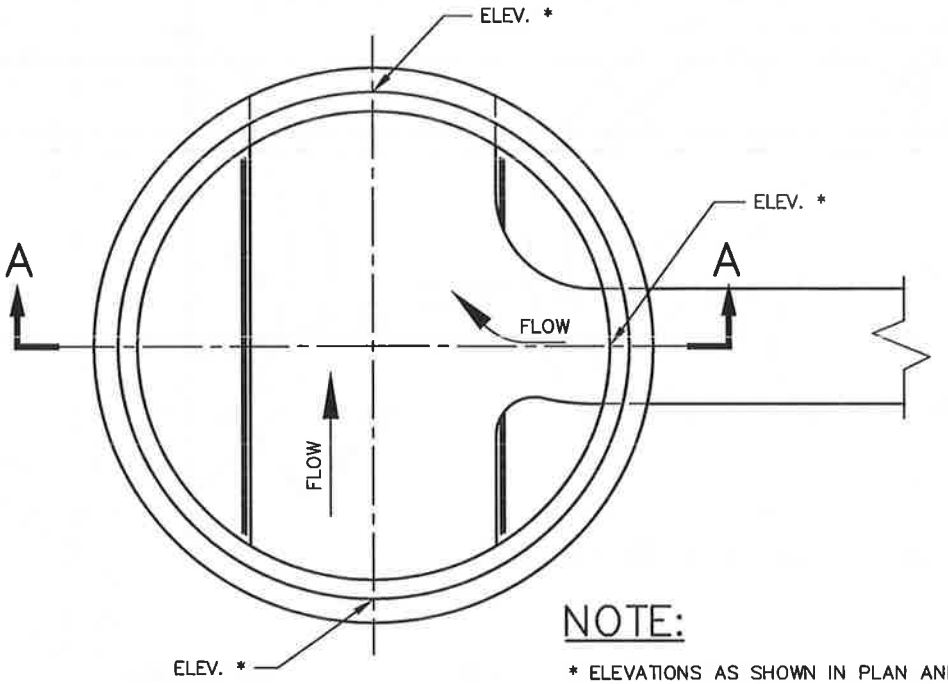
(D) MANHOLE FRAME AND COVER:
- A. REFER TO DRAWING NO. SD–507 (24" OPENING) OR SD–508 (30" OPENING).
- B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.

(E) WHERE PVC IS PIPE UTILIZED, INSTALL A RUBBER RING OR GASKET COLLAR WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

(F) PROVIDE MANHOLE CONCRETE REINFORCING TO ACCOMMODATE TRAFFIC LOADINGS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE TYPE B	STANDARD DRAWING NO. SD–502

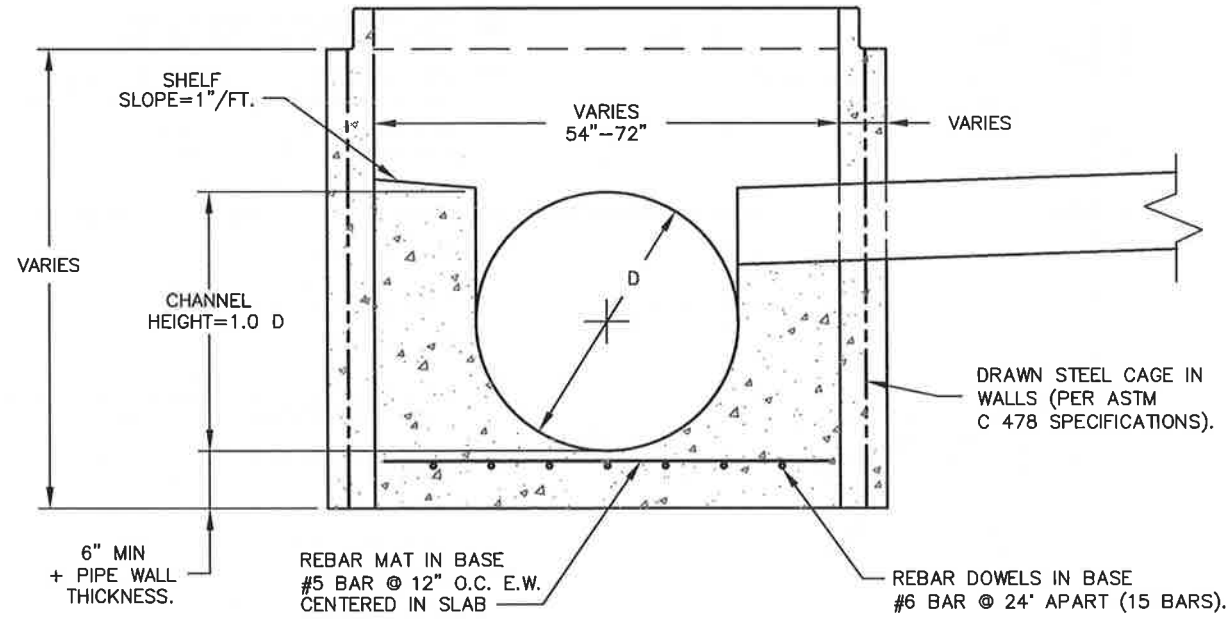


NOTE:

* ELEVATIONS AS SHOWN IN PLAN AND PROFILE.

PLAN VIEW

N.T.S.

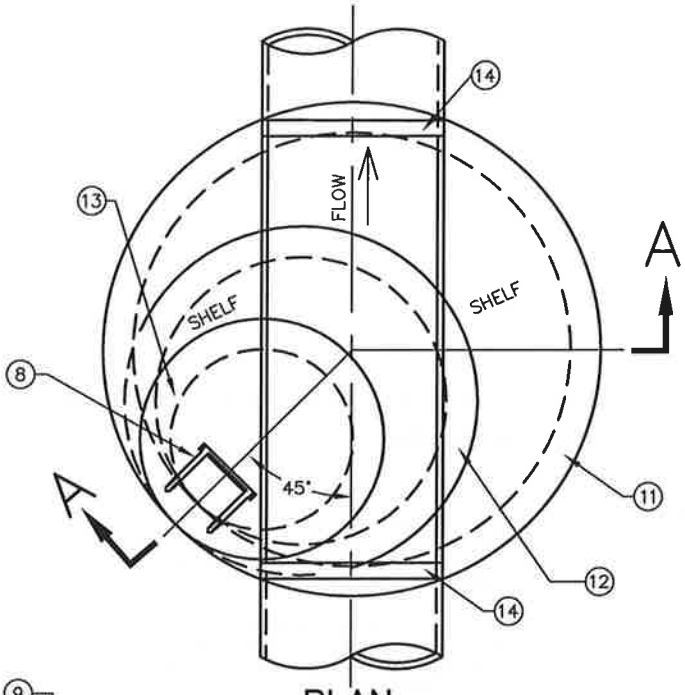


SECTION A–A

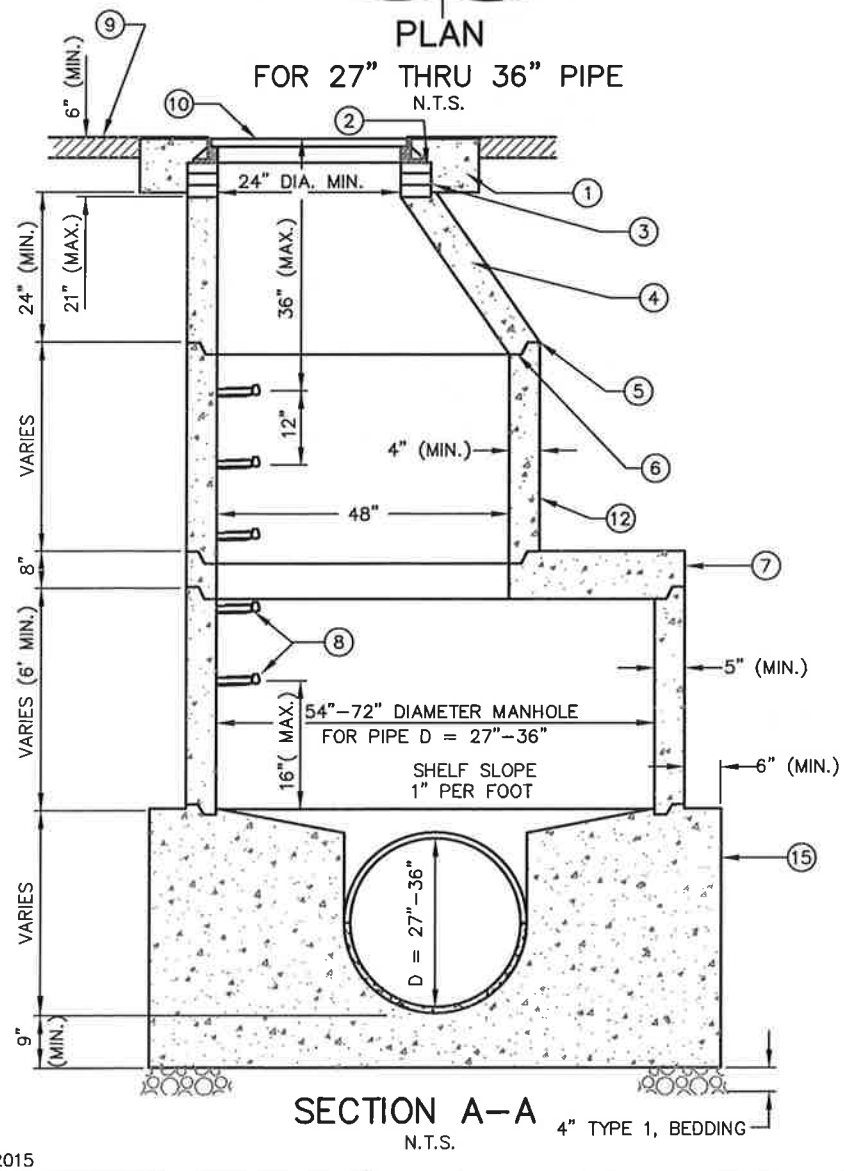
N.T.S.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE PRECAST BASE TYPE B	STANDARD DRAWING NO. SD–502A



PLAN
FOR 27" THRU 36" PIPE
N.T.S.



SECTION A–A
N.T.S.

LEGEND

1. CONCRETE COLLAR IN PAVED AND GRAVEL STREET SECTIONS PER SD–508.
2. FRAME TO BE GROUTED TO GRADE RINGS, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.
3. GRADE RINGS GROUT WATER TIGHT IN PLACE.
4. PRECAST MONOLITHIC ECCENTRIC CONE.
5. RAMNEK OR APPROVED GASKETS ALL JOINTS.
6. PROPERLY ALIGN ALL INTERIOR JOINTS.
7. REINFORCED CONCRETE REDUCER SLAB AS APPROVED BY THE ENGINEER.
8. MANHOLE STEPS.
9. REPLACEMENT SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).
10. FRAME AND COVER PER SD–507 OR SD–507A.
11. 54" RCP THRU 72" RCP PIPE.
12. 48" DIAMETER BARREL SECTION.
13. 24" DIA GRADE RINGS.
14. PREGASKETED HUB RING OR RUBBER GASKETED COLLAR–FLEXIBLE AND WATER TIGHT.
15. CAST–IN–PLACE MANHOLE BASE. SEE SD–502A FOR PREFABRICATED BASE.

NOTES:

A. OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–502A.

B. PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

C. MANHOLE FRAME AND COVER:
   A. REFER TO DRAWING NO. SD–507 (24" OPENING) OR SD–508 (30" OPENING).
   B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.

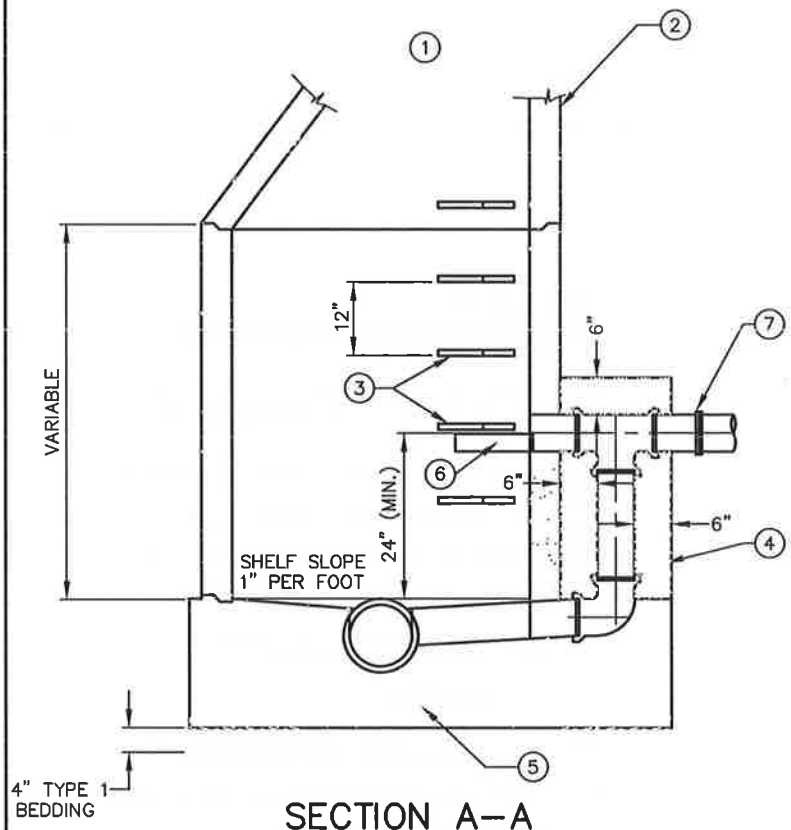
D. WHERE PVC PIPE IS UTILIZED, A RUBBER RING OR GASKET COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

E. PROVIDE MANHOLE CONCRETE REINFORCING TO ACCOMMODATE TRAFFIC LOADINGS.

F. PIPE MAIN CANNOT BE INSTALLED CONTINUOUSLY THROUGH BASE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE TYPE B, DEEP	STANDARD DRAWING NO. SD–503



SECTION A–A
N.T.S.

LEGEND

1. FRAME AND COVER PER STANDARD DRAWING SD–507.
2. MANHOLE PER STANDARD DRAWING SD–501, SD–502 OR SD–503.
3. MANHOLE STEPS.
4. TYPE 1 BEDDING MATERIAL.
5. CONCRETE BASE CAST IN PLACE PER SECTION 703.
6. EXTEND HALF PIPE DIAMETER INTO MANHOLE A MINIMUM OF 12".
7. FLEXIBLE JOINT.

NOTES:

A. PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

B. MANHOLE FRAME AND COVER
   A. REFER TO STANDARD DRAWING SD–507.
   B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.

C. CONSTRUCT BASIC MANHOLE PER TYPE SPECIFIED.

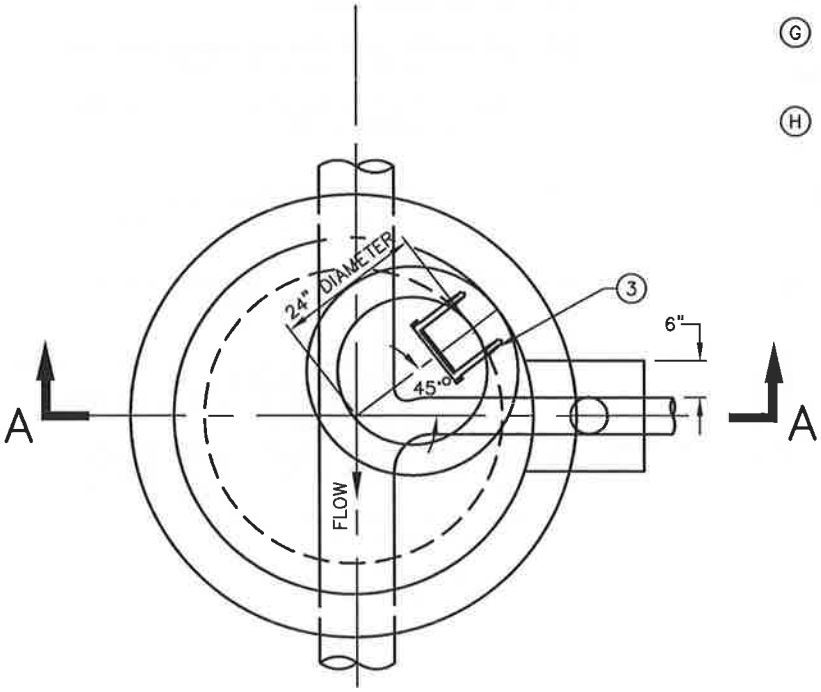
D. WHERE PVC PIPE IS UTILIZED, A RUBBER RING OR GASKETED COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

E. IF THE DROP MANHOLE IS ON THE UPSTREAM SIDE, ROTATE MANHOLE 180 DEGREES SO THE VERTICAL WALL WILL BE DOWNSTREAM.

F. REFER TO STANDARD DRAWING NO SD–509 FOR STEP SPECIFICATIONS.

G. OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEER'S APPROVAL, SEE SD–501A.

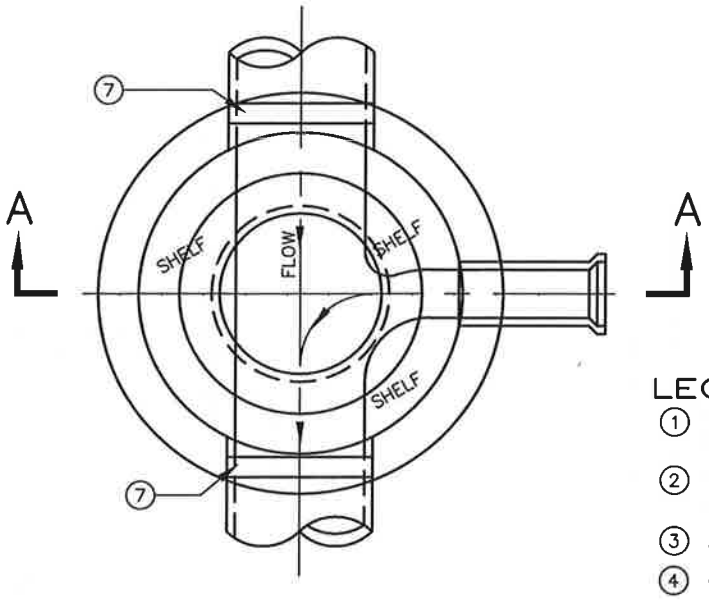
H. PROVIDE MANHOLE CONCRETE REINFORCING TO ACCOMMODATE TRAFFIC LOADINGS.



PLAN
N.T.S.

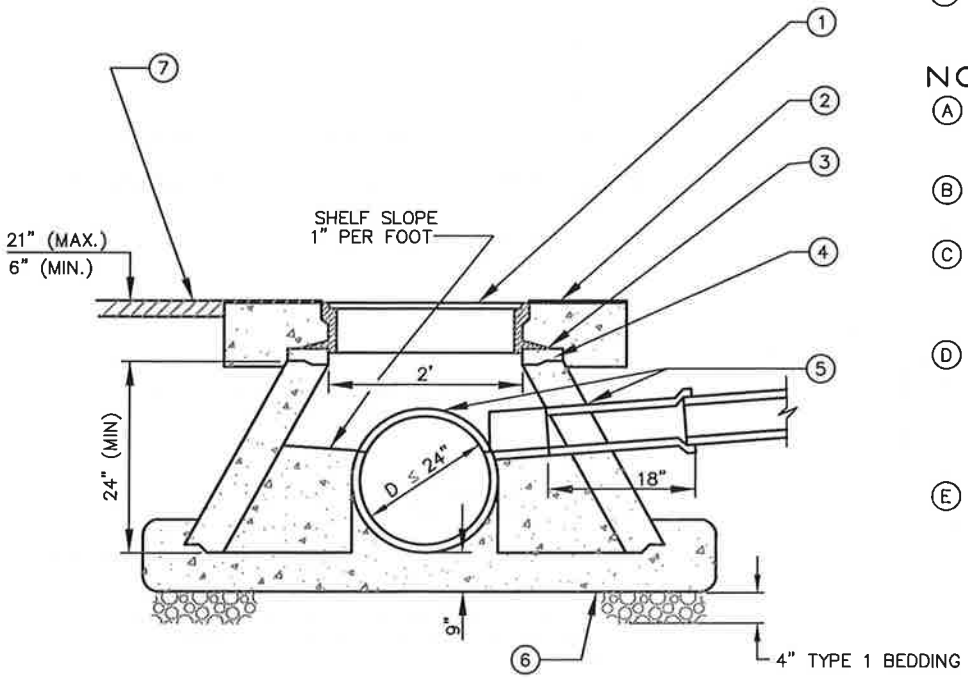
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	DROP MANHOLE	STANDARD DRAWING NO. SD–504



PLAN

N.T.S.



SECTION A–A

≥ 30" DEEP AND ≤ 48" DEEP

N.T.S.

LEGEND

(1) FRAME AND COVER PER STANDARD DRAWING SD–507.

(2) CONCRETE COLLAR IN PAVED SECTIONS PER SD–508.

(3) FRAME TO BE GROUTED TO GRADE RINGS.

(4) GRADE RINGS GROUTED IN PLACE.

(5) CORE–DRILL THROUGH PRECAST SECTION.

(6) CAST IN PLACE OR PRECAST CONCRETE BASE.

(7) PRECAST GASKETED HUB RING OR RUBBER GASKETED COLLAR–FLEXIBLE AND WATER TIGHT.

NOTES:

(A) OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–501A.

(B) FOR DIAMETER, D, GREATER THAN 24", SEE SD–502" STANDARD MANHOLE TYPE B".

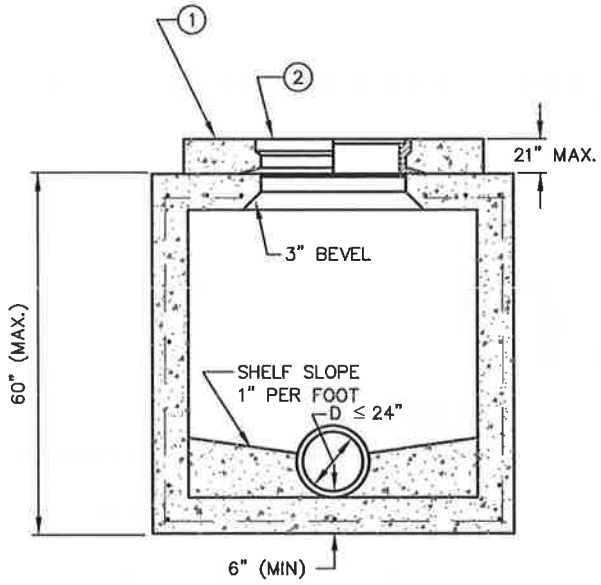
(C) MANHOLE FRAME AND COVER:
A. REFER TO DRAWING NO. SD–507.
B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.

(D) WHERE PVC PIPE IS UTILIZED, A RUBBER RING OR GASKET COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

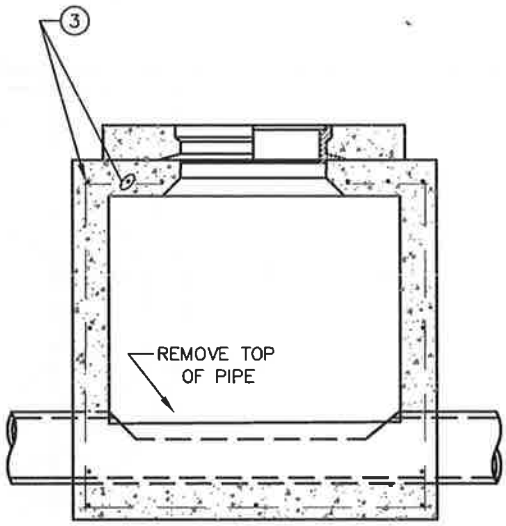
(E) PROVIDE MANHOLE CONCRETE REINFORCING TO ACCOMMODATE TRAFFIC LOADING.

2015

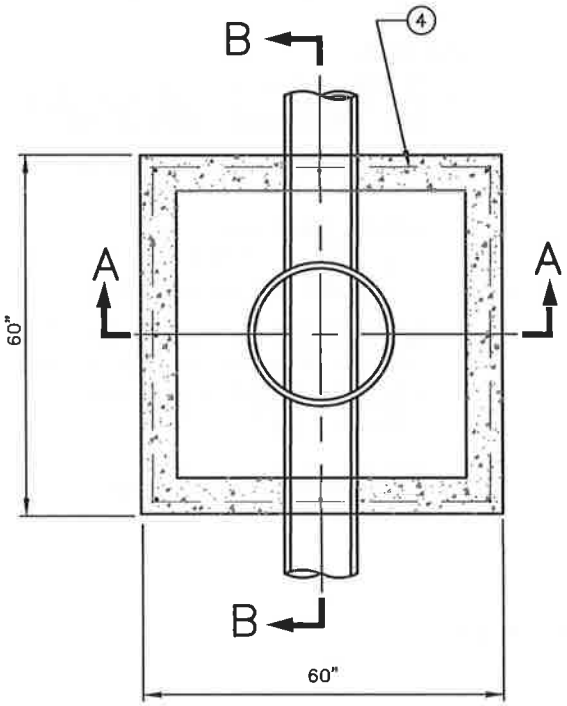
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD SHALLOW MANHOLE	STANDARD DRAWING NO. SD–505



SECTION A–A
N.T.S.



SECTION B–B
N.T.S.



TOP VIEW
N.T.S.

LEGEND

1. CONCRETE COLLAR PER SD–508.
2. FRAME AND COVER WITH GRADE RINGS AS REQUIRED.
3. #4 BARS 6" O.C BOTH WAYS, CUT TO MISS OPENING IN TOP.
4. #4 BARS ALL CORNERS AND 24" O.C.

NOTES:

A. ALL WALLS AND BOTTOM MINIMUM 6" THICK.

B. USE WITH MANHOLES GREATER THAN 30" DEEP AND LESS THAN 48" DEEP TO FLOWLINE OF PIPE.

C. MANHOLE FRAME AND COVER:
   A. PER SD–507A.
   B. FRAME AND COVER SHALL BE FLUSH WITH FINISH GRADE OF PAVEMENT.

D. USE WITH 8" DIAMETER THROUGH 24" DIAMETER PIPE ONLY.

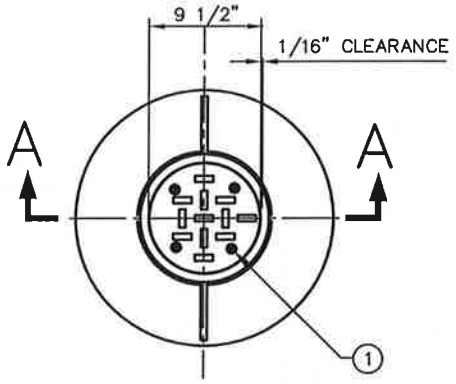
E. WHERE PVC PIPE IS UTILIZED, A RUBBER RING OR GASKET COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE CHANNEL, IN ORDER TO INSURE WATERTIGHT SEAL.

F. SHALLOW MANHOLE TYPE 1 SUBJECT TO ENGINEER'S APPROVAL.

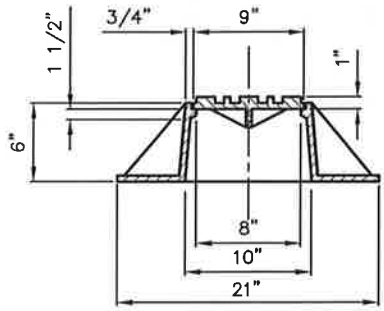
G. PROVIDE MANHOLE CONCRETE REINFORCING TO ACCOMMODATE TRAFFIC LOADINGS.

2015

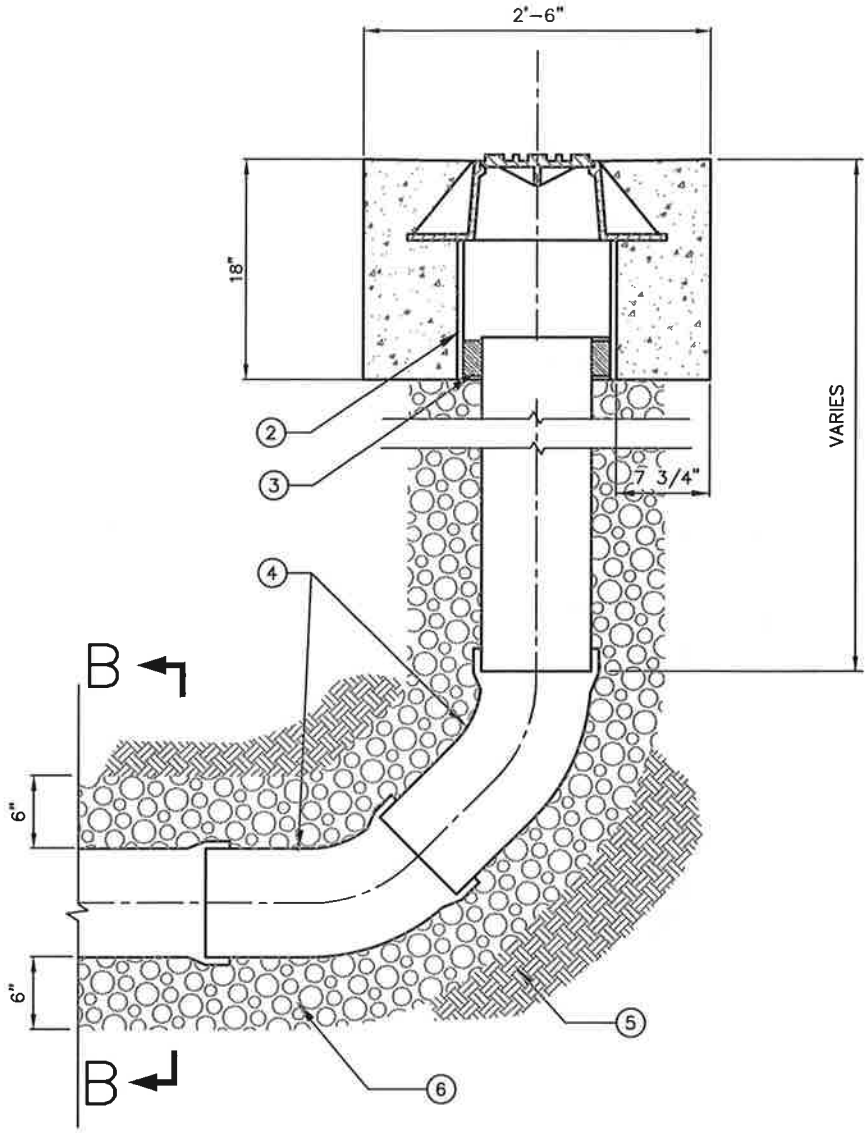
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	SHALLOW MANHOLE TYPE 1	STANDARD DRAWING NO. SD–505A



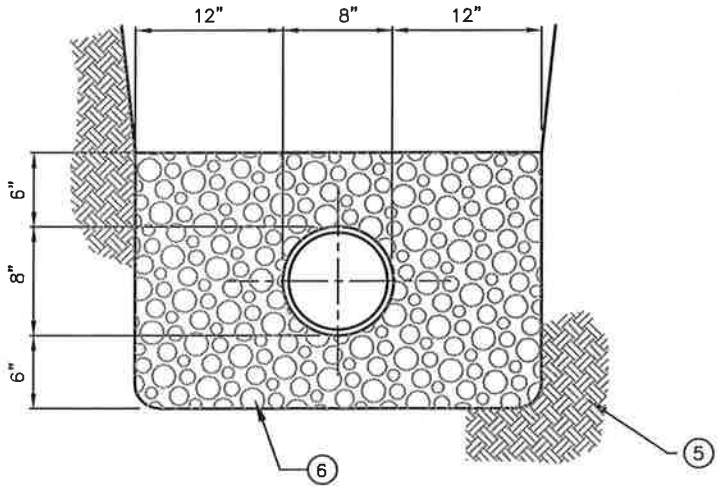
PLAN
N.T.S.



SECTION A–A
CAST IRON
RING & COVER
N.T.S.



SIDE
N.T.S.



SECTION B–B
N.T.S.

LEGEND

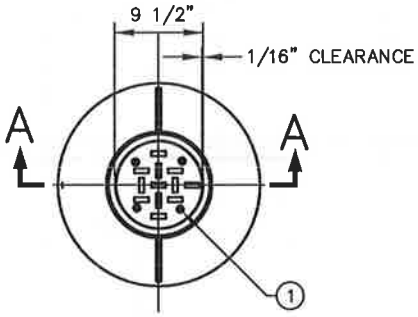
1. 4– 1" DIA. HOLES ON 3 1/2" RADIUS.
2. 12" DIA. x 1'–0" PVC, DIP OR CP.
3. FIBER JOINT PACKING.
4. 1/8 BEND.
5. UNDISTURBED MATERIAL.
6. TYPE 1 BEDDING MATERIAL.

NOTE:

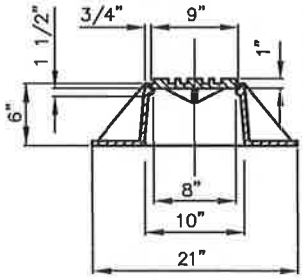
(A) CLEAN–OUT TO BE USED ONLY WITH APPROVAL FROM ENGINEER.

2015

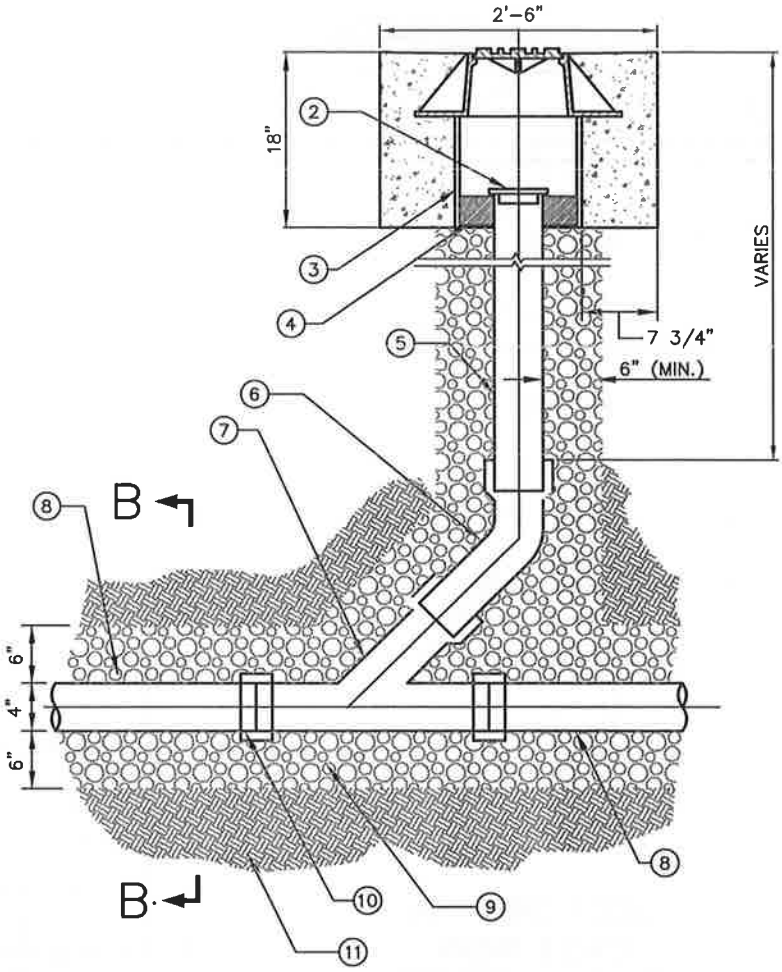
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD 8" TRAFFIC RATED CLEAN–OUT	STANDARD DRAWING NO. SD–506



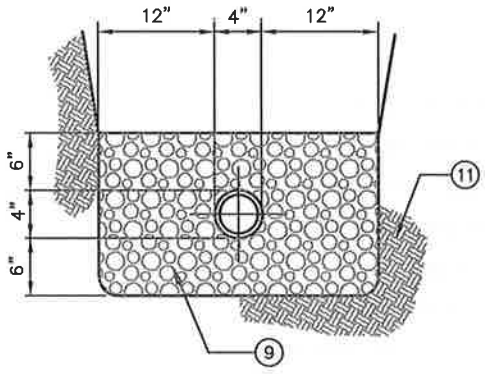
PLAN
N.T.S.



SECTION A–A
CAST IRON
RING & COVER
N.T.S.



SIDE
N.T.S.



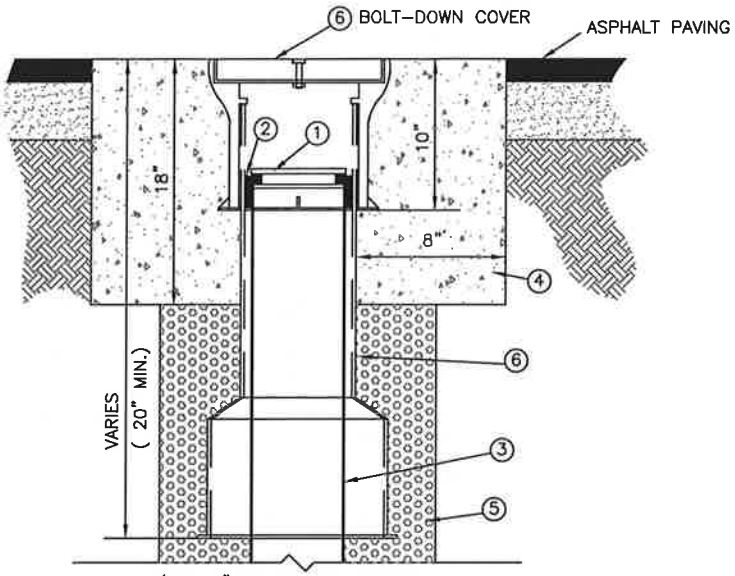
SECTION B–B
N.T.S.

LEGEND

1. 4– 1" DIA. HOLES ON 3 1/2" RADIUS.
2. MECHANICAL PLUG.
3. 12" DIA. X 1'–0" PVC, DIP OR CP.
4. FIBER JOINT MATERIAL.
5. PVC ASTM D 3034.
6. 45° BENDS.
7. "Y" FITTINGS.
8. EXISTING OR NEW PIPE.
9. TYPE 1 BEDDING MATERIAL.
10. MISSION COUPLER OR APPROVED SUBSTITUTION.
11. UNDISTURBED MATERIAL.

2015

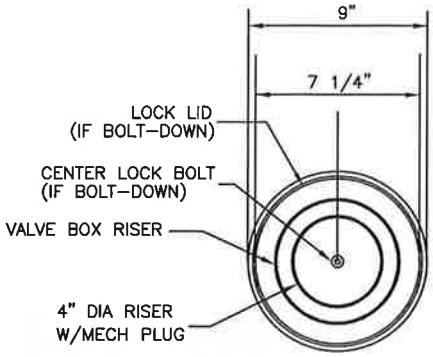
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD 4" TRAFFIC RATED CLEAN–OUT	STANDARD DRAWING NO. SD–506A



(FOR 4" CLEAN-OUT DETAILS SEE SD-506A).

BOLT-DOWN COVER IN ASPHALT

N.T.S.

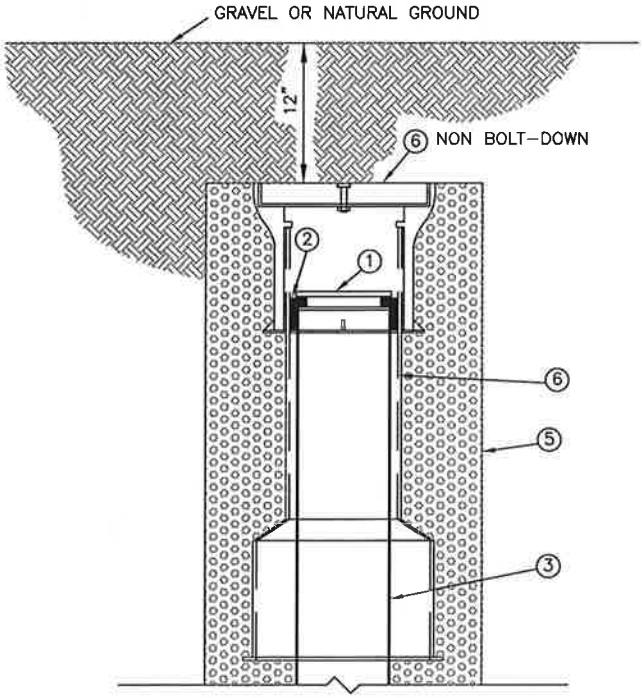


BOLT-DOWN COVER PLAN VIEW

N.T.S.

LEGEND

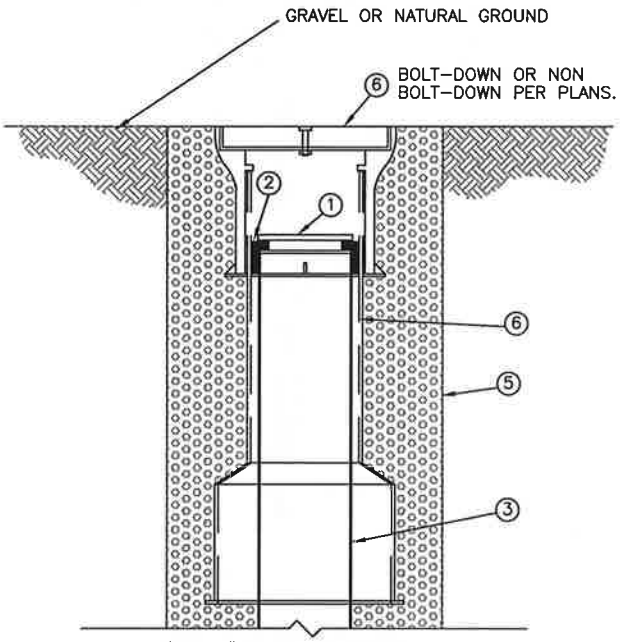
1. MECHANICAL PLUG, YELLOW TWIST PLUG WITH STAINLESS STEEL WING NUT.
2. FIBER JOINT MATERIAL.
3. 4" DIA PVC ASTM D 3034 RISER.
4. CLASS 3000 psi CONCRETE COLLAR.
5. TYPE 1 BEDDING 6" MIN. AROUND PIPE.
6. 2 PIECE VALVE BOX W/BOLT-DOWN COVER PER TYLER/UNION CATALOGUE ITEM NO. 461-A OR EQUAL.



(FOR 4" CLEAN-OUT DETAILS SEE SD-506A).

BELOW GRADE NON BOLT-DOWN COVER

N.T.S.



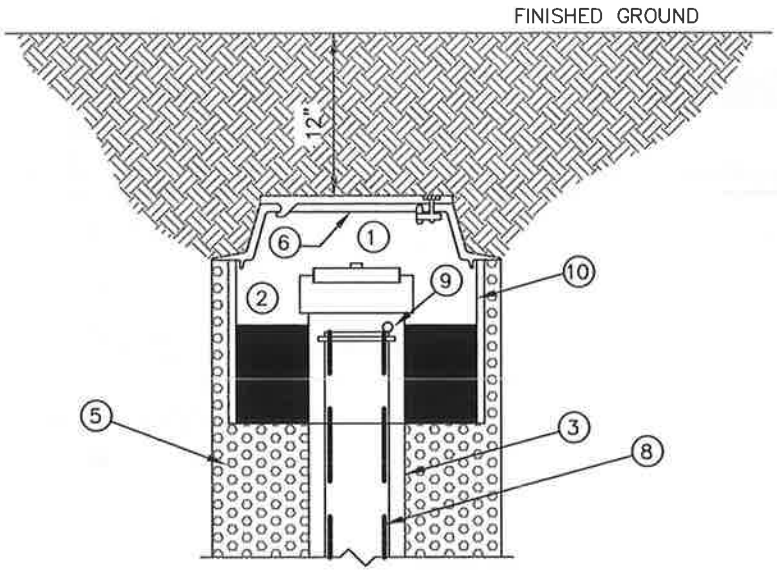
(FOR 4" CLEAN-OUT DETAILS SEE SD-506A).

COVER DETAIL WITH NO CONC COLLAR

N.T.S.

2015

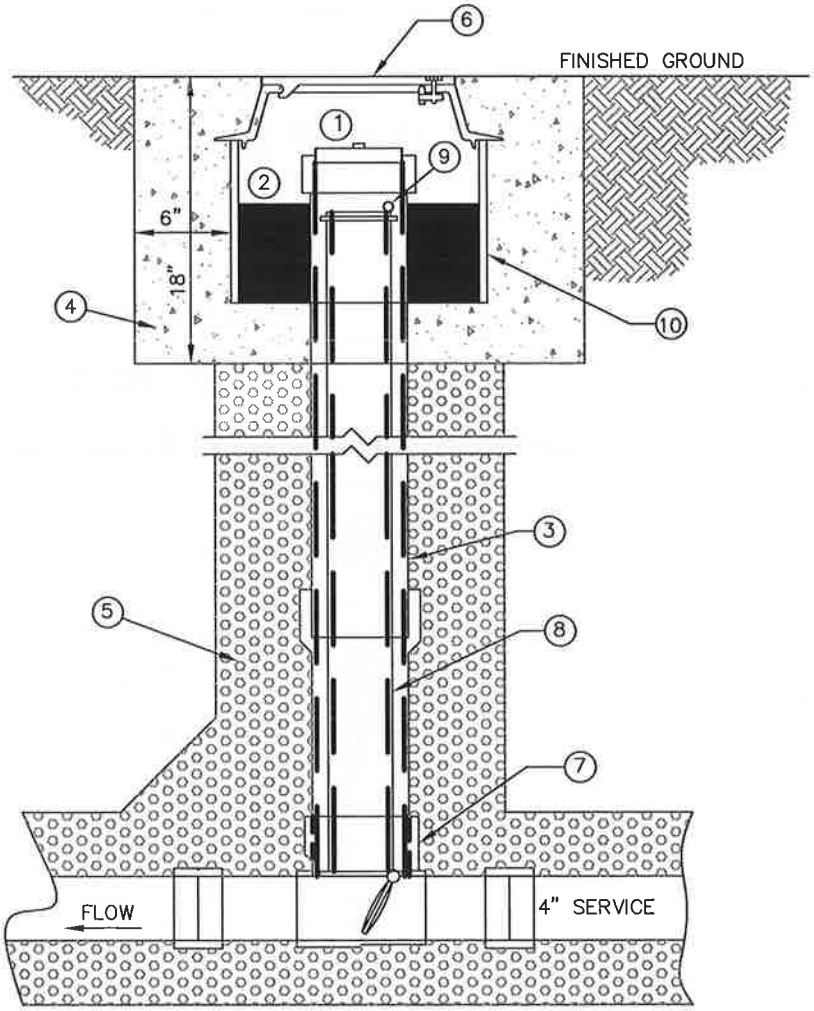
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	BOLT-DOWN COVER DETAILS-4" CLEAN-OUTS	STANDARD DRAWING NO. SD-506B



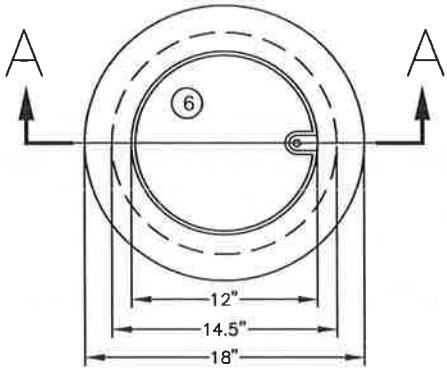
BOLT–DOWN COVER BELOW GRADE
N.T.S.

LEGEND

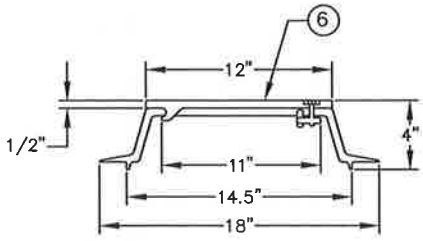
1. THREADED PLUG.
2. FIBER JOINT MATERIAL
3. 6" DIA ABS RISER
4. CLASS 3000 psi CONCRETE COLLAR.
5. TYPE 1 BEDDING 6" MIN. AROUND PIPE
6. FRAME & COVER, BOLT–DOWN OR NON BOLT–DOWN, AS MFG BY NEENAH FOUNDARY CO., NEENAH MOODEL R–1914–A OR APPROVED SUBSTITUTE.
7. 6" DIA ABS VALVE BODY W/RISER FOR FLAPPER ASS'BLY AS MFG BY CLEAN CHECK INC.
8. 4" DIA ABS RISER W/FLAPPER AS MFG BY CLEAN CHECK INC. (REMOVABLE)
9. LIFTING RING
10. 15" DIA X 1'–0" PVC, DIP, CP



BOLT–DOWN COVER W/CONC. COLLAR
N.T.S.



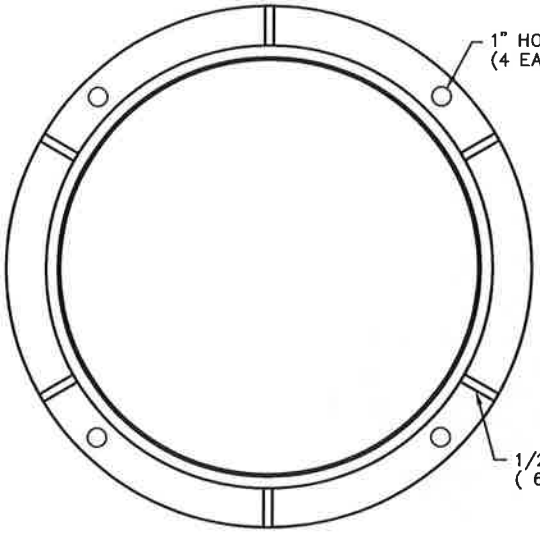
PLAN
N.T.S.



SECTION A–A
N.T.S.

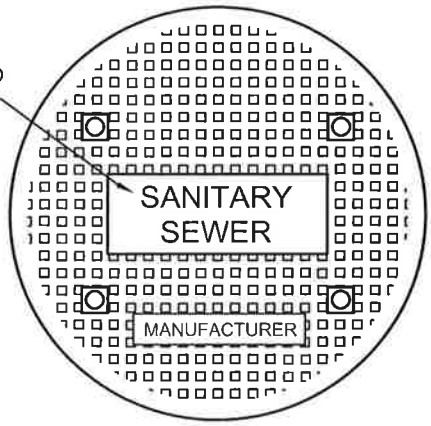
2015

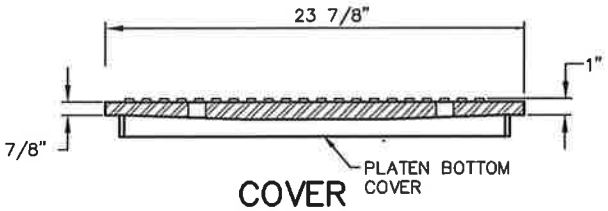
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	BOLT–DOWN COVER DETAIL FOR BACKWATER VALVE–6" DIA.	STANDARD DRAWING NO. SD–506C



PLAN

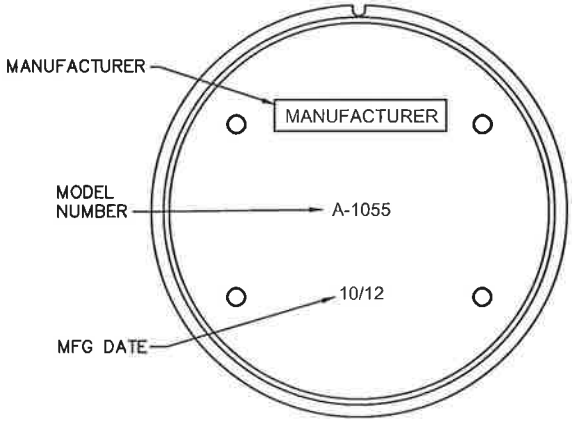
N.T.S.





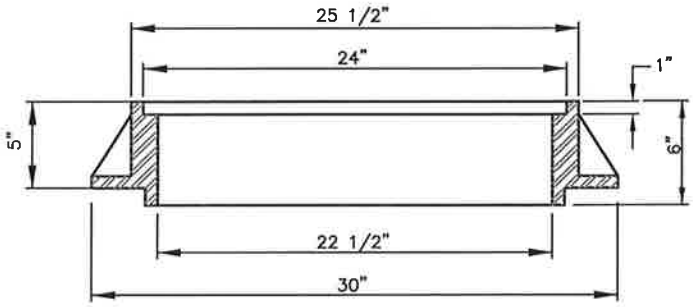
COVER

N.T.S.



COVER

N.T.S.



FRAME

N.T.S.

NOTE: 2012 ISPWC USES 1" LID THICKNESS FOR NEW CONSTRUCTION. VERIFY FRAME DIMENSIONS PRIOR TO PURCHASING REPLACEMENT LIDS FOR EXISTING FACILITIES.

NOTES:

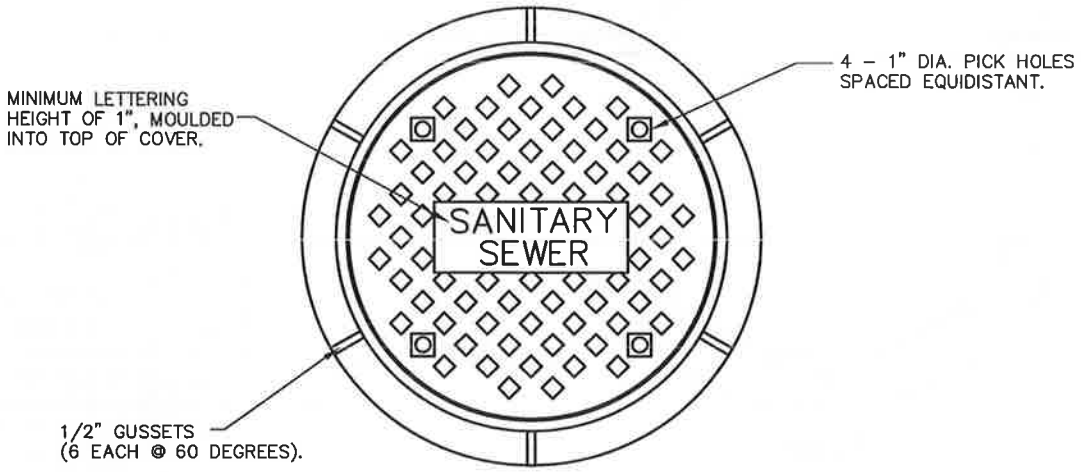
(A) MANHOLE FRAMES AND COVERS TO HAVE A TOLERANCE OF 1/4" OR LESS.

(B) COVERS NOT TO BE WARPED. REPLACE ALL THAT RATTLE OR VIBRATE WHEN TRAVELED UPON. MACHINE ALL MATCHING SURFACES.

(C) MINIMUM WEIGHT OF FRAME AND COVER = 275 LBS.

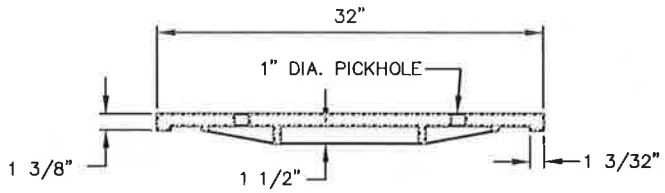
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE COVER AND FRAME	STANDARD DRAWING NO. SD-507



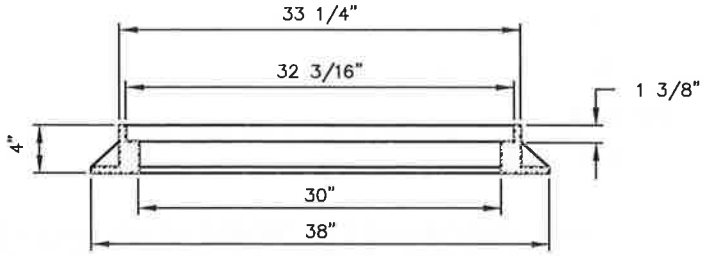
PLAN

N.T.S.



COVER

N.T.S.



FRAME

N.T.S.

NOTES:

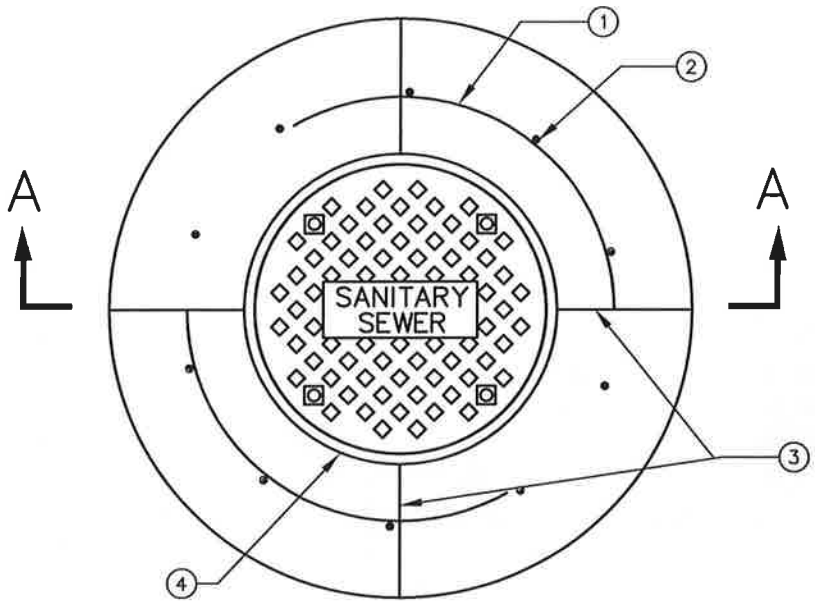
(A) MANHOLE FRAMES AND COVERS TO HAVE A TOLERANCE OF 1/4" OR LESS.

(B) COVERS NOT TO BE WARPED. REPLACE ALL THAT RATTLE OR VIBRATE WHEN TRAVELED UPON. MACHINE ALL MATCHING SURFACES.

(C) MINIMUM WEIGHT OF FRAME AND COVER = 400 LBS.

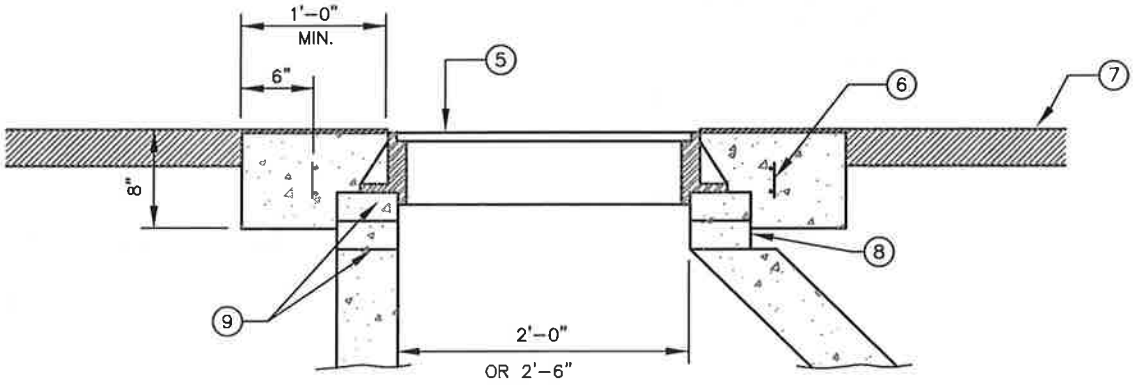
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	MANHOLE COVER AND FLAT FRAME	STANDARD DRAWING NO. SD-507A



PLAN

N.T.S.



SECTION A–A

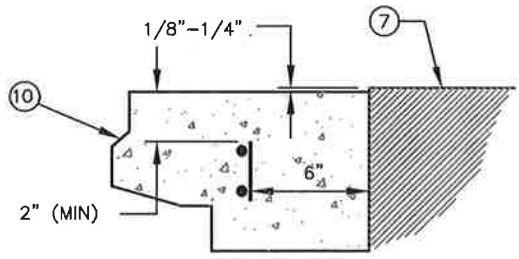
N.T.S.

NOTE:

(A) TOP OF COLLAR TO BE FLUSH WITH MANHOLE COVER.

LEGEND

1. #4 REBAR HOOPS (2 EACH) SEE SECTION A–A).
2. #4 REBAR AT 20" SPACING.
3. SCORES.
4. RIM.
5. FRAME AND COVER PER SD–507 AND SD–507A.
6. SEE "DETAIL A" FOR REBAR IN COLLAR.
7. FINISHED GRADE.
8. SEE OTHER STANDARD DRAWINGS OF MANHOLES FOR MAXIMUM HEIGHT.
9. GROUT BETWEEN RING AND COVER AND GRADE RINGS.
10. FRIBILLATED POLYPROPYLENE FIBER (ADDED PER MANUFACTURER'S RECOMMENDATIONS) MAY BE USED IN LIEU OF #4 REBAR IN CONCRETE COLLARS.

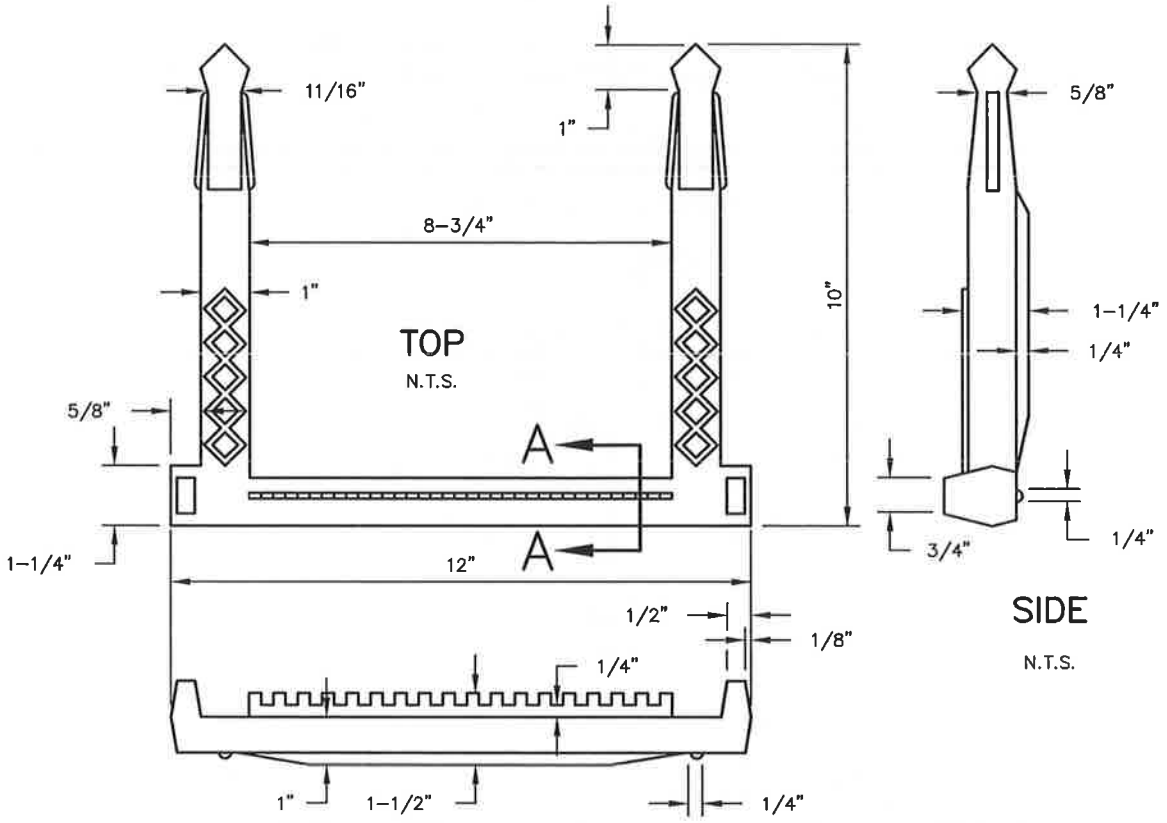


DETAIL A

N.T.S.

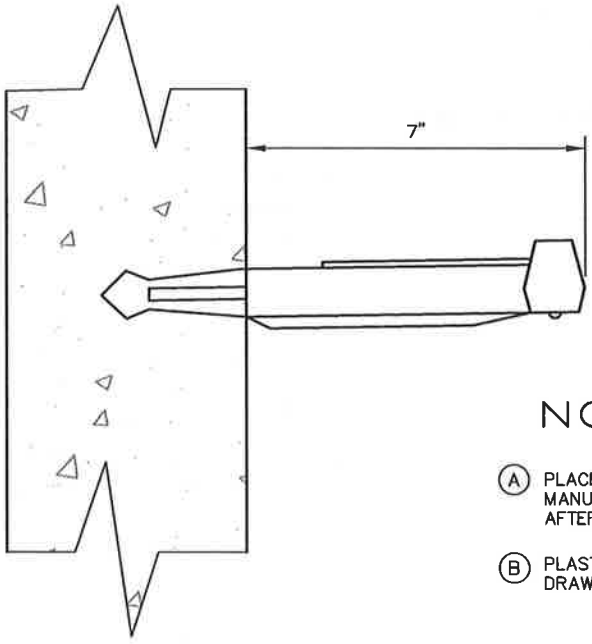
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	MANHOLE COLLAR	STANDARD DRAWING NO. SD–508



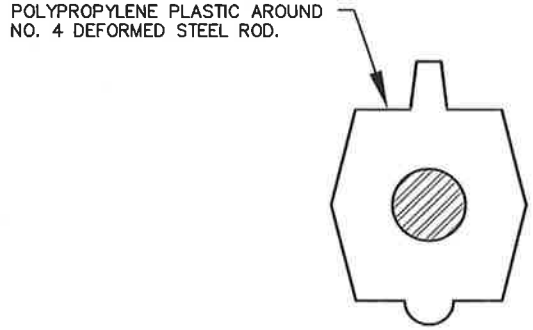
FRONT

N.T.S.



STEP IN MH WALL

N.T.S.



SECTION A-A

N.T.S.

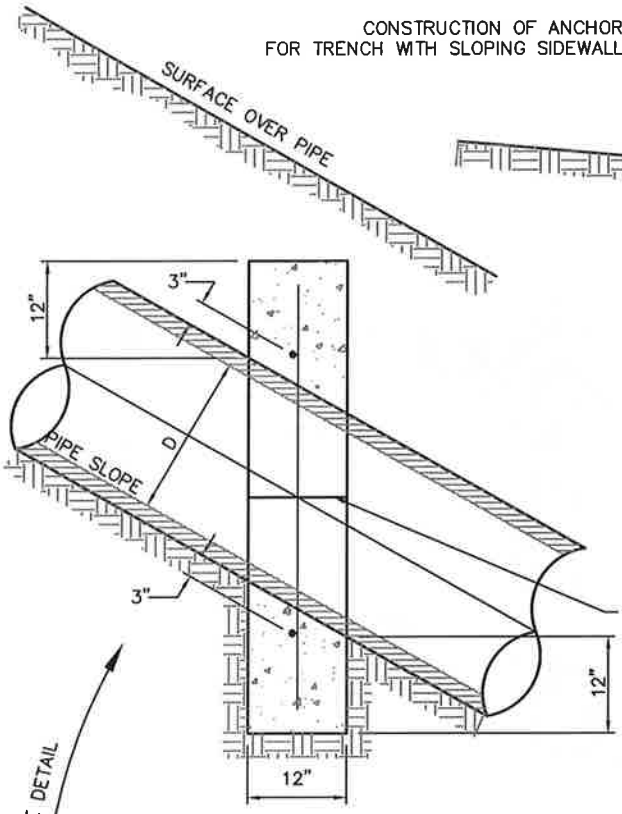
NOTES:

(A) PLACE INTO WET CONCRETE WALL DURING MANUFACTURE OR MORTAR INTO HOLES AFTER CONCRETE HAS SET.

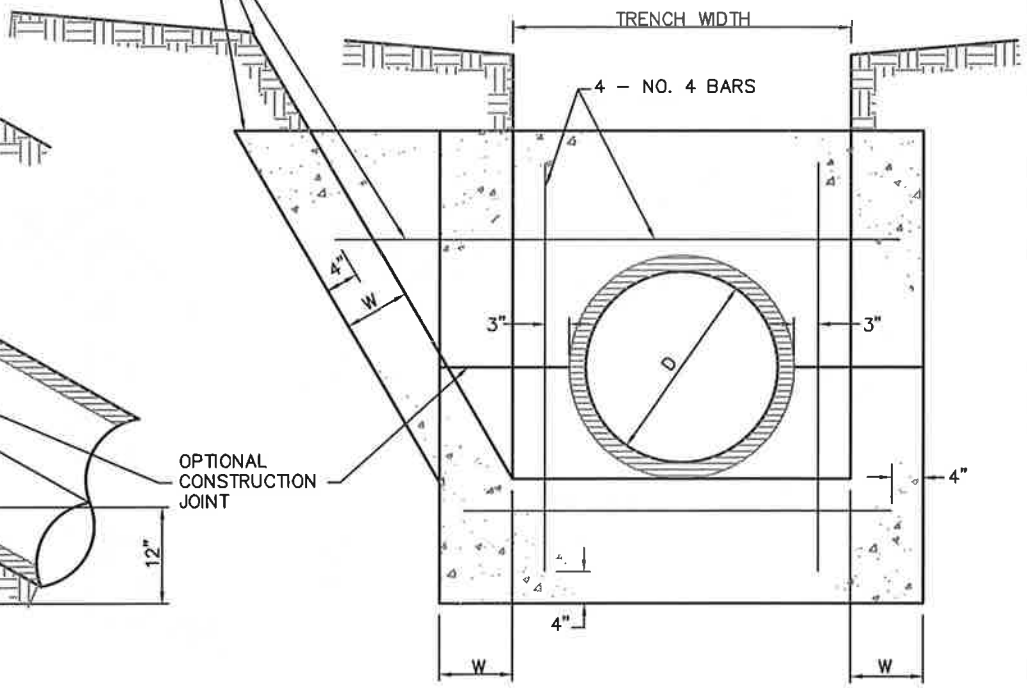
(B) PLASTIC COATED STEPS AS PER THIS STANDARD DRAWING OR AS APPROVED BY THE ENGINEER.

2015

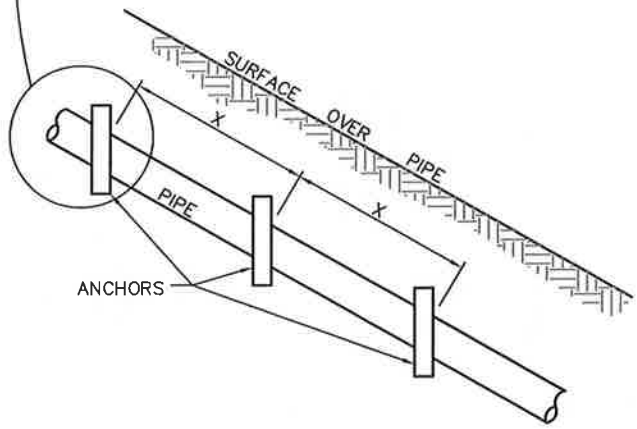
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PLASTIC COATED MANHOLE STEPS	STANDARD DRAWING NO. SD-509



PROFILE
N.T.S.



SECTION
N.T.S.



PROFILE
N.T.S.

PIPE SLOPE	MAX. "X" DISTANCE
20% TO 35%	36'
35% TO 50%	24'
50% AND OVER	16'

NOTES:

(A) PIPE ANCHORS REQUIRED ON SLOPES OF 20% OR GREATER FOR ALL TYPES OF UTILITY PIPES AND MAIN LINES (SEWER, WATER STORM PIPE, IRRIGATION, ETC.).

(B) ALL REINFORCING STEEL TO BE NO. 4 BARS.

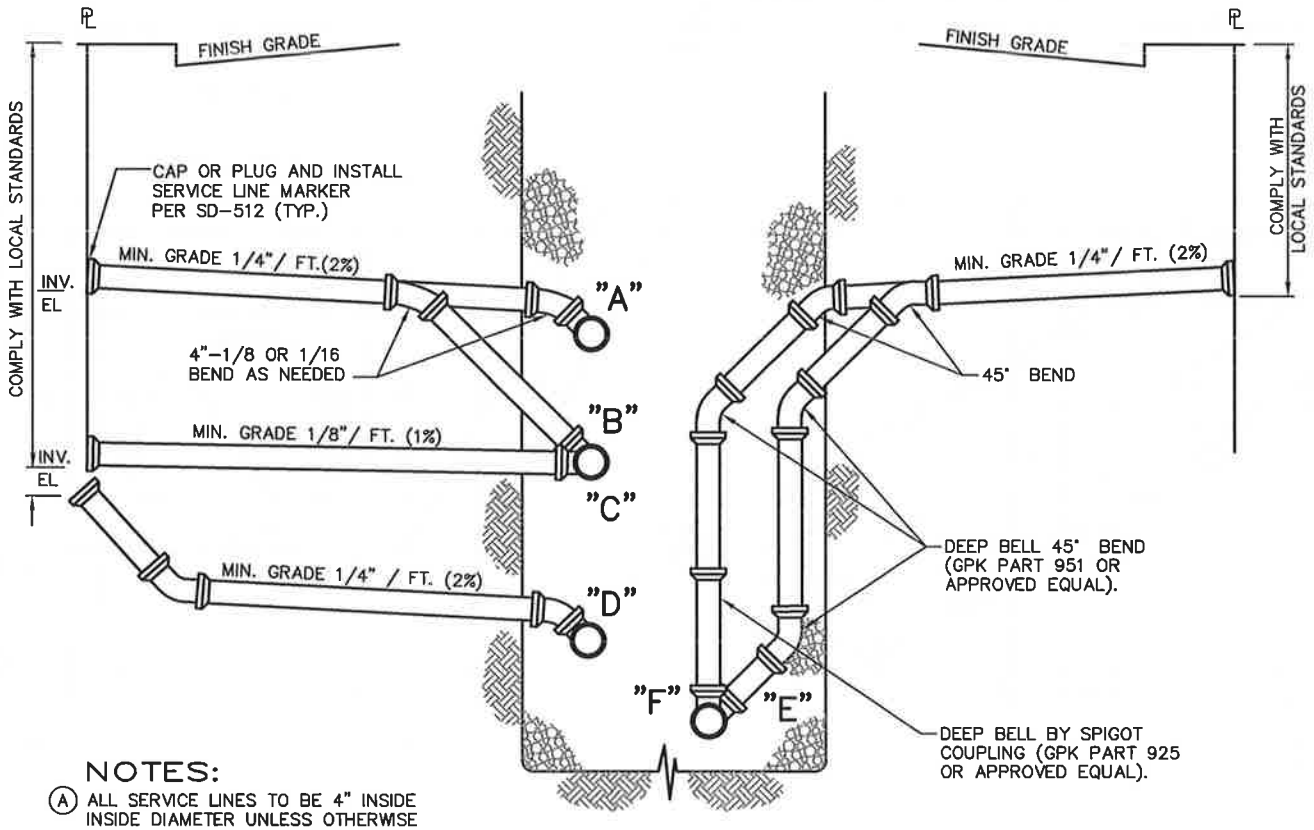
(C) "W" = 8" UNLESS OTHERWISE SPECIFIED.

(D) CONCRETE TO BE 5.5 SK/C.Y. AND 2500 P.S.I.

(E) POUR CONCRETE AGAINST UNDISTURBED EARTH.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PIPE ANCHORS	STANDARD DRAWING NO. SD-510



NOTES:

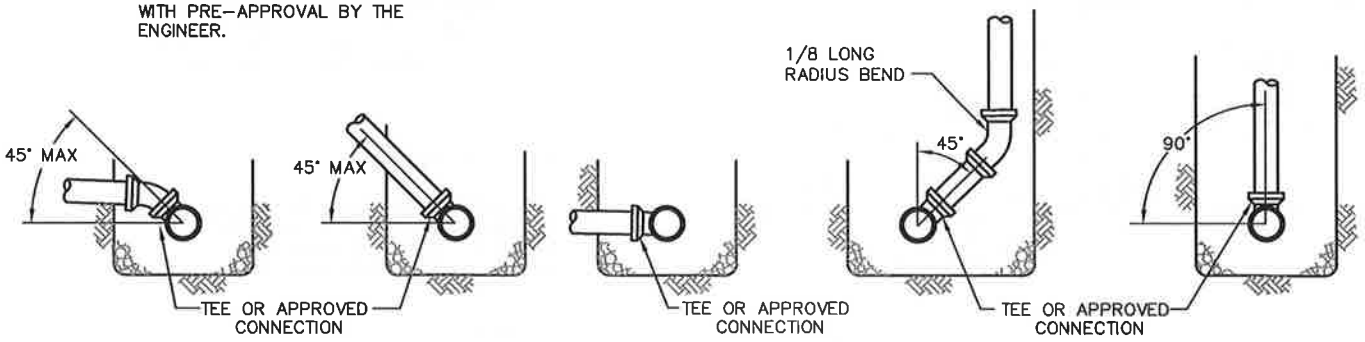
(A) ALL SERVICE LINES TO BE 4" INSIDE INSIDE DIAMETER UNLESS OTHERWISE NOTED.

(B) TYPE "C" CONNECTION WILL ONLY BE ALLOWED IF SHOWN ON THE PLANS OR OTHERWISE APPROVED BY THE ENGINEER.

(C) TYPE "E" OR "F" ALLOWABLE FOR TRENCHES 15' DEEP OR GREATER WITH PRE-APPROVAL BY THE ENGINEER.

ELEVATIONS

N.T.S.



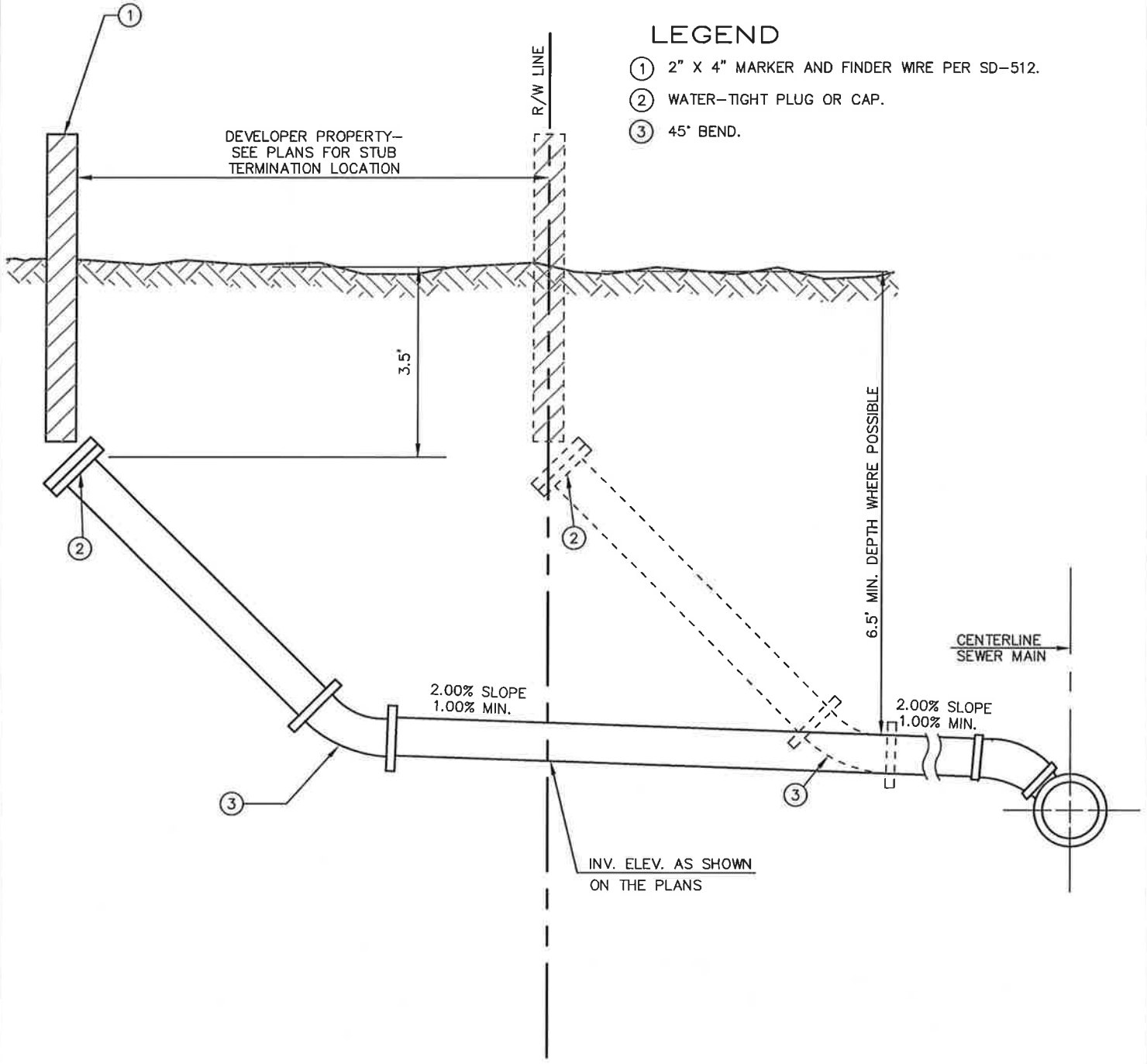
TYPE "A"&"D" TYPE "B" TYPE "C" (SEE NOTE B) TYPE "E" (SEE NOTE C) *TYPE "F" (SEE NOTE C)*

CONNECTION DETAILS

N.T.S.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD SEWER SERVICE LINE	STANDARD DRAWING NO. SD-511



PROFILE
N.T.S.

2015

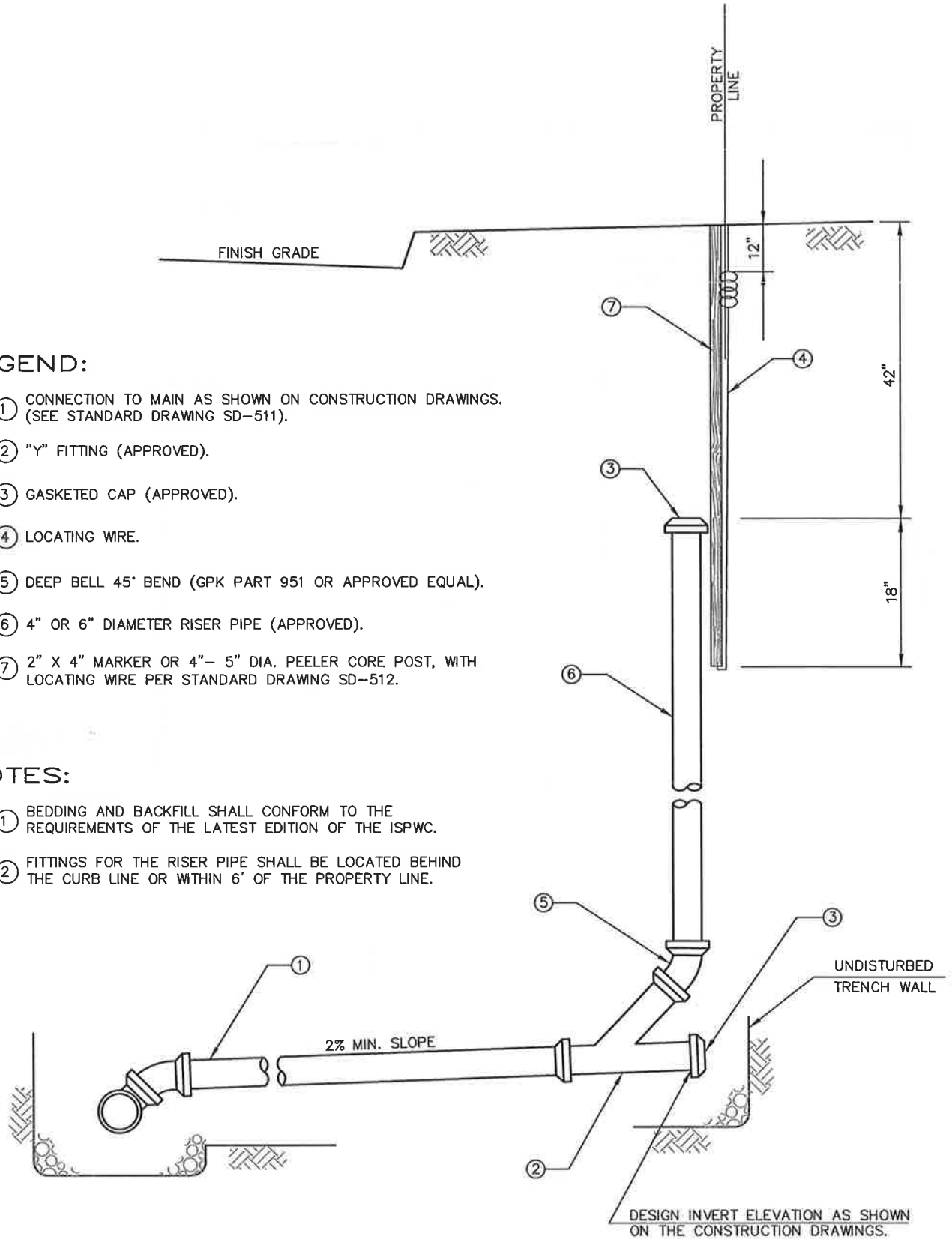
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD SEWER SERVICE CONNECTION FOR NEW DEVELOPMENT PROJECTS	STANDARD DRAWING NO. SD-511A

LEGEND:

1. CONNECTION TO MAIN AS SHOWN ON CONSTRUCTION DRAWINGS. (SEE STANDARD DRAWING SD-511).
2. "Y" FITTING (APPROVED).
3. GASKETED CAP (APPROVED).
4. LOCATING WIRE.
5. DEEP BELL 45° BEND (GPK PART 951 OR APPROVED EQUAL).
6. 4" OR 6" DIAMETER RISER PIPE (APPROVED).
7. 2" X 4" MARKER OR 4"– 5" DIA. PEELER CORE POST, WITH LOCATING WIRE PER STANDARD DRAWING SD-512.

NOTES:

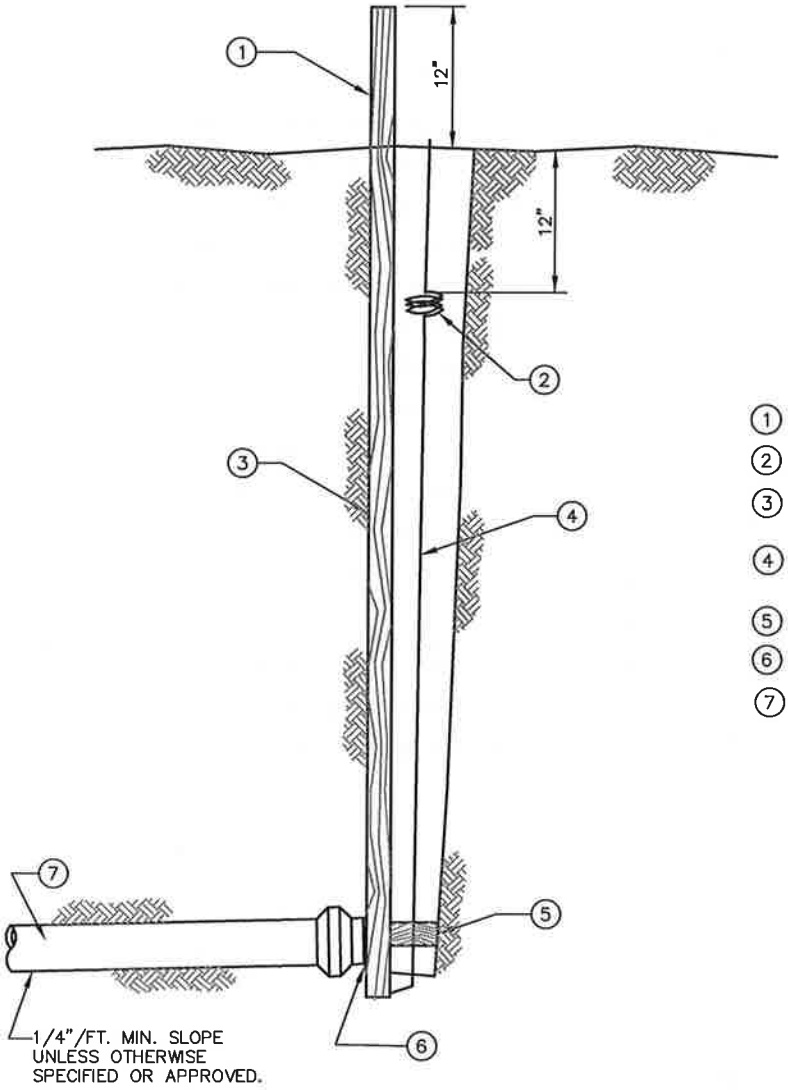
1. BEDDING AND BACKFILL SHALL CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF THE ISPWC.
2. FITTINGS FOR THE RISER PIPE SHALL BE LOCATED BEHIND THE CURB LINE OR WITHIN 6' OF THE PROPERTY LINE.



PROFILE
N.T.S.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD DEEP SEWER SERVICE FOR EXISTING DEVELOPMENT TYPE 'J'	STANDARD DRAWING NO. SD-511B



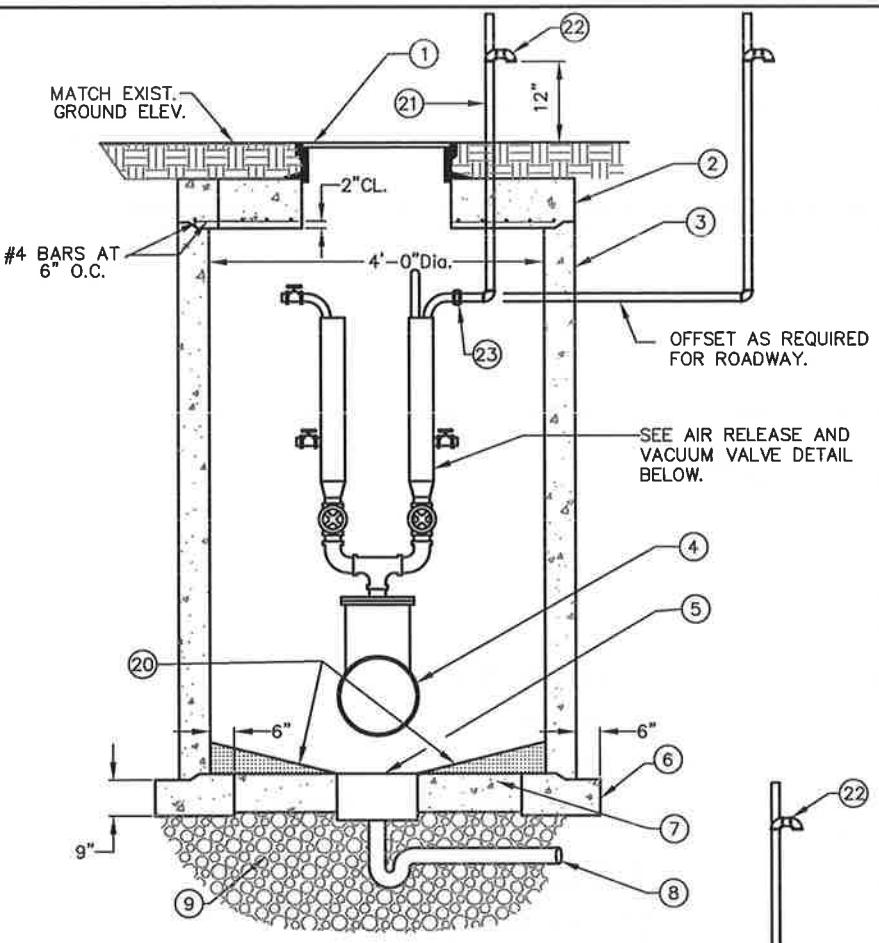
PROFILE
N.T.S.

LEGEND

1. PAINT GREEN.
2. THREE 6" DIAMETER COILS.
3. 2" X 4" MARKER OR 4"–5" DIAMETER PEELER CORE POST.
4. NO. 12 AWG. GALVANIZED FINDER WIRE (FASTEN TO BOTTOM OF WOODEN MARKER).
5. 2" X 4" BLOCKING.
6. PLUG OR CAP.
7. 4" OR 6" SEWER SERVICE PIPE.

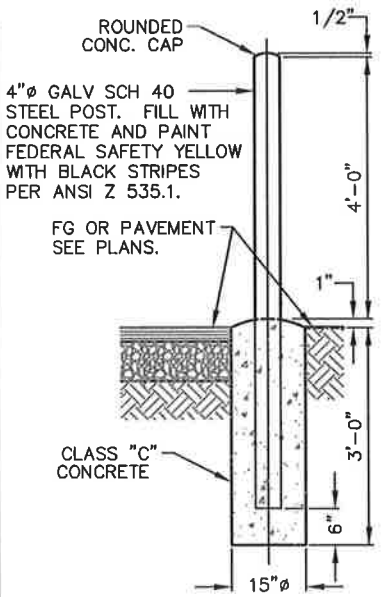
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD SERVICE MARKER	STANDARD DRAWING NO. SD–512



ELEVATION

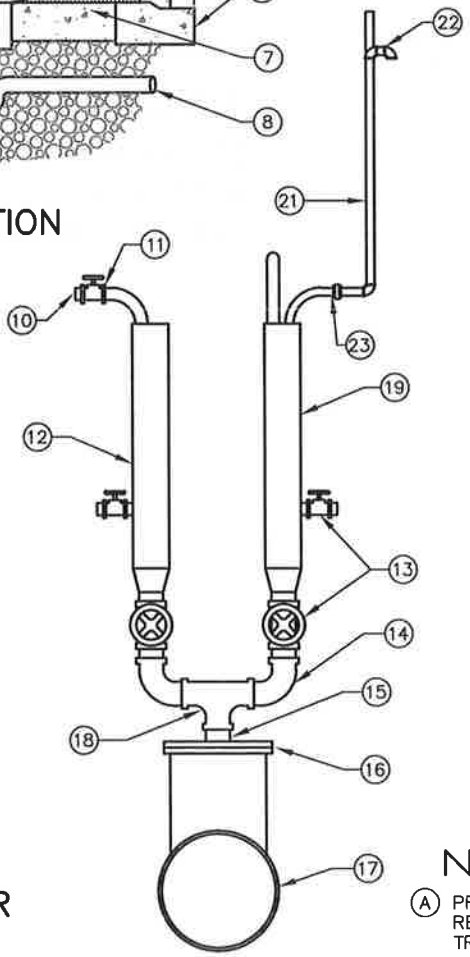
N.T.S.



GUARD POST FOR BLOWOFF

N.T.S.

NOTE: PROVIDE 3/8" EJ MATERIAL WHERE INSTALLED IN CONC PAVING

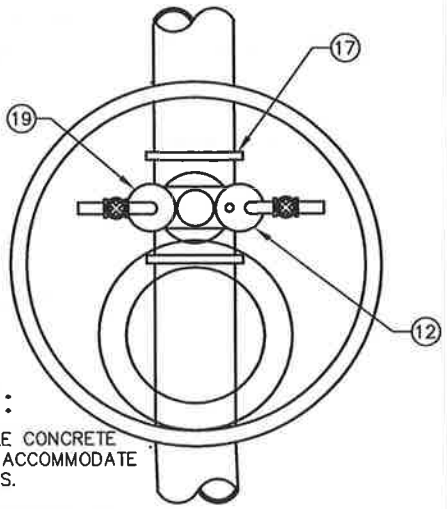


AIR RELEASE AND VACUUM VALVE DETAIL

N.T.S.

LEGEND

1. CAST IRON RING AND COVER MARKED "SEWER" PER SD-507.
2. STANDARD MANHOLE SLAB.
3. MANHOLE TYPE "B" PER SD-502.
4. PRESSURE SEWER.
5. CAST IRON OR CONCRETE TRAP W/GRATED LID.
6. CONCRETE FOOTING.
7. CONCRETE FLOOR.
8. 4" DRAIN TO GRAVITY SEWER.
9. 4" TYPE 1 BEDDNG MATERIAL.
10. SHUT OFF VALVE (TYP).
11. QUICK DISCONNECT COUPLING.
12. 2" AIR RELEASE, VENT TO SUMP WITH AIR GAP.
13. GATE VALVE.
14. 90° ELBOW.
15. 2" THREADED CONNECTION.
16. BLIND FLANGE TAPPED FOR 2" IPT NIPPLE.
17. CAST IRON FLANGED X FANGED TEE.
18. 2" X 2" X 2" TEE.
19. VACUUM RELEASE VALVE.
20. GROUT AT 4:1 SLOPE.
21. BRASS NIPPLE OR C.I. SPOOL DISCHARGE PIPE. SIZE AS SHOWN ON PLANS
22. COMAPNION FLANGE W/BUG SCREEN.
23. FLANGE OR UNION.



PLAN

N.T.S.

NOTES:

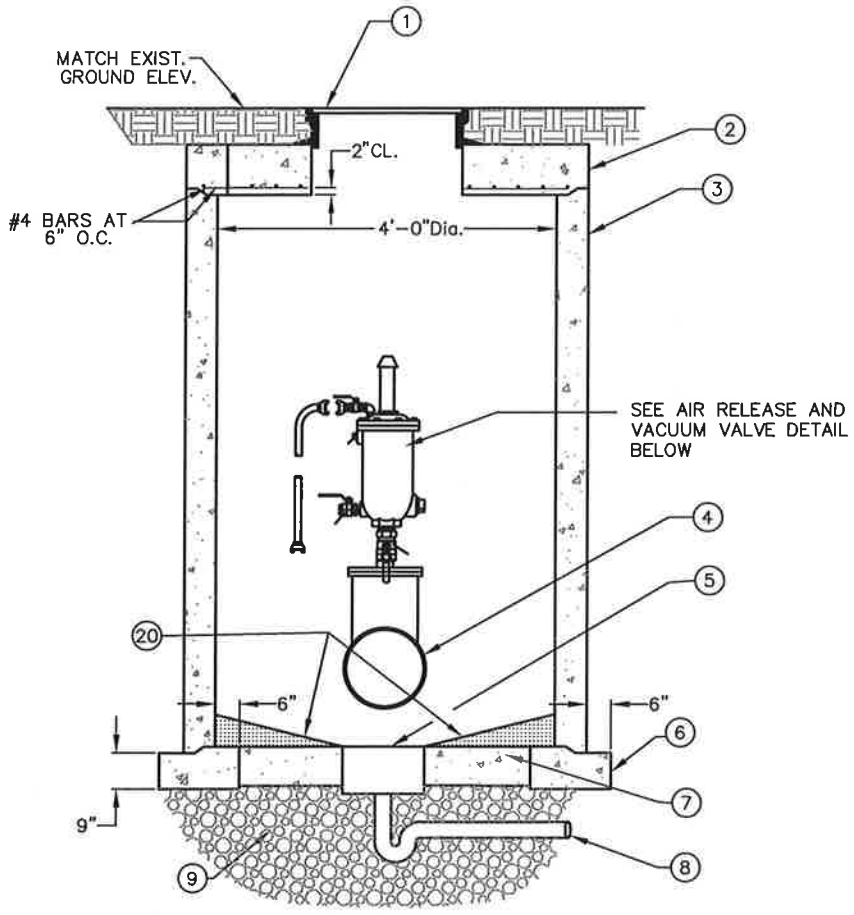
(A) PROVIDE MANHOLE CONCRETE REINFORCING TO ACCOMMODATE TRAFFIC LOADINGS.

(B) PROVIDE PIPE SUPPORTS FOR DEEP INSTALLATIONS.

(C) USE GALVANIZED STEEL FOR PIPE AND NIPPLES AND GALVANIZED MALLEABLE FITTINGS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	AIR RELEASE/ VACUUM VALVE	STANDARD DRAWING NO. SD-513

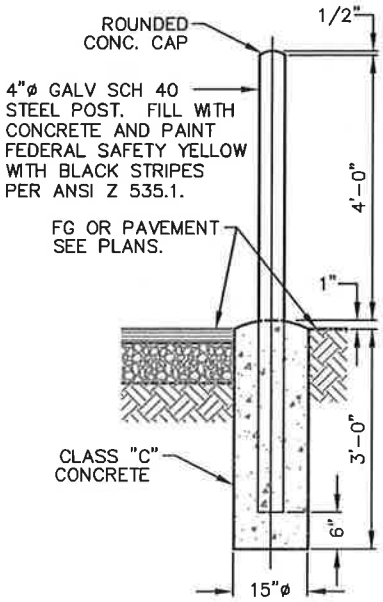


ELEVATION

N.T.S.

LEGEND

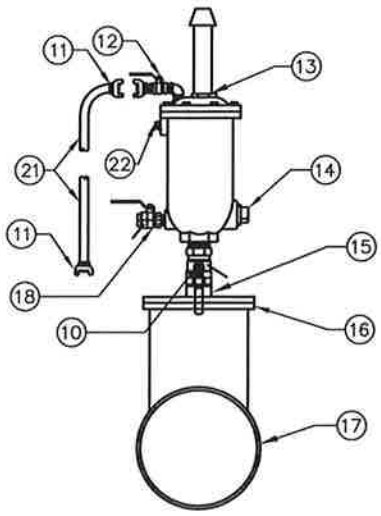
1. CAST IRON RING AND COVER MARKED "SEWER" PER SD-507.
2. STANDARD MANHOLE SLAB.
3. MANHOLE TYPE "B" PER SD-502.
4. PRESSURE SEWER.
5. CAST IRON OR CONCRETE TRAP W/GRATED LID.
6. CONCRETE FOOTING.
7. CONCRETE FLOOR.
8. 4" DRAIN TO GRAVITY SEWER.
9. 4" TYPE 1 BEDDING MATERIAL.
10. SHUT OFF VALVE (TYP).
11. QUICK DISCONNECT COUPLING.
12. 1/2" FULL FLOW BALL VALVE WITH DISCONNECT COUPLING.
13. OUTLET.
14. 2" CLEAN-OUT.
15. 2" THREADED CONNECTION.
16. BLIND FLANGE TAPPED FOR 2" IPT NIPPLE.
17. CAST IRON FLANGED X FLANGED TEE.
18. BRONZE 1" FULL FLOW BALL VALVE.
19. AIR/VACUUM VALVE SIZED FOR APPLICATION
20. GROUT AT 4:1 SLOPE.
21. 1/2" RUBBER HOSE WITH QUICK DISCONNECT COUPLING ON EACH END.
22. 1/2" N.P.T. PIPE PLUG.



GUARD POST FOR BLOWOFF

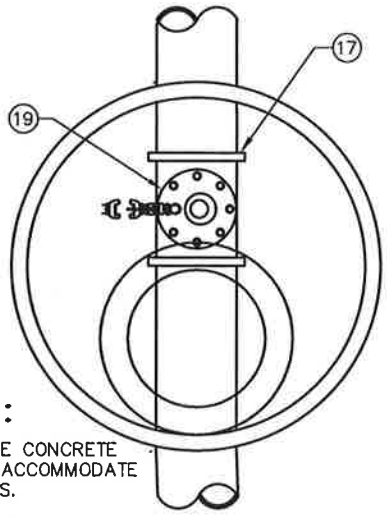
N.T.S.

NOTE: PROVIDE 3/8" EJ MATERIAL WHERE INSTALLED IN CONC PAVING.



AIR RELEASE AND VACUUM VALVE DETAIL

N.T.S.



PLAN

N.T.S.

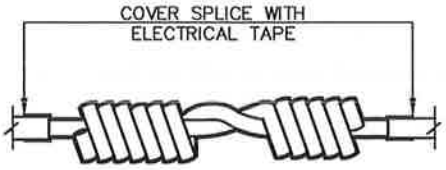
NOTES:

(A) PROVIDE MANHOLE CONCRETE REINFORCING TO ACCOMMODATE TRAFFIC LOADINGS.

(B) PROVIDE PIPE SUPPORTS FOR DEEP INSTALLATIONS.

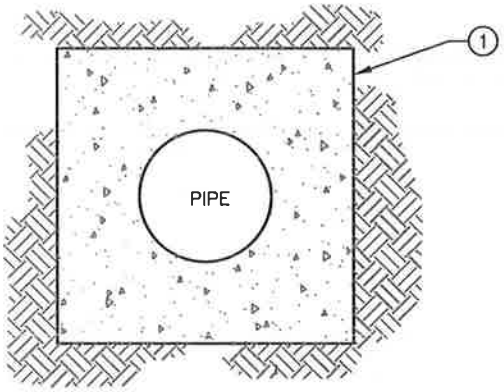
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	COMBINATION AIR RELEASE/VACUUM VALVE	STANDARD DRAWING NO. SD-513A



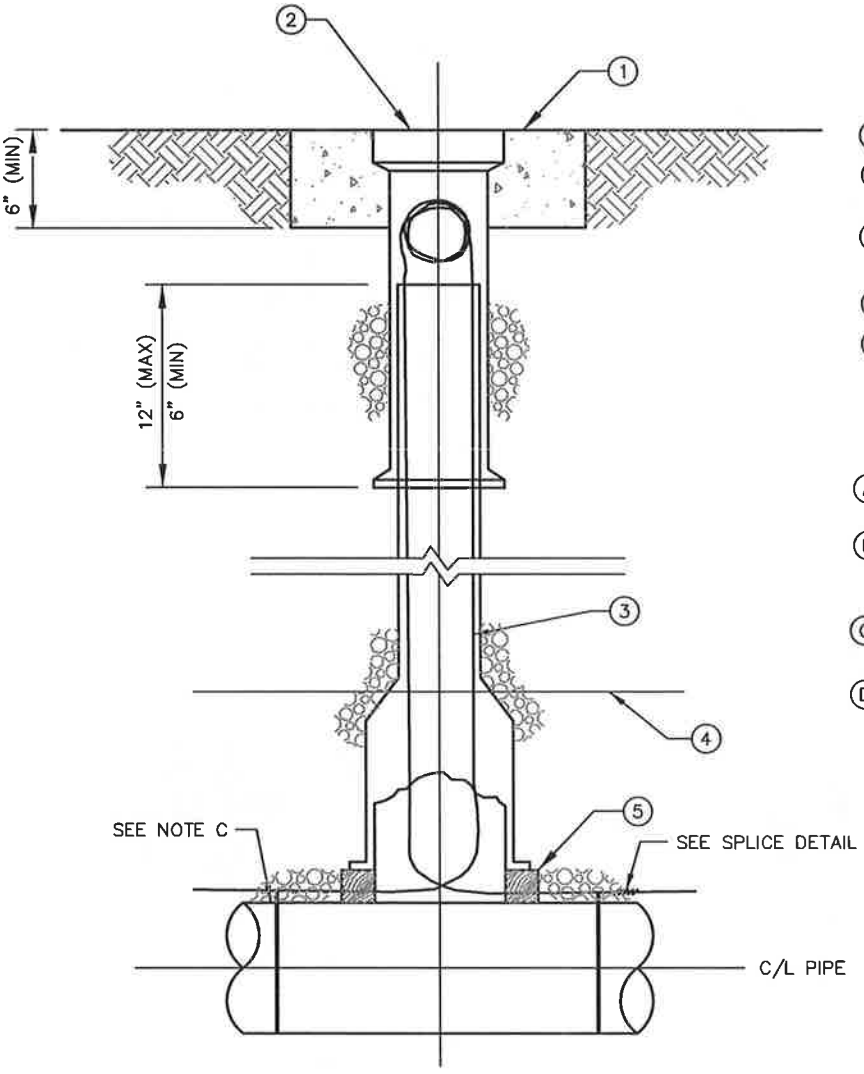
SPLICE DETAIL

N.T.S.



TOP VIEW

N.T.S.



ELEVATION

N.T.S.

LEGEND

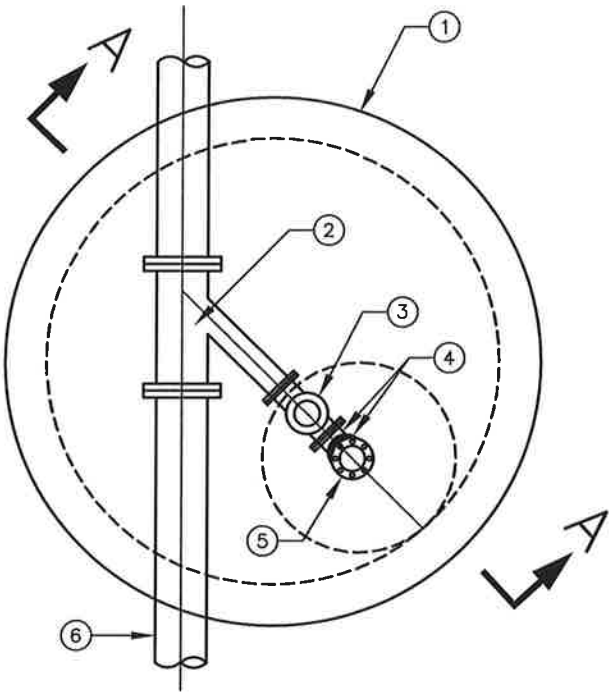
1. 18" X 18" X 6" CONCRETE PAD.
2. RICH SERIES 921 OR 926 VALVE BOX AND COVER OR APPROVED SUBSTITUTION.
3. NO. 10 AWG. INSULATED COPPER LOCATING WIRE WITH 4/64" PVC INSULATION.
4. MARKING TAPE 18"–24" ABOVE MAIN SEWER.
5. 4" REDWOOD BLOCKS.

NOTES:

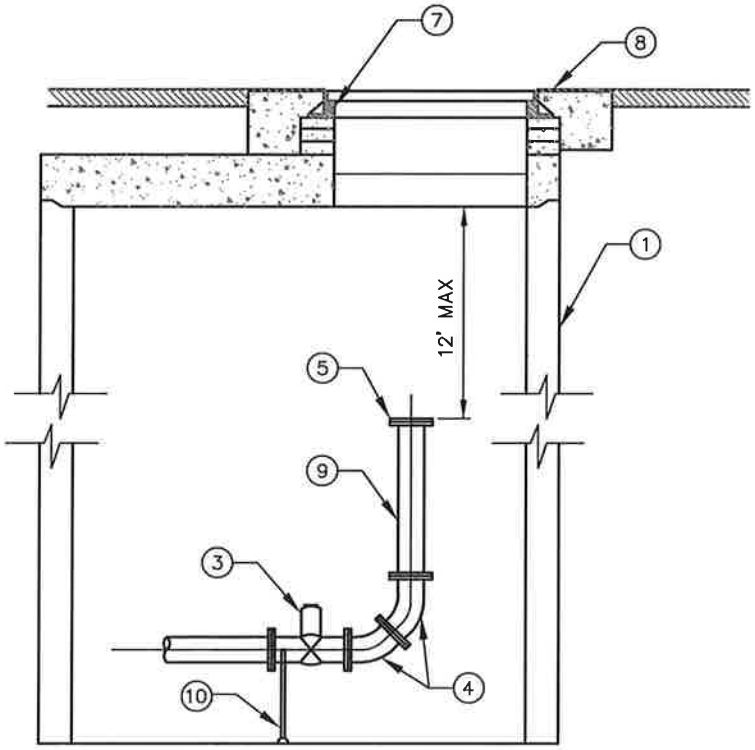
- (A) WIRE TO BE CONTINUOUS BETWEEN LOCATING WIRE BOXES EXCEPT AS NOTED.
- (B) PLACE LOCATING WIRE ON TOP OF THE SEWER MAIN AND TAPED WITH ELECTRICAL TAPE, 10' ON CENTER, (MAX).
- (C) CONTRACTOR SHALL CONDUCT A CONDUCTIVITY TEST ON ALL LOCATING WIRE SPLICES.
- (D) LOCATE BOXES AT 1000' INTERVALS, UNLESS OTHERSWISE INDICATED ON THE CONTRACT DOCUMENTS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	LOCATION WIRE BOX DETAIL	STANDARD DRAWING NO. SD–514



PRESSURE SEWER CLEANOUT DETAIL–PLAN
N.T.S.



PRESSURE SEWER CLEANOUT DETAIL–SECTION A–A
N.T.S.

LEGEND

1. 6'–0"ø PRECAST CONCRETE MANHOLE.
2. "X"x4" MJxMJxFLG 45° WYE W/RESTRAINT.
3. 4" PLUG VALVE FLGxFLG.
4. 4" 45° FLGxFLG ELBOW.
5. 4" BLIND FLANGE.
6. "X" PRESSURE SEWER.
7. STANDARD MANHOLE RING AND COVER.
8. FINISHED GRADE.
9. 4" FLGxFLG DI SPOOL.
10. PIPE SUPPORT.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PRESSURE SEWER CLEANOUT	STANDARD DRAWING NO. SD–515

ISPWC – DIVISION 600

Culverts, Storm Drain, and Gravity Irrigation

Section 601 – Culvert, Storm Drain and Gravity Irrigation Pipe
Section 602 – Storm Drain Inlets, Catch Basins, Manholes, and Gravity Irrigation Structures

SECTION 601

CULVERT, STORM DRAIN AND GRAVITY IRRIGATION PIPE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Culvert, storm drain and gravity irrigation pipe materials, installation and testing.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 304 – Trench Foundation Stabilization.

C. Section 305 – Pipe Bedding.

D. Section 306 – Trench Backfill.

E. Section 405 – Non-Potable Water Line Separation.

F. Section 501 – Gravity Sewers.

1.3 REFERENCES

A. AASHTO M 036: Corrugated Metal Pipe, Ribbed Pipe and Pipe Arches.

B. AASHTO M 190: Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.

C. AASHTO M 196: Corrugated Aluminum Pipe and Pipe Arches.

D. AASHTO M 218: Steel Sheet, Zinc-Coated (Galvanized), for Corrugated Steel Pipe.

E. AASHTO M 252: Corrugated Polyethylene Drainage Tubing, 3 inch to 10 inch.

F. AASHTO M 274: Steel Sheet, Aluminum-Coated (Type 2) for Corrugated Steel Pipe.

G. AASHTO M 294: Corrugated Polyethylene Pipe, 12 inch to 48 inch.

H. AASHTO M 304: Polyvinyl Chloride (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter.

I. ASTM C 14: Concrete Sewer, Storm Drain, and Culvert Pipe.

J. ASTM C 76: Reinforced Concrete Pipe.

K. ASTM C 443: Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets.

L. ASTM D 3034: Type PSM PVC Sewer Pipe and Fittings.

M. ASTM D 3212: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

N. ASTM F 2736: Standard Specification for 6 to 30 in. Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe.

O. ASTM F 2764: Standard Specification for 30 to 60 in. Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.

P. ASTM F 477: Elastomeric Seals for Joining Plastic Pipe.

Q. ASTM F 679: PVC Large Diameter Plastic Gravity Sewer Pipe and Fittings.

R. ASTM F 794: PVC Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

S. ASTM F 1803: Dual wall closed profile PVC sewer pipe sizes 18” to 60”.

T. ASTM F 2736: Polypropylene Corrugated Single Wall and Double Wall Pipe.

U. ASTM F 2764: Polypropylene Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this section.

B. Submit manufacturer’s certification that pipe and fittings meet or exceed specified requirements including all requested test results and material identification.

C. Submit manufacturers’ installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of constructed culverts and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to Owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store pipe in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from damage, sunlight and contamination until ready for installation in the pipe.

PART 2 MATERIALS

2.1 PIPE SIZE, TYPE AND STRENGTH

A. If type and strength classifications are not indicated in the Contract Documents, use any of the alternate pipe materials meeting the minimum requirements of this section.

B. Comply with pipe size, type, and strength classifications indicated in the Contract Documents.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 CULVERT, STORM DRAIN AND GRAVITY IRRIGATION PIPE AND FITTINGS

A. Solid Wall PVC Pipe Sizes 4 inch to 15 inch: ASTM D 3034.

1. Minimum Wall Thickness: SDR 35.

2. Joints: Elastomeric gasket joints with ASTM F 477 elastomeric gaskets.

B. Solid Wall PVC Pipe Sizes 18 inch to 36 inch: ASTM F 679.

1. Minimum Wall Thickness: T-1 (or T-2 with Engineer approval).

C. Ribbed PVC Pipe Sizes 8 inch to 48 inch: ASTM F 794, PS46.

1. Minimum Pipe Stiffness: 46 psi.

2. Ribs to be perpendicular to the axis of the pipe, unless otherwise approved by the Engineer.

D. Large Diameter Closed Profile PVC Pipe Sizes 18 inch to 60 inch: ASTM F 1803.

1. Minimum Pipe Stiffness: 46 psi.

E. Polyvinyl Chloride Profile Wall Drain Pipe and Fittings, 15 inch to 48 inch: AASHTO M 304.

1. Minimum Pipe Stiffness: Sufficient to accommodate HS-25 traffic loading considering depth of bury, soil conditions, and application.

F. Corrugated Polyethylene Drainage Tubing, 3 inch to 10 inch: AASHTO M 252.

1. Type: S – smooth inner liner, or Type D – smooth inner liner with essentially smooth outer wall with internal supports.

2. Minimum Pipe Stiffness: 46 psi.

3. Joints: Watertight bell and spigot with ASTM F 477 gaskets.

G. Corrugated Polyethylene Pipe, 12 inch to 60 inch: AASHTO M 294.

1. Type: S – smooth inner liner.

2. Minimum Pipe Stiffness: Sufficient to accommodate HS-25 traffic loading considering depth of bury, soil conditions, and application.

3. Joints: Watertight bell and spigot with ASTM F 477 gaskets.

H. Reinforced Concrete Pipe 12 inch to 144 inch: ASTM C 76.

1. Minimum Class: As indicated in the Contract Documents.

2. Joints: ASTM C 443, Rubber Gasket Joints.

3. Liner: Section 506, Plastic Liner.

I. Non-Reinforced Concrete Pipe - 4 inch to 36 inch: ASTM C 14.

1. Minimum Class: Class 3 unless otherwise indicated in the Contract Documents.

2. Joints: ASTM C 443, Rubber Gasket Joints.

3. Liner: Section 506, Plastic Liner.

J. Corrugated Galvanized Steel Metal Pipe, Ribbed Pipe and Pipe Arches: AASHTO M 036.

1. Type, Thickness and Corrugation: AASHTO M 218 and as indicated in the Contract Documents.

2. Exterior Coating: AASHTO M 190, Type A or aluminized Type 2 coating per AASHTO M 274.

3. Joints: Consistent with corrugations.

K. Corrugated Aluminum Pipe and Pipe Arches: AASHTO M 196.

1. Type, Thickness and Corrugation: As indicated in the Contract Documents.

2. Joints: Consistent with corrugations.

L. Corrugated Aluminized Steel Pipe and Pipe Arches – AASHTO M 036.

1. Type, thickness and corrugation: AASHTO M 274 and as indicated in the Contract Documents.

2. Joints: Consistent with corrugations.

M. Corrugated Polypropylene Pipe: 12 inch to 30 inch: ASTM F 2736.

1. Minimum pipe stiffness: 46 psi.

2. Joints: Watertight per ASTM D 3212 with ASTM F 477 gaskets.

N. Triple Wall Polypropylene Pipe: 30 inch to 60 inch: ASTM F 2764.

1. Minimum pipe stiffness: 46 psi.

2. Joints: Watertight per ASTM D 3212 with ASTM F 477 gaskets.

2.3 COUPLINGS FOR DISSIMILAR PIPE OR TWO PLAIN ENDS OF SIMILAR PIPE

A. Coupling for Two Pipes of Dissimilar Type or Size: Flex seal couplers made by Mission Clay Products of Corona, California, or approved substitution providing for a watertight connection, and a consistent pipe invert.

B. Coupling for Two Pipes Where Factory Bell and Spigot are not Available: Flex seal couplers made by Mission Clay Products of Corona, California, or approved substitution providing for a watertight connection and a consistent pipe invert.

C. Coupling of PVC Plain End to PVC Plain End: Bell-by-bell connection.

2.4 GRAVITY IRRIGATION SLIDE GATES AND VALVES

A. Refer to Special Provisions.

2.5 SOURCE QUALITY CONTROL

A. Provide test and inspection reports required by the Standard for the pipe and fittings.

B. Inspect pipe and fittings, markings to verify type, class, thickness and marking information required by the Standard for the pipe and fitting.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade and installation meets the requirements of Section 405 – Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine pipe and fittings for defects or damage.

D. Verify pipe, fittings, aggregate, and materials delivered to the site meet the requirements of the Contract Documents.

E. Verify utility locations, required separation, existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 PIPE INSTALLATION

A. Prepare trench bottom as required by Section 301 – Trench Excavation.

B. Maintain groundwater 1 foot below the pipe invert and, if necessary, provide foundation stabilization in accordance with Section 304 – Trench Foundation Stabilization.

C. Provide pipe bedding and initial backfill as required by Section 305 – Pipe Bedding.

D. Install pipe in accordance with the manufacturer's recommendations for the type of pipe specified in the Contract Documents.

E. For bell and spigot installation, install pipe upgrade with the bell-end upgrade.

F. Use standard lengths of pipe unless otherwise required for installation of tees, fittings, catch basins, manholes, or culvert inlets and outlets.

G. Utilize proper tools for cutting and beveling pipe ends and joining pipe. Use manufacturer's recommended tools designed for this task.

H. Move pipe carefully and prevent damage to pipe and manufactured ends while lowering pipe into trench.

I. Remove dirt and other foreign material from pipe.

J. For bell and spigot installation, prepare pipe joint using specified gasket and manufacturer's recommended lubricant. For corrugated piping, provide and install couplings consistent with piping system.

K. For bell and spigot installation, mark, or verify that pipe ends are marked, to indicate insertion stop position (home). Ensure that pipe is inserted into bell to this mark. Push spigot into bell using methods recommended by the manufacturer. Protect the end of the pipe during "homing" and do not use excessive force that may result in over-assembled joints, dislodged gaskets, or damaged ends. If full entry is not achieved, disassemble and clean the joint and reassemble.

L. Provide sufficient restraint for the pipe to ensure that joints are held in place while bedding and initial backfill are placed.

M. Limit joint gap on concrete pipe to less than 5/8 inch for pipe 4 inches through 10 inches, 7/8 inch for pipe 12 inches through 24 inches, and 1 inch for pipe 27 inches and larger.

N. When pipe installation is not in progress, block and plug the open end of the pipe to prevent creep, uplift or floating and entrance of water or other material into the pipe.

O. Limit variance of installed pipe from design line and grade to less than 0.02 feet, unless a smaller variance is necessary to prevent a level or negative slope.

P. Backfill trench as required by Section 306 – Trench Backfill.

3.3 PLUGS AND PIPE MARKERS

A. Where indicated in the Contract Documents, furnish and install plugs or caps on pipe ends and stub-outs.

1. Provide shop drawings for plugs and caps on pipelines greater than 18 inches in diameter.

2. Ensure plugs and caps are easily removed and provide a suitable end for making a connection when the pipeline is extended.

3. Fasten or block caps and plugs to ensure no displacement during testing and backfilling.

B. Furnish and install pipe markers at stub-outs per Standard Drawing SD-512 - Standard Service Marker.

C. Provide the Engineer with two working days notice to allow measurement of the vertical and horizontal location of pipe ends before the pipeline is covered.

3.4 PIPE ANCHORS

A. Install pipe anchors as required per Standard Drawing SD-510 - Pipe Anchors.

3.5 TESTING

A. Perform testing in the presence of the Engineer.

B. For pipes 24 inches and smaller:

1. Test per Section 501 – Gravity Sewers.

C. For pipes larger than 24 inches:

1. Test per Section 501 – Gravity Sewers.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Work includes all labor, equipment and materials required to complete the work including pipe, fittings, couplings, connections, excavation, pipe bedding, backfill, end bevels, and all appurtenances not itemized in the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items. Surface repair is incidental to this bid item unless otherwise listed in the Bid Schedule.

A. Storm Drain/Culvert/Gravity Irrigation Pipe: By the linear foot for the size, type and class of pipe specified measured along the horizontal centerline through all fittings and structures including flared ends.

1. Bid Schedule Payment Reference: 601.4.1.A.1.
2. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Reinforced Concrete (RCP)…linear foot (LF).

3. Bid Schedule Payment Reference: 601.4.1.A.3.
4. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Non-Reinforced Concrete (NRCP)…linear foot (LF).

5. Bid Schedule Payment Reference: 601.4.1.A.5.
6. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ PVC…linear foot (LF).

7. Bid Schedule Payment Reference: 601.4.1.A.7.
8. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Ribbed PVC…linear foot (LF).

9. Bid Schedule Payment Reference: 601.4.1.A.9.
10. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Closed Profile PVC…linear foot (LF).

11. Bid Schedule Payment Reference: 601.4.1.A.11.
12. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Corrugated Galvanized Steel (CGSP)…linear foot (LF).

13. Bid Schedule Payment Reference: 601.4.1.A.13.
14. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Corrugated Aluminum (CAP)…linear foot (LF).

15. Bid Schedule Payment Reference: 601.4.1.A.15.
16. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Corrugated Aluminized Steel (CASP)…linear foot (LF).

17. Bid Schedule Payment Reference: 601.4.1.A.17.
18. Bid Schedule Description: _____ Storm Drain/Culvert/Gravity Irrigation Pipe, Class _____ Corrugated Polyethylene (CPP)…linear foot (LF).

19. Bid Schedule Payment Reference: 601.4.1.A.19.
20. Bid Schedule Description: _____ x _____ Pipe Arch, Class _____ Corrugated Galvanized Steel (CGSPA)…linear foot (LF).

21. Bid Schedule Payment Reference: 601.4.1.A.21.
22. Bid Schedule Description: _____ x _____ Pipe Arch, Class _____ Corrugated Aluminum (CAPA)…linear foot (LF).

23. Bid Schedule Payment Reference: 601.4.1.A.23.
24. Bid Schedule Description: _____ x _____ Pipe Arch, Class _____ Corrugated Aluminized Steel Pipe Arch (CASPA)…linear foot (LF).

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SECTION 602

STORM DRAIN INLETS, CATCH BASINS, MANHOLES, AND GRAVITY IRRIGATION STRUCTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Stormwater inlets, catch basins, manholes and appurtenances.

1.2 RELATED SECTIONS

A. Section 204 – Structural Excavation and Backfill.

B. Section 301 – Trench Excavation.

C. Section 305 – Pipe Bedding.

D. Section 405 – Non-Potable Water Line Separation.

E. Section 506 – Plastic Liner.

F. Section 601 – Culvert and Storm Drain Pipe.

G. Section 703 – Cast-in-Place Concrete.

H. Section 704 – Precast Concrete.

1.3 REFERENCES

A. AASHTO T 99: Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop.

B. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

C. ASTM A 48: Gray Iron Castings.

D. ASTM A 536: Standard Specification for Ductile Iron Castings.

E. ASTM A 615: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

F. ASTM C 478: Precast Reinforced Concrete Manhole Sections.

G. ASTM C 497: Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.

H. ASTM D 3034: Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

I. ASTM D 3212: Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.

J. ASTM F 1336: Standard Specification for Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings.

1.4 SUBMITTALS

C. Submit shop drawings for materials to be installed or furnished under this section.

D. Submit manufacturer's certification that inlets, catch basins, manholes and appurtenances meet or exceed specified requirements.

E. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

C. Accurately record actual locations of constructed inlets, catch basins, stormwater manholes and other encountered utilities in relation to existing permanent benchmarks.

D. Provide copy of record drawings to Owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

C. Handle and store inlet, catch basin and manholes sections, castings, and appurtenances in a manner which prevents shock, damage or excessive exposure to weather.

D. Protect joint sealing material from damage, sunlight and contamination until ready for installation in the manhole.

PART 2 MATERIALS

2.1 APPURTENANCES, TYPE AND STRENGTH

A. Comply with inlet, catch basin, sediment trap, manhole and gravity irrigation structure size and type indicated in the Contract Documents and detailed in the Standard Drawings.

B. Notify the Engineer if inlet, catch basin, sediment trap, manhole and gravity irrigation structure type and size classifications are not indicated in the Contract Documents.

C. Notify the Engineer if installation conditions such as inlet, catch basin, sediment trap, manhole and gravity irrigation structure, invert depth, soils, and

bedding conditions do not match conditions contemplated by the Contract Documents.

2.2 PRECAST APPURTENANCES

A. Precast Manholes: ASTM C 478 for all components except as modified herein and as shown on the Standard Drawings.

B. Precast Inlets and Catch Basins: Per Section 704 – Precast Concrete and in accordance with the Standard Drawings.

2.3 CAST-IN-PLACE APPURTENANCES

A. Cast-in-Place Manholes: ASTM C 478 and Section 703 – Cast-in-Place Concrete for all materials and dimensions except as modified herein or as shown on the Standard Drawings.

B. Cast-in-Place Inlets, Catch Basins, Sediment Traps, and Gravity Irrigation Structures: Per Section 703 – Cast-in-Place Concrete and in accordance with the Standard Drawings.

2.4 STEPS

A. Aluminum.

1. Material: Forged 6061-T6 alloy with minimum tensile strength of 38 ksi.

2. Dimensions: Not less than 3/4 inch wide by 7/8 inch deep, with 2 non-skid grooves not to exceed 1/8 inch depth and 1/8 inch width.

B. Plastic Coated Steel.

1. Material: 1/2 inch steel reinforced bar covered with a polypropylene plastic conforming to Standard Drawing SD-509-Plastic Coated Manhole Steps.

2. Products: Kor-N-Seal by NPC, Inc., or approved substitution.

2.5 GRADE RINGS, FRAMES, GRATES AND COVERS

A. Provide size and shape detailed in the Standard Drawings unless otherwise specified in the Contract Documents.

B. Grade rings to be 3,000 psi per Section 703 - Concrete. An HDPE form, Wirly-Gig or approved substitution, installed per manufacturer's recommendations, may be used in lieu of grade rings up to the maximum height shown on the standard drawings for manholes.

C. Provide ASTM A 48 Class 30 ksi cast iron frames, grates and covers, free of all defects. Plane or ground castings to ensure perfectly flat, smooth, even,

and true surfaces. When specified in the Contract Documents, galvanize or shop paint to provide corrosion protection.

D. Covers to have "Storm Drain" or “Irrigation” (depending on application) molded into the top with letters having a minimum height of 1 inch, or as specified in the Contract Documents.

E. Where lock-type castings are called for, provide a locking device made of corrosion resistant metal such that the cover may be readily released from the frame.

2.6 COLLARS

A. Class 3000 psi concrete and ASTM A 615 Grade 60 ksi reinforcing steel as specified in Section 703 – Cast-in-Place Concrete.

2.7 LINER

A. Per Section 506 – Plastic Liner.

2.8 MORTAR AND GROUT

A. Per Section 703 – Cast-in-Place Concrete.

2.9 CULVERT HEADWALLS

A. Per Section 703 – Cast-in-Place Concrete.

2.10 GRAVITY IRRIGATION SLIDE GATE AND VALVES

A. Refer to Special Provisions.

2.11 PVC DRAINAGE STRUCTURES

A. Polyvinyl Chloride (PVC) drainage structures are approved unless otherwise specified. Approved structures are limited to:

1. Inline Basins,

2. Catch Basins, and

3. Curb Inlets.

B. Nyloplast-ADS drainage structures, or approved equivalent.

1. Structure. Heavy duty PVC per ASTM D 3034.

2. Joints. Watertight per ASTM D 3212.

3. PVC Gaskets: Watertight per ASTM F 1336.

4. Frames and Grates: Ductile Iron per ASTM A 536 or Cast Iron per ASTM A 48.

5. Structural Backfill: Type 1 aggregate per Section 802.

6. Concrete: Class 3000 per Section 703.

C. In all traffic areas, PVC drainage structures to be HS-25 rated with concrete collar integrally cast around the structural bearing frame. Wheel load is not to be borne directly by the PVC material.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade per Section 301 - Trench Excavation and Section 204 – Structural Excavation and Backfill, and installation complies with Section 405 – Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine inlets, catch basins, manholes and appurtenances for defects or damage.

D. Verify inlets, catch basins, manholes, castings, aggregate, and materials delivered to the site meet the requirements of the Contract Documents.

E. Verify utility locations and existing piping locations prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 PLACEMENT OF BEDDING

A. Place a minimum of 4 inches of compacted bedding on prepared subgrade as specified in Section 305 – Pipe Bedding. Extend bedding either to the limits of the excavation or at least 12 inches outside the limits of the base section.

B. Fill the balance of the excavated area with select material compacted level to the top of the bedding.

C. Provide a smooth and level bearing surface on the bedding surface.

3.3 CONNECTION OF STORM DRAIN OR GRAVITY IRRIGATION LINES

A. Provide a flexible connection between pipe and inlets, catch basins and manholes.

1. Pipe Joint: Within 18 inches of the inlet, catch basin or manhole wall.

2. Pipe Hub: Cast in the manhole wall or base.

3. Flexible Manhole Connector: KOR-N-SEAL or approved substitution.

B. Pipe hubs to be compatible with pipeline material and provide a watertight seal between the pipe and the manhole.

1. Ridge Type: Embed in the manhole wall.

2. Flexible O-Ring Type: Place on the exterior of the pipe installed as gaskets embedded in the concrete manhole wall.

C. For HDPE profile pipe or other pipe with undular exterior, provide transition to smooth wall pipe prior to manhole.

3.4 CONNECTION TO EXISTING INLETS, CATCH BASINS, MANHOLES OR GRAVITY IRRIGATION STRUCTURES

A. Core drill all connections to existing drainage structures to provide a neat and smooth access.

B. Provide a Kor-n-Seal flexible connector or approved substitution between the drainage structure and the pipe, providing a waterproof barrier and flexible joint.

C. For HDPE profile pipe or other pipe with undular exterior, provide transition to smooth wall pipe prior to manhole.

3.5 PLACEMENT OF CONCRETE BASES

A. Cast-in-Place Bases.

1. For New Storm Drains or Culverts: Per ASTM C 478, except where modified by the Standard Drawings or the Contract Documents.

2. Over Existing Storm Drains or Culverts:

a. Provide a watertight seal, Ram-Nek gaskets, or approved substitution around the existing pipe at the manhole.

b. Saw cut existing storm drain or culvert to spring line, before pouring of the base. After pouring of the base, slope the base floor to flow to the existing storm drain or culvert line.

c. Fill all voids in the base floor and the exposed edges of the existing pipe with a non-shrink grout or mortar, allowing no deleterious material to enter the sewer system.

B. Prefabricated Bases.

1. Per ASTM C 478 or Section 704 – Precast Concrete except where modified by the Standard Drawings or the Contract Documents.

3.6 MANHOLE INVERT CONSTRUCTION

A. Construct manhole inverts to provide smooth, flow-through characteristics and in accordance with the Standard Drawings and Contract Documents.

B. Grouting of inverts and sharp edges or rough sections are not permitted.

C. Construct the invert to a section identical with that of the lower half of the pipe flowing through the manhole. At transitions of different pipe diameters, construct the invert to form a smooth transition.

D. Where a full section of sewer pipe is laid through the manhole, saw cut the top portion of the pipe to or below the spring line of the pipe. Cover the exposed edges with mortar.

E. Slope the top surface of the manhole floor to drain towards the flow line as shown on the Standard Drawings. Provide a minimum manhole base diameter of 48 inches.

F. Divert flow for at least 24 hours following the placement of concrete or mortar in the invert section(s).

G. Construct catch manhole and catch basin inverts per applicable Standard Drawings. Inverts to be flush with interior wall of structure.

3.7 APPURTENANCES BARREL OR BOX CONSTRUCTION

A. Construct cast-in-place manhole, inlet and catch basin walls or place precast barrel or box sections plumb and true per the Standard Drawings, the Contract Documents, and ASTM C 478.

B. Prior to installation of barrel or box sections, place non-shrink grout or a mastic (Ram-Nek or approved substitution) to the top of the concrete base providing a watertight seal, as applicable. Alternatively, imbed the barrel section in the concrete base prior to the concrete curing.

3.8 JOINTING OF PRECAST SECTIONS

A. Seal joints with a mastic material (Ram-nek or approved substitution).

B. Trim mastic flush with the inside wall of the manhole, inlet or catch basin and grout voids with a non-shrink grout.

3.9 PLACEMENT OF GRADE RINGS

A. Adjust inlet, catch basin or manhole frames to design elevations with grade

rings such that the maximum height of the grade rings is less than 21 inches from the top of the manhole cone or inlet / catch basin box to the frame.

B. Set grade rings in a bed of non-shrink grout or mortar troweled smooth with the inside of the manhole or inlet / catch basin. Apply non-shrink grout between metal frame and top grade ring and between multiple grade rings. A mastic material may be used if pre-approved by Engineer.

3.10 INSTALLATION OF STEPS

A. Install steps in manholes, inlets or catch basins greater than 4 feet in depth with locations in accordance with the Standard Drawings.

B. Cast, mortar, or attach steps by mechanical means to meet the loading and testing requirements of ASTM C 478 and ASTM Test Method C 497.

3.11 TESTING

A. Perform testing after backfilling and compaction and following installation of other utilities but prior to surface restoration, unless using the vacuum method.

B. For the vacuum test method, conduct preliminary tests prior to backfilling and final tests after backfilling and compaction of trenches.

C. Unless otherwise indicated in the Contract Documents, test all manholes, inlets and catch basins.

D. Hydrostatic Testing.

1. Test and Procedure: Per Section 502 - Manholes

E. Vacuum Testing.

1. Authorization: Vacuum test stormwater manholes only with pre-approval of the Engineer unless directed to do so in the Contract Documents.

2. Test and Procedure: Per Section 502 - Manholes.

3.12 PLACEMENT OF CONCRETE COLLARS

A. Place collars in all paved areas per Standard Drawings SD-616 - Manhole Collar.

B. Finish the surface of the concrete collar with a smooth uniform lightly broomed surface 1/8 inch to 1/4 inch below the adjacent pavement.

C. Install frame and cover even with the concrete surface.

D. Allow Engineer to inspect concrete reinforcement on each collar.

3.13 SPECIAL STRUCTURES

A. Construct special structures per requirements for standard inlets, catch basins, manholes, sediment traps or gravity irrigation structures as shown in the Standard Drawings except as otherwise called for in the Contract Documents.

3.14 PVC DRAINAGE STRUCTURES

A. Excavate a minimum of 2 feet around structure and 1 foot below structure to allow placement and compaction of structural backfill material.

B. Remove additional unsuitable material below the structure and replace with foundation stabilization material, if required.

C. Install drainage structure, appurtenances, and connecting pipe in accordance with manufacturer's recommendations to ensure a structurally sound and water tight structural assembly and pipe connections. Adjust structure to correct elevation.

D. Backfill with Type 1 aggregate placed in 12" lifts and compacted to 95% density per AASHTO T 99.

E. Test to the approval of the Engineer in accordance with this section.

F. In traffic areas and other locations shown on the plans, pour a concrete collar around frame so traffic load is transferred to the collar and not imposed on the PVC structure.

G. Unless otherwise detailed, install per Standard Drawing SD-625.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit price options as designated on the Bid Schedule. Includes furnishing and installing the drainage or gravity irrigation structure, frame, grate, cover, appurtenances, pipe connections, excavation, bedding, foundation, backfill, compaction, collars, testing, and all other items not itemized on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Storm Drain or Gravity Irrigation Manhole: Per each for the various types and sizes of manholes indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.A.1.
2. Bid Schedule Description: Storm Drain or Gravity Irrigation Manhole – Type _____…each (EA).

B. Storm Drain or Gravity Irrigation Manhole Extra Depth: Per each basis for depth 4 feet through 10 feet and per additional 1 foot for depths in excess of 10 feet. Measurement of manhole depths to the nearest foot from invert at the center of the manhole to the top of the manhole ring and cover.

1. Bid Schedule Payment Reference: 602.4.1.B.1.
2. Bid Schedule Description: Storm Drain or Gravity Irrigation Extra Depth Manhole – Type _____ 4 feet through 10 feet Vertical Depth…each (EA).

3. Bid Schedule Payment Reference: 602.4.1.B.3.
4. Bid Schedule Description: Storm Drain or Gravity Irrigation Manhole – Type _____ Additional Depth…vertical foot (VF).

C. Shallow Storm Drain or Gravity Irrigation Manhole: Per each for the various types and sizes of manholes indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.C.1.
2. Bid Schedule Description: Shallow Storm Drain or Gravity Irrigation Manhole – Type _____…each (EA).

D. Stormwater or Gravity Irrigation Structure Core Drilling: Per each for the size indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.D.1.
2. Bid Schedule Description: Stormwater Structure Core Drilling _____ size…each (EA).

E. Storm Drain or Gravity Irrigation Catch Manhole: Per each for the types and sizes of catch manholes indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.E.1.
2. Bid Schedule Description: Storm Drain or Gravity Irrigation Catch Manhole…each (EA).

F. Catch Basin: Per each for the type and size of catch basin indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.F.1.
2. Bid Schedule Description: Catch Basin – Type _____…each (EA).

G. Inlet: Per each for the various types and sizes of inlets indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.G.1.
2. Bid Schedule Description: Inlet – Type _____…each (EA).

H. Precast Sediment Box: Per each for the type and size of precast sediment box indicated on the bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.H.1.
2. Bid Schedule Description: Precast Sediment Box - Size _____ …each (EA).

I. Sediment Box/Catch Basin: Per each for the type and size of sediment box/catch basin indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.I.1.
2. Bid Schedule Description: Sediment Box/Catch Basin – Type _____…each (EA).

J. Inlet Catch Basin Type V: Per each for the type and size of inlet catch basin indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.J.1.
2. Bid Schedule Description: Inlet Catch Basin – Type V…each (EA).

K. Dia. Gravity Irrigation Slide Gate: Per each for the type and size of dia gravity irrigation slide gate indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.K.1.
2. Bid Schedule Description: ____ Dia Gravity Irrigation Slide Gate - Type _____…each (EA).

L. Dia. Gravity Irrigation Valves: Per each for the type and size of dia gravity irrigation valve indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.L.1.
2. Bid Schedule Description: _____ Dia Gravity Irrigation Valves - Type _____…each (EA).

M. Concrete Irrigation Box Size _____: Per each for the type and size of concrete irrigation box indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.M.1.
2. Bid Schedule Description: Concrete Irrigation Box – Size _____…each (EA).

N. Precast Concrete Irrigation Structure: Per each for the types and size of precast concrete irrigation structure indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.N.1.
2. Bid Schedule Description: Precast Concrete Irrigation Structure - Size _____…each (EA).

O. Irrigation Ditch _____ Wide by _____ Deep: Per each for the type and size of irrigation ditch indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.O.1.
2. Bid Schedule Description: Irrigation Ditch – Size, _____ Wide by _____ Deep…each (EA).

P. Curb Opening Inlet: Per each for the type and size of curb opening inlet indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.P.1.
2. Bid Schedule Description: Curb Opening Inlet……each (EA).

Q. Groundwater Observation Well: Per each for the type and size of groundwater observation well indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.Q.1.
2. Bid Schedule Description: Groundwater Observation Well…each (EA).

R. Anti-Seep Collar: Per each for the size of pipe indicated on the Bid Schedule.

1. Bid Schedule Payment Reference: 602.4.1.R.1.
2. Bid Schedule Description: Anti-Seep Collar…each (EA).

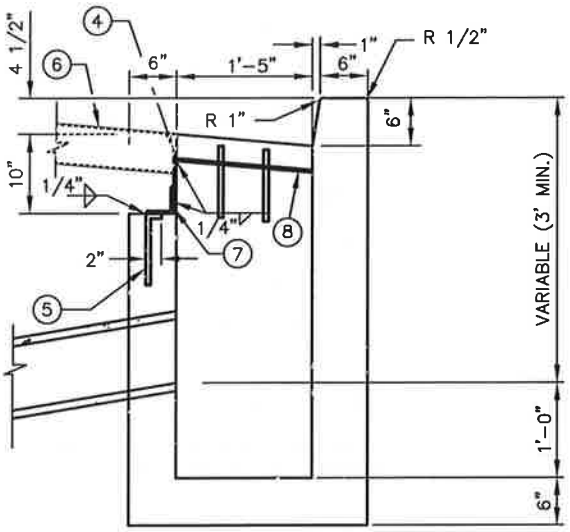
END OF SECTION

ISPWC - DIVISION 600

Culverts, Storm Drains, and Gravity Irrigation

Standard Drawings

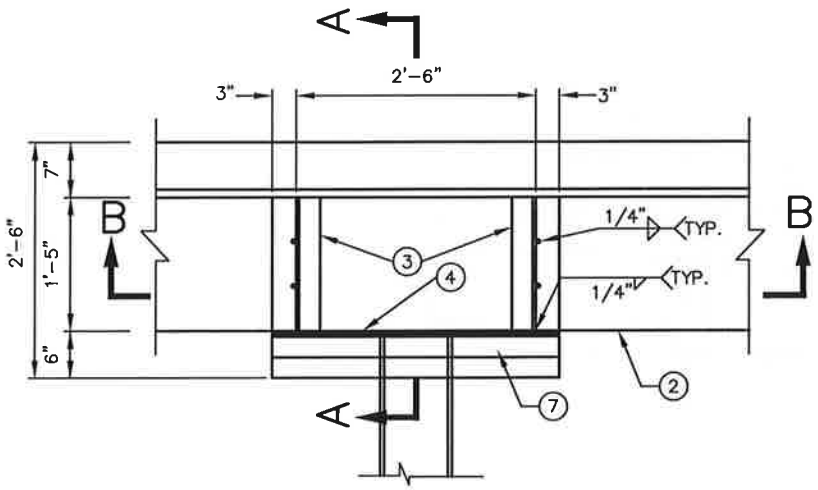
SD-601 – Inlet Catch Basin Type I
SD-602 – Inlet Catch Basin Type II
SD-603 – Inlet Catch Basin Type III
SD-604 – Inlet Catch Basin Type IV
SD-604A – Inlet Catch Basin Type IV (for Rolled Curb)
SD-605 – Inlet Catch Basin Type V
SD-606 – Catch Basin / Sediment Box – Type A
SD-607 – Catch Basin / Sediment Box – Type B
SD-608 – Catch Basin / Sediment Box – Type C
SD-608A – Catch Basin / Sediment Box – Type D
SD-609 – Catch Basin Grate Type I
SD-609A – Standard Shallow Manhole
SD-610 – Catch Basin Grate Type II
SD-610A – Catch Basin Grate Type III
SD-611 – Standard Concrete Catch Manhole
SD-612 – Standard Manhole Type A
SD-613 – Standard Manhole Type B
SD-613A – Standard Manhole Type B – Raised Invert
SD-614 – Standard Manhole Type B, Deep
SD-614A – Standard Manhole Type B, Deep – Raised Invert
SD-615 – Shallow Manhole Type 1
SD-615A – Shallow Manhole Type 1 – Raised Invert
SD-616 – Manhole Collar
SD-617 – Standard Manhole Frame, Cover and Riser
SD-618 – Plastic Coated Manhole Steps
SD-619 – Standard Irrigation Box
SD-620 – Standard Irrigation Stand Pipe
SD-621 – Irrigation Ditches
SD-622 – Connecting Bands for CMP
SD-623 – Storm Drain Monument
SD-624 – Sand and Grease Trap
SD-625 – PVC Drain Basin Structure
SD-626 – Curb Opening Inlet
SD-627 – Groundwater Observation Well
SD-628 – Inlet Pipe and Protection Apron
SD-629 – Anti-Seep Collar



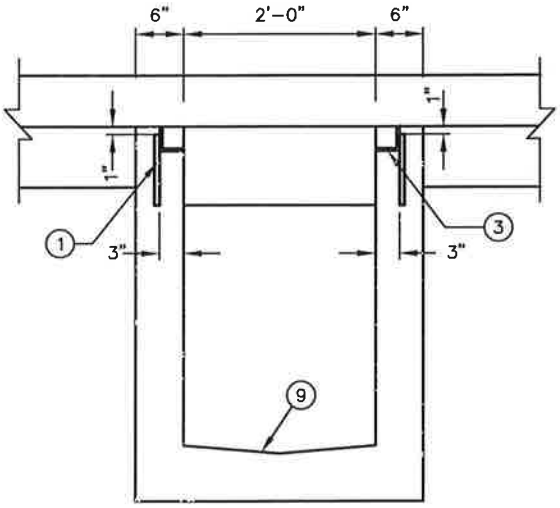
SECTION A–A
N.T.S.

LEGEND

1. 2 – 7" NO. 4 BAR EACH SIDE.
2. EDGE OF GUTTER.
3. 1.75" X 1.75" X 3/8" ANGLE IRON.
4. 3/8" X 10" 3'–0" A–36 STEEL PLATE.
5. 3 – 7" NO. 4 BARS.
6. PAVEMENT SURFACE.
7. 3 1/2" X 3" X 3/8" X 3'–0" ANGLE IRON.
8. STANDARD GRATE AND GRATE FRAME. SEE SD–609, SD–610 AND SD–610A.
9. TROWEL SMOOTH.



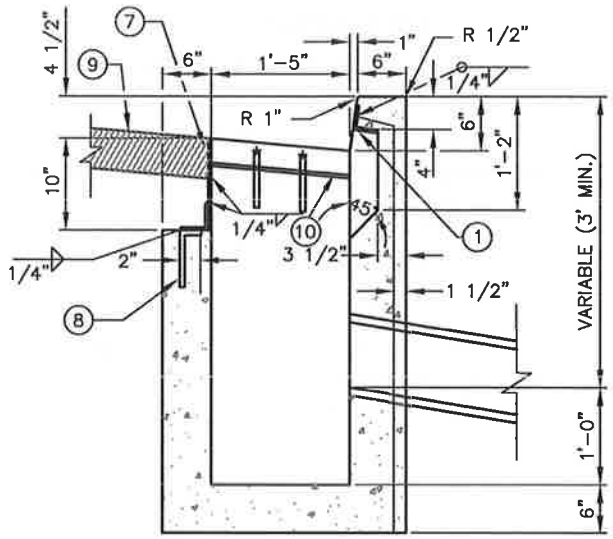
PLAN
N.T.S.



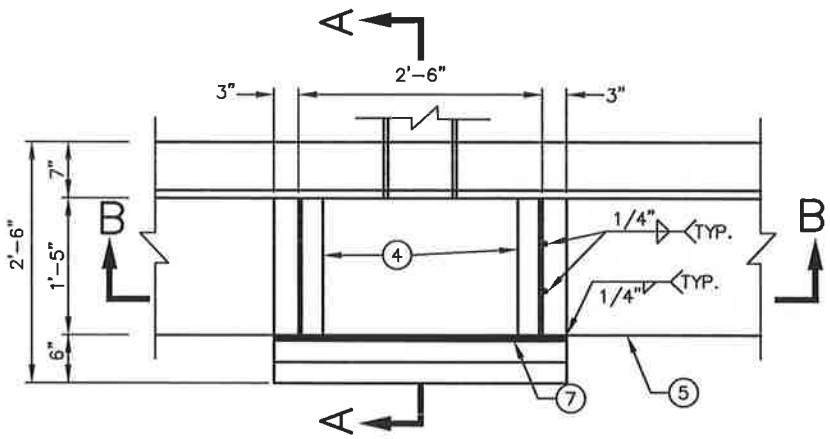
SECTION B–B
N.T.S.

2015

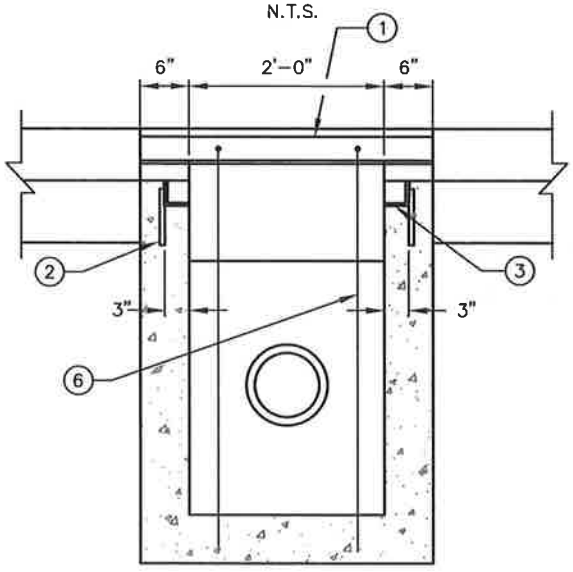
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	INLET CATCH BASIN TYPE I	STANDARD DRAWING NO. SD–601



SECTION A–A
N.T.S.



PLAN
N.T.S.



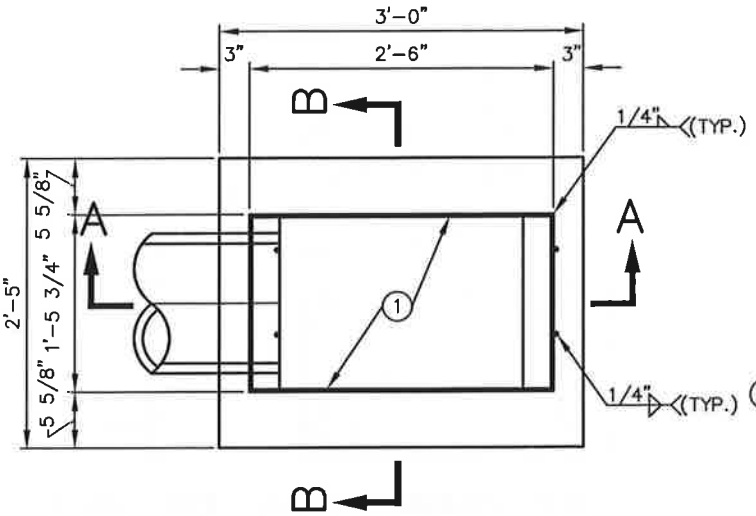
SECTION B–B
N.T.S.

LEGEND

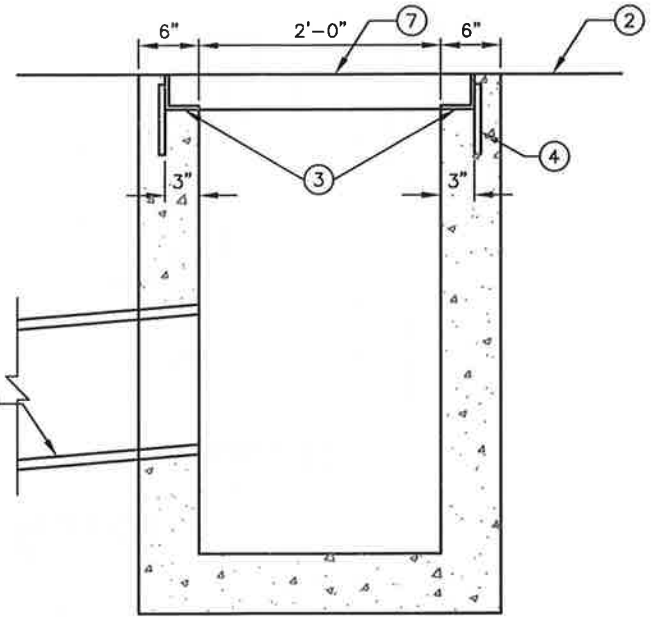
1. GALV. 3" X 3" X 3/8" X 3'-0" ANGLE IRON.
2. 2 – 7" NO. 4 BAR EACH SIDE.
3. 2 – 3'-0" NO. 4 BARS.
4. 3 1/2" X 3" X 3/8" X 1'-5" ANGLE IRON.
5. EDGE OF GUTTER.
6. 3 1/2" X 3" X 3/8" X 3'-0" ANGLE IRON.
7. 3/8" X 10" 3'-0" A-36 STEEL PLATE.
8. 3 – 7" NO. 4 BARS.
9. PAVEMENT SURFACE.
10. STANDARD GRATE AND GRATE FRAME. SEE SD-609, SD-610 AND SD-610A.

2015

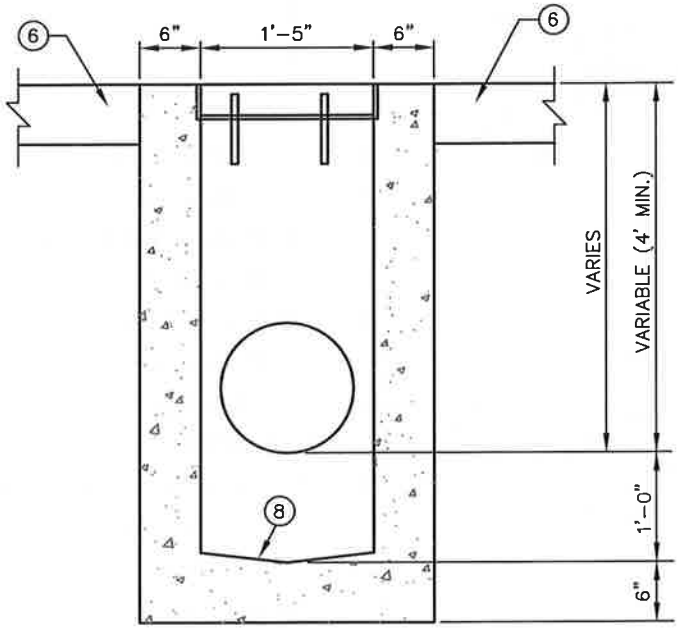
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	INLET CATCH BASIN TYPE II	STANDARD DRAWING NO. SD-602



PLAN
N.T.S.



SECTION A–A
N.T.S.



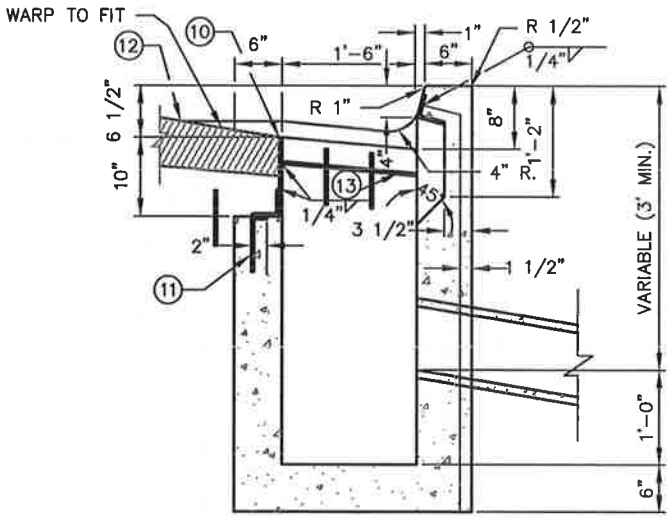
SECTION B–B
N.T.S.

LEGEND

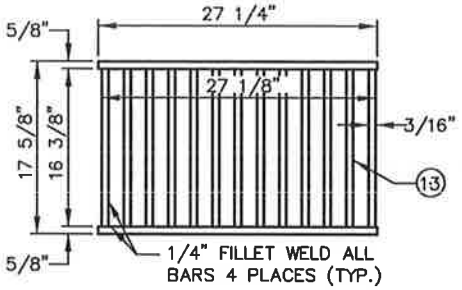
1. 2 BARS 3 1/2" X 3/8" X 2'–6".
2. FINISHED SURFACE.
3. 2 – ANGLES 3 1/2" X 3".
4. 2 – 7" NO. 4 BAR EACH SIDE.
5. 1" PER FOOT MINIMUM SLOPE.
6. PAVEMENT SURFACE.
7. STANDARD GRATE AND GRATE FRAME. SEE SD–609, SD–610 AND SD–610A.
8. TROWEL SMOOTH.

2015

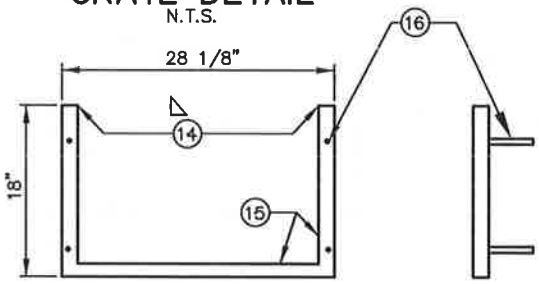
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	INLET CATCH BASIN TYPE III	STANDARD DRAWING NO. SD–603



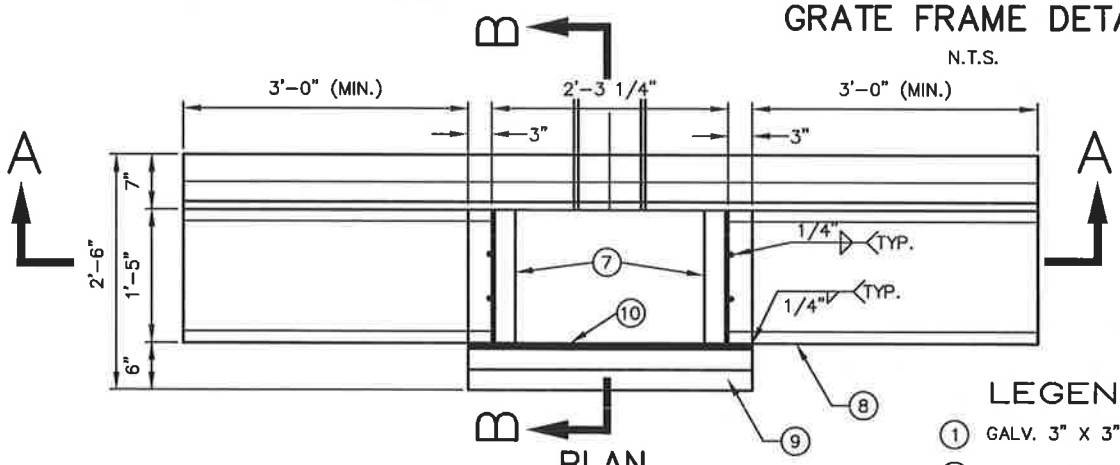
SECTION B–B
N.T.S.



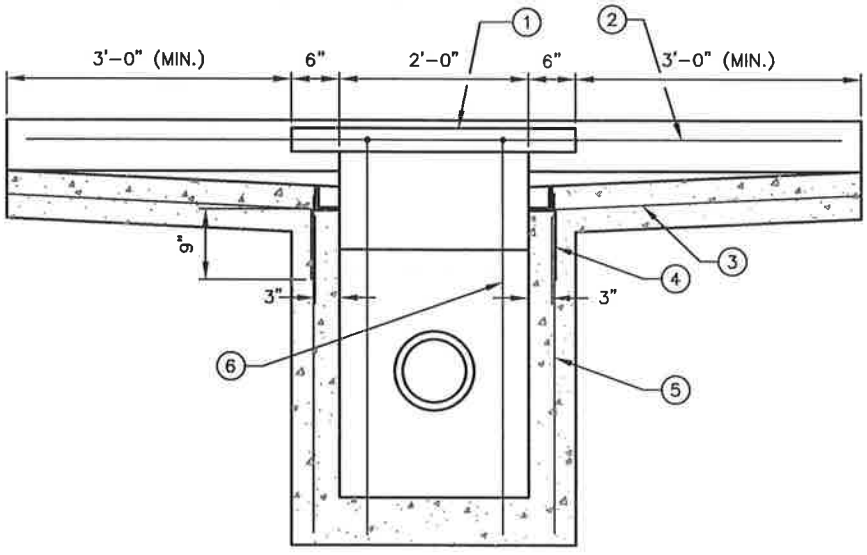
GRATE DETAIL
N.T.S.



GRATE FRAME DETAIL END VIEW
N.T.S. N.T.S.



PLAN
N.T.S.



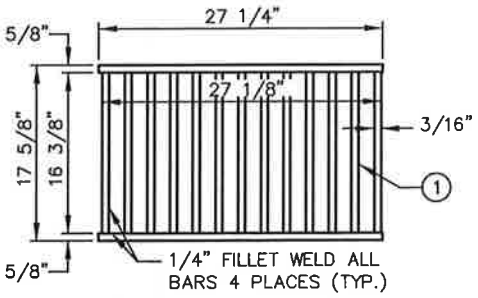
SECTION A–A
N.T.S.

LEGEND

1. GALV. 3" X 3" X 3/8" X 3'–0" ANGLE IRON.
2. 1 – 8'–7" NO. 4 BAR (MIN).
3. 2 – 3'–9" NO. 4 BARS EACH SIDE.
4. 2 – 7" NO. 4 BAR EACH SIDE.
5. 1 – 3'–1" NO. 4 BAR EACH SIDE.
6. 2 – 3'–0" NO. 4 BARS.
7. 3 1/2" X 3" X 3/8" X 1'–5" ANGLE IRON.
8. EDGE OF GUTTER.
9. 3 1/2" X 3" X 3/8" X 3'–0" ANGLE IRON.
10. 3/8" X 10" 3'–0" A–36 STEEL PLATE.
11. 3 – 7" NO. 4 BARS.
12. PAVEMENT SURFACE.
13. 1 1/2" X 5/8" STEEL BAR (TYP.).
14. 1.5" X 1.5" X .25" STEEL TRIANGLE (2 PLACES).
15. 1.75" x 1.75" X .25" STEEL ANGLE.
16. WELD (4) 1/2" X 3" STUDS.

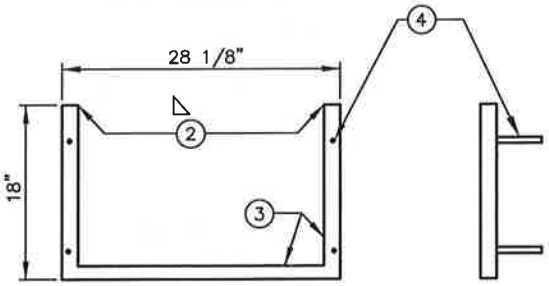
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	INLET CATCH BASIN TYPE IV	STANDARD DRAWING NO. SD–604



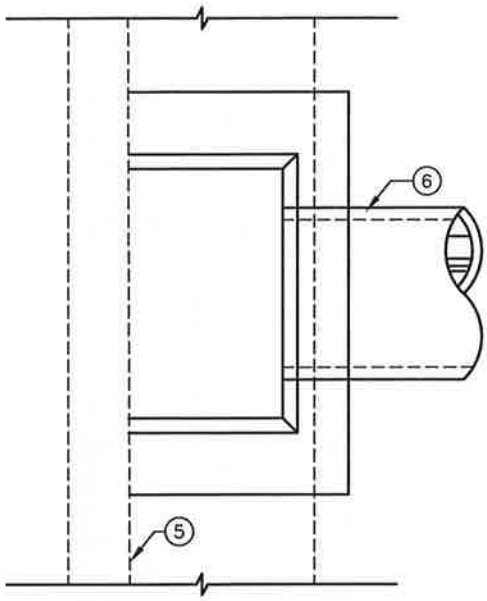
GRATE DETAIL

N.T.S.



GRATE FRAME DETAIL END VIEW

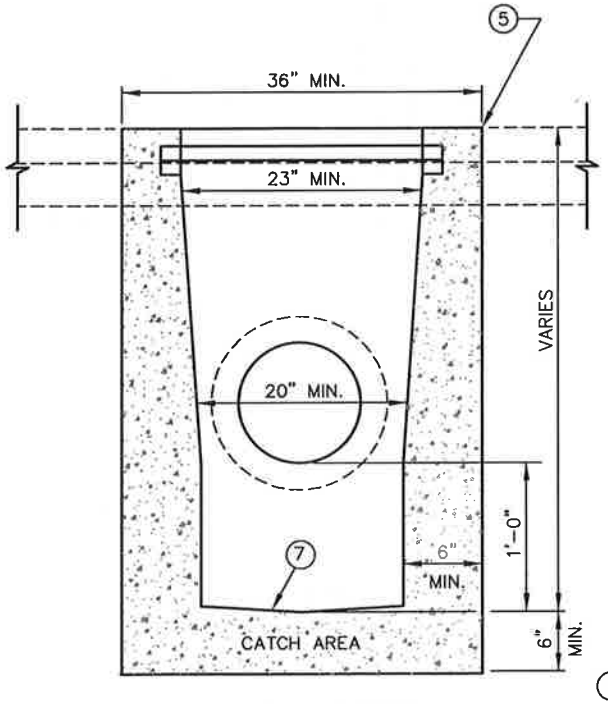
N.T.S.



TOP VIEW

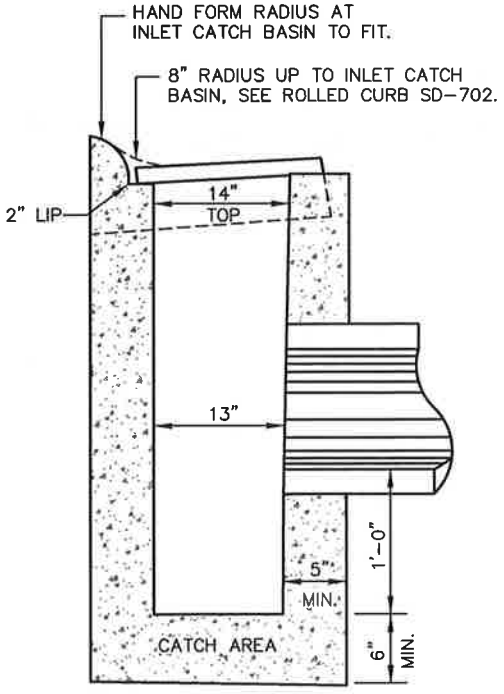
N.T.S.

N.T.S.



FRONT VIEW

N.T.S.



SIDE VIEW

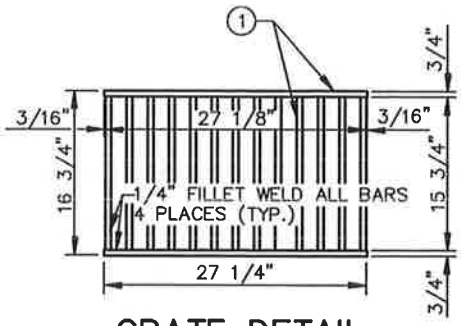
N.T.S.

LEGEND

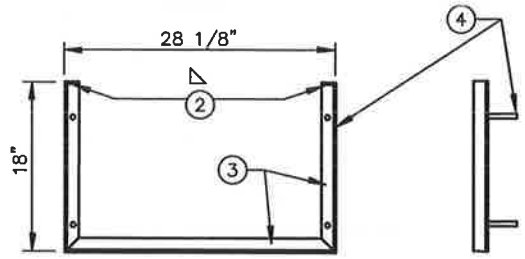
1. 1 1/2" X 5/8" STEEL BAR (TYP.).
2. 1.5" X 1.5" X .25" STEEL TRIANGLE (2 PLACES).
3. 1.75" X 1.75" X .25" STEEL ANGLE.
4. WELD (4) 1/2" X 3" STUDS.
5. ADJOINING TOP OF CURB.
6. OUTLET.
7. TROWEL SMOOTH.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	INLET CATCH BASIN TYPE IV (FOR ROLLED CURB)	STANDARD DRAWING NO. SD-604A

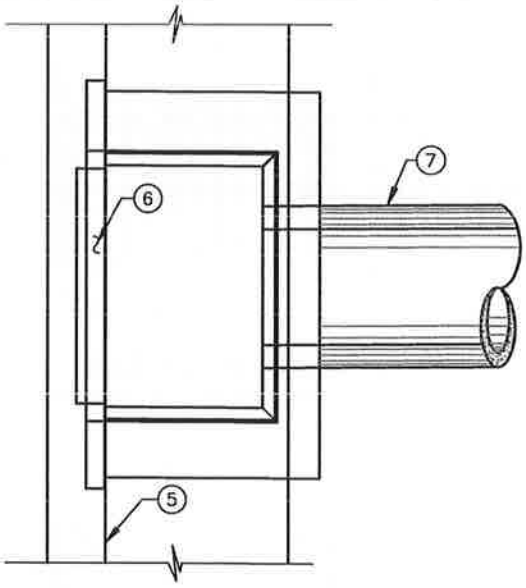


GRATE DETAIL
N.T.S.

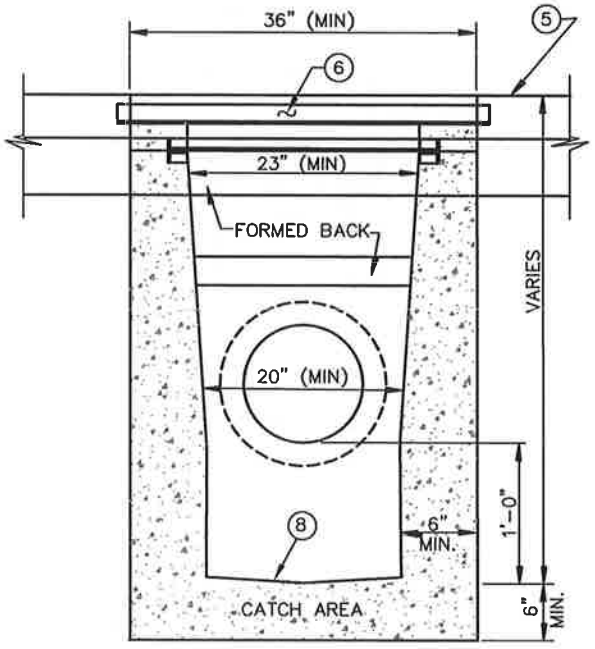


GRATE FRAME DETAIL
N.T.S.

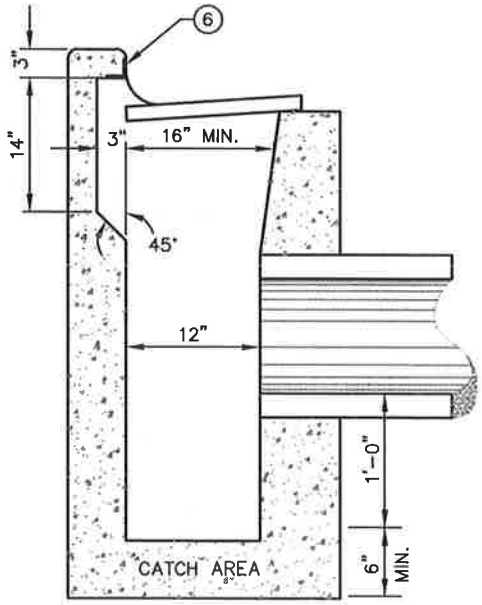
END VIEW
N.T.S.



TOP VIEW
N.T.S.



FRONT VIEW
N.T.S.



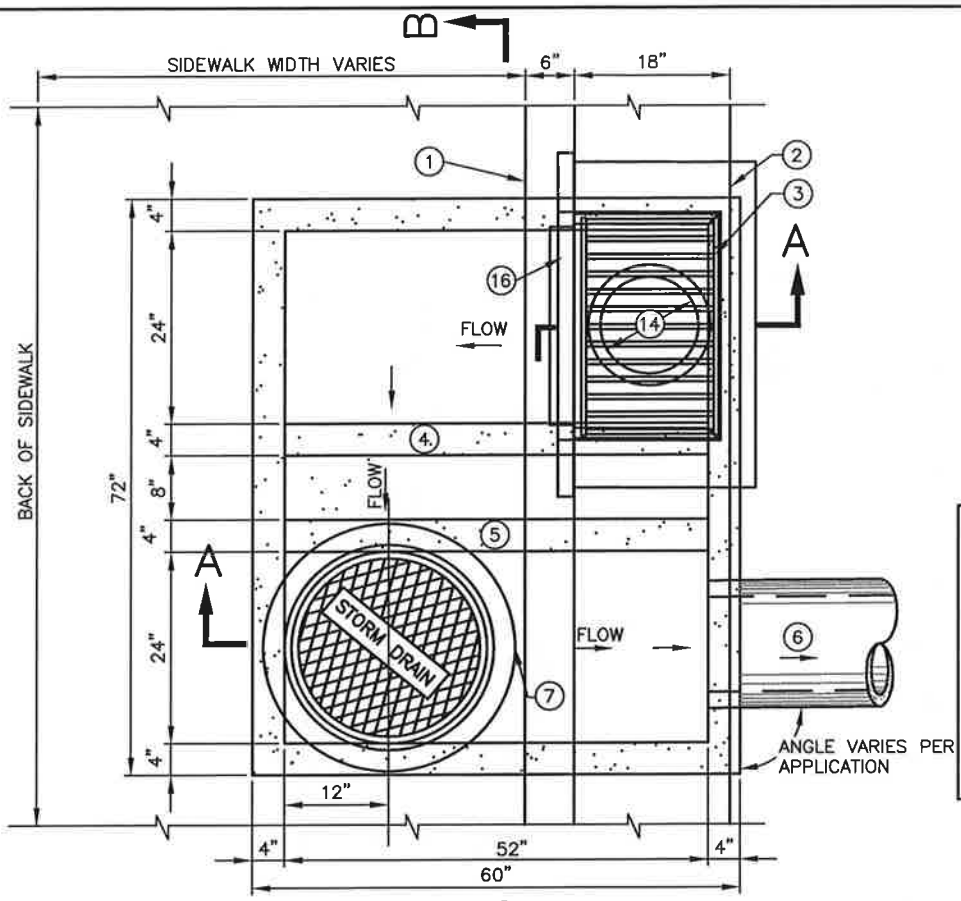
SIDE VIEW
N.T.S.

LEGEND

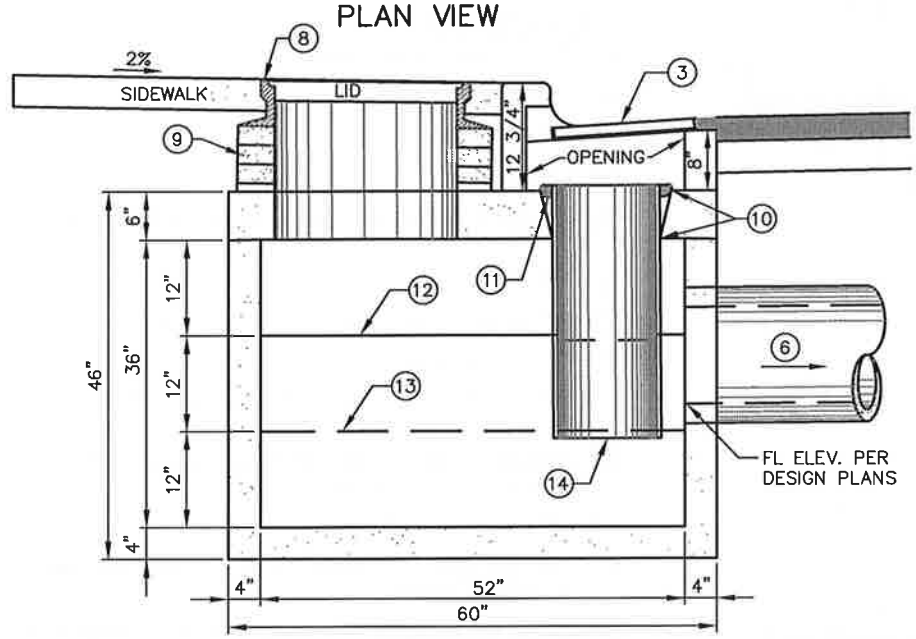
1. 1 1/2" X 5/8" STEEL BAR (TYP.).
2. 1.5" X 1.5" X .25" STEEL TRIANGLE (2 PLACES).
3. 1.75" X 1.75" X .25" STEEL ANGLE.
4. WELD (4) 1/2" X 3" STUDS.
5. ADJOINING TOP OF CURB.
6. 2" X 2" X 1/4" X 36" STEEL ANGLE, 36" LONG.
7. OUTLET.
8. TROWEL SMOOTH.

2015

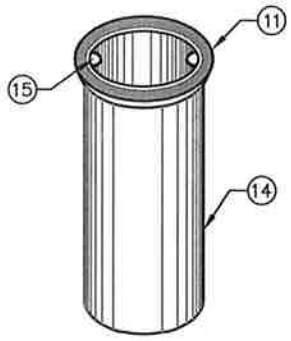
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	INLET CATCH BASIN TYPE V	STANDARD DRAWING NO. SD-605



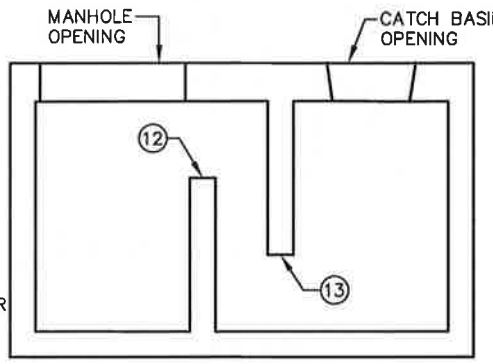
PLAN VIEW



SECTION A–A



12" VERTICAL PIPE



SECTION B–B

LEGEND

1. BACK OF CURB LINE.
2. LIP OF GUTTER.
3. STANDARD GRATE AND GRATE FRAME. SEE SD–609, SD–610 AND SD–610A.
4. BAFFLE WALL "A".
5. BAFFLE WALL "B".
6. 12" PIPE OUTLET.
7. SPECIAL DIAMOND FINISH MANHOLE COVER WITH "STORM DRAIN" CAST IN COVER PER SD–616.
8. STANDARD RING.
9. CONCRETE RISER RINGS.
10. FORM TAPERED HOLE OPENING SO GASKET WEDGES IN SNUG.
11. 12" RUBER GASKET SDR–35 M.J. GASKET.
12. TOP OF BAFFLE WALL "B".
13. BOTTOM OF BAFFLE WALL "A".
14. 12" DIA. X 30" LONG VERTICAL PVC PIPE.
15. PREFABRACATED GALVANIZED STEEL HANDLES WITH GALVANIZED SCREWS/NUTS.
16. 2" x 2" x 1/4" STEEL ANGLE.

NOTES:

(A) DESIGN LOAD: AASHTO HS–25 HIGHWAY LOADING AND CLASS 4000 psi CONCRETE.

(B) ALL REINFORCING STEEL TO BE GRADE 60.

(C) DETAILED DRAWING OF A PRECAST BOX OR A POURED IN PLACE BOX DESIGN MUST BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTION.

(D) CONSTRUCT CATCH BASIN PORTION ABOVE BOX LIKE INLET CATCH BASIN, TYPE V FOR CURB APPLICATIONS.

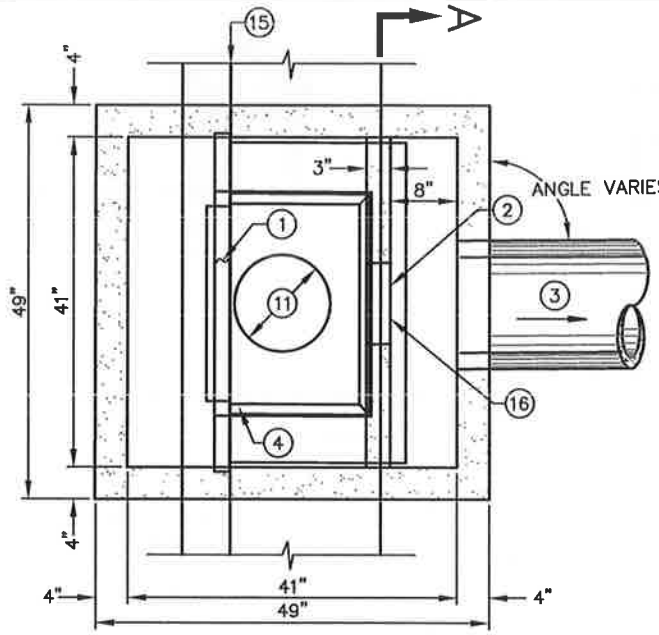
(E) STEEL ANGLE GRATE AND GRATE FRAME PER SD–605.

(F) TANK CAPACITY IS APPROXIMATELY 500 GALLONS OR 69 CUBIC FEET.

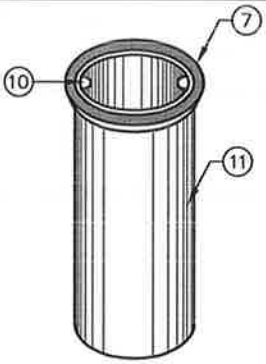
(G) BEFORE THESE BOXES ARE USED THE APPLICATION MUST BE APPROVED BY THE OWNER.

2015

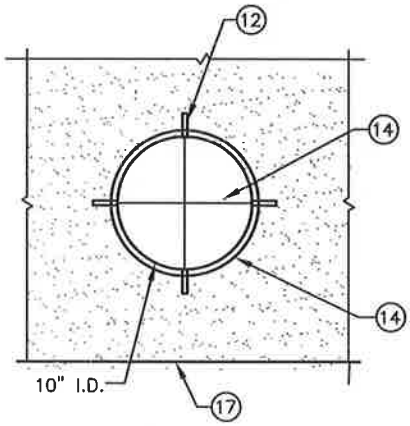
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CATCH BASIN/SEDIMENT BOX – TYPE A	STANDARD DRAWING NO. SD–606



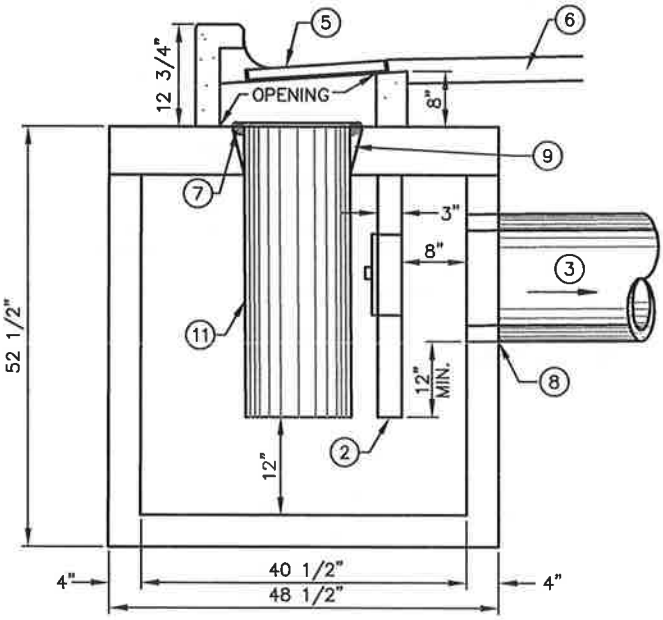
TOP VIEW
N.T.S.



12" VERTICAL PIPE
N.T.S.



PVC SLEEVE CLEANOUT
N.T.S.



SIDE VIEW
N.T.S.

NOTES:

(A) DESIGN LOAD: AASHTO HS-25 HIGHWAY LOADING AND CLASS 4000 psi CONCRETE.

(B) ALL REINFORCING STEEL TO BE GRADE 60.

(C) DETAILED DRAWING OF A PRECAST BOX OR A POURED IN PLACE BOX DESIGN MUST BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTION.

(D) CONSTRUCT CATCH BASIN PORTION ABOVE BOX LIKE INLET CATCH BASIN, TYPE V FOR CURB APPLICATIONS.

(E) STEEL ANGLE GRATE AND GRATE FRAME PER SD-609 AND SD-610.

(F) TANK CAPACITY IS APPROXIMATELY 300 GALLONS OR 40 CUBIC FEET.

(G) BEFORE THESE BOXES ARE USED THE APPLICATION MUST BE APPROVED BY THE OWNER.

LEGEND

(1) 2" X 2" 1/4" STEEL ANGLE.

(2) BAFFLE WALL.

(3) 12" PIPE OUTLET.

(4) GRATE FRAME.

(5) STANDARD FRAME AND GRATE. SEE SD-609, SD-610 AND SD-610A.

(6) ASPHALT.

(7) 12" RUBBER GASKET SDR-35 M.J. GASKET.

(8) FLOWLINE PER DESIGN PLANS.

(9) FORM TAPERED HOLE OPENING SO GASKET WEDGES ARE SNUG.

(10) PREFABRACATED GALVANIZED STEEL HANDLES WITH GALVANIZED SCREWS/NUTS.

(11) 12" DIA. PVC X 30" LONG.

(12) CAST (4) 3/8" X 3" STEEL STUDS THROUGH PIPE WALL TO SECURE SLEEVE.

(13) PLACE 10" DIAMETER REMOVABLE PIPE PLUG WITHIN PIPE SLEEVE (CHERNE EXPANSION GRIPPER OR APPROVED EQUAL.

(14) 10" DIAMETER PVC PIPE SLEEVE CAST INTO BAFFLE WALL ALIGN WITH OUTLET PIPE.

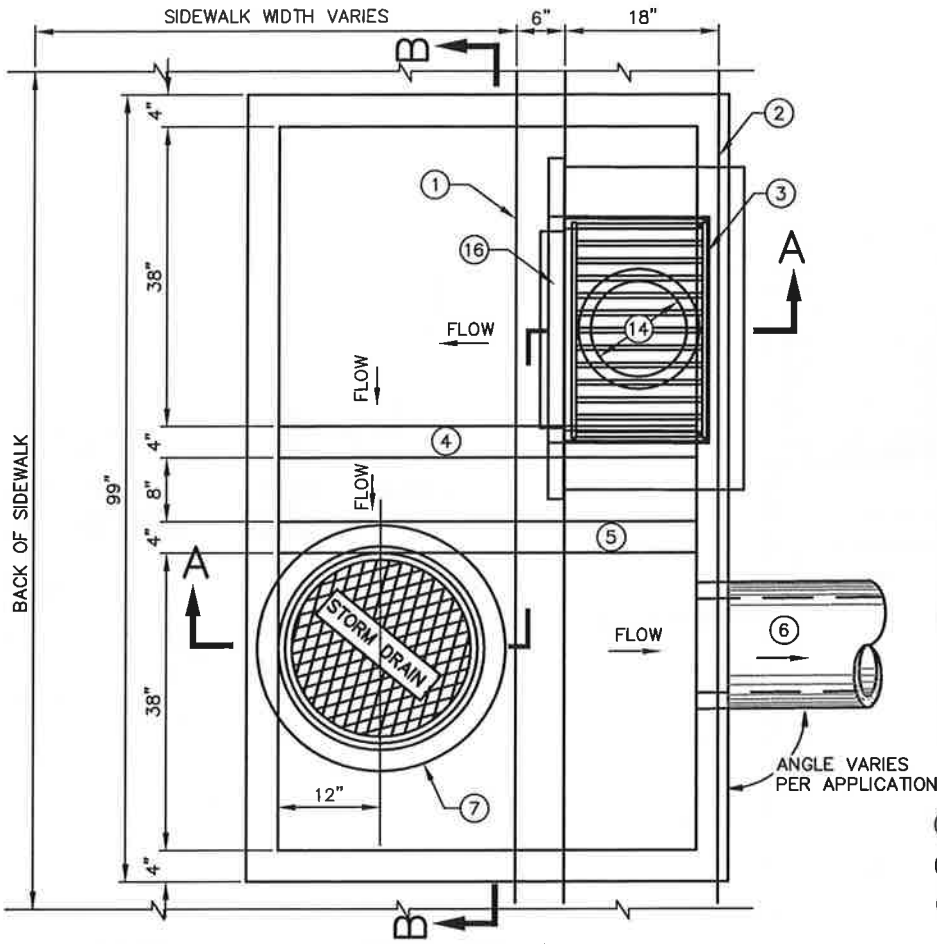
(15) FACE OF CURB.

(16) 10" PVC PIPE SLEEVE CLEANOUT WITHIN BAFFLE WALLS. CENTERED ON OUTLET PIPE TO ALLOW BEST ACCESS.

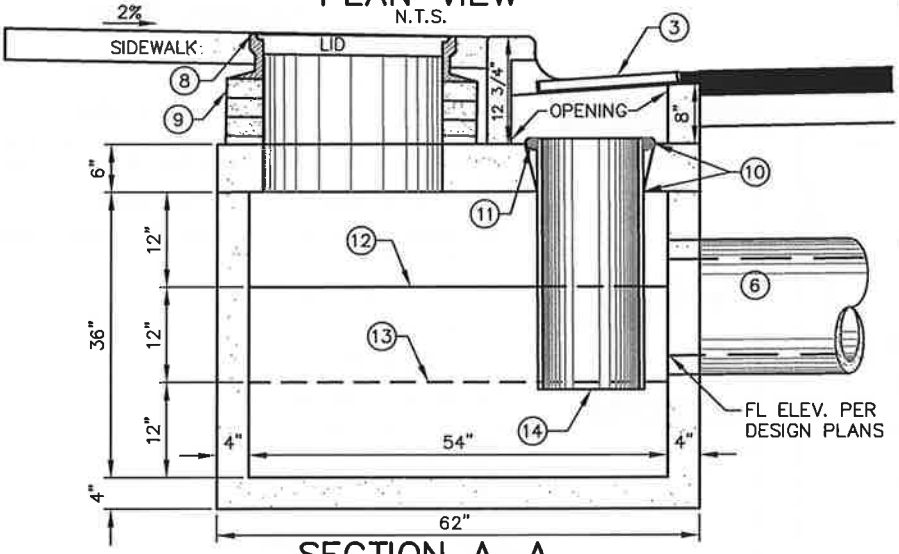
(17) BOTTOM OF BAFFLE WALL.

2015

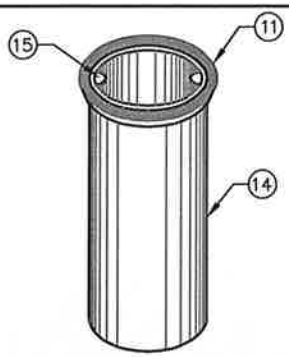
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CATCH BASIN/SEDIMENT BOX – TYPE B	STANDARD DRAWING NO. SD-607



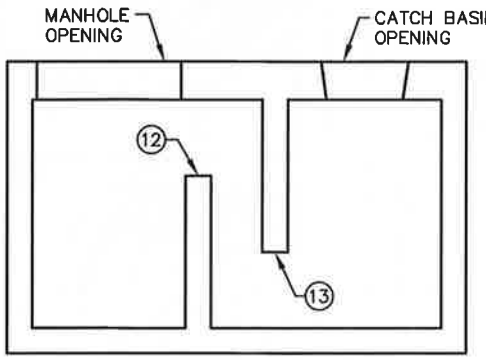
PLAN VIEW
N.T.S.



SECTION A–A
N.T.S.



12" VERTICAL PIPE
N.T.S.



SECTION B–B
N.T.S.

LEGEND

1. BACK OF CURB LINE.
2. LIP OF GUTTER.
3. STANDARD GRATE AND GRATE FRAME. SEE SD–609, SD–610 AND SD–610A.
4. BAFFLE WALL "A".
5. BAFFLE WALL "B".
6. 12" PIPE OUTLET.
7. SPECIAL DIAMOND FINISH MANHOLE COVER WITH "STORM DRAIN" CAST IN COVER PER SD–616.
8. STANDARD RING.
9. CONCRETE RISER RINGS.
10. FORM TAPERED HOLE OPENING SO GASKET WEDGES IN SNUG.
11. 12" RUBBER GASKET SDR–35 M.J. GASKET.
12. TOP OF BAFFLE WALL "B".
13. BOTTOM OF BAFFLE WALL "A".
14. 12" DIA. X 30" LONG VERTICAL PVC PIPE.
15. PREFABRICATED GALVANIZED STEEL HANDLES WITH GALVANIZED SCREWS/NUTS.
16. 2" X 2" X 1/4" STEEL ANGLE.

NOTES:

A. DESIGN LOAD: AASHTO HS–25 HIGHWAY LOADING AND CLASS 4000 psi CONCRETE.

B. ALL REINFORCING STEEL TO BE GRADE 60.

C. DETAILED DRAWING OF A PRECAST BOX OR A POURED IN PLACE BOX DESIGN MUST BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTION.

D. CONSTRUCT CATCH BASIN PORTION ABOVE BOX LIKE INLET CATCH BASIN, TYPE V FOR CURB APPLICATIONS.

E. STEEL ANGLE GRATE AND GRATE FRAME PER SD–609 AND SD–610.

F. TANK CAPACITY IS APPROXIMATELY 750 GALLONS OR 100 CUBIC FEET.

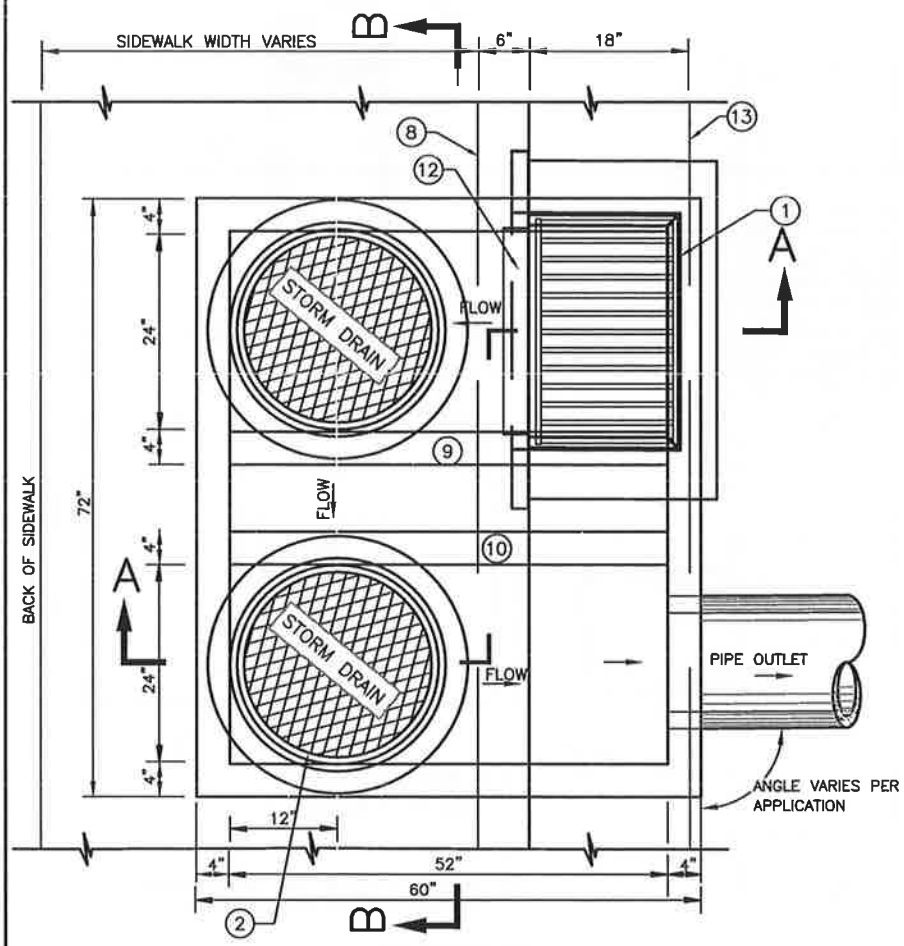
G. BEFORE THESE BOXES ARE USED THE APPLICATION MUST BE APPROVED BY THE OWNER.

H. DESIGN MAY BE REVERSED FOR BEST APPLICATION WITH MANHOLE AND CATCH BASIN OPENINGS IN OPPOSITE DIRECTIONS.

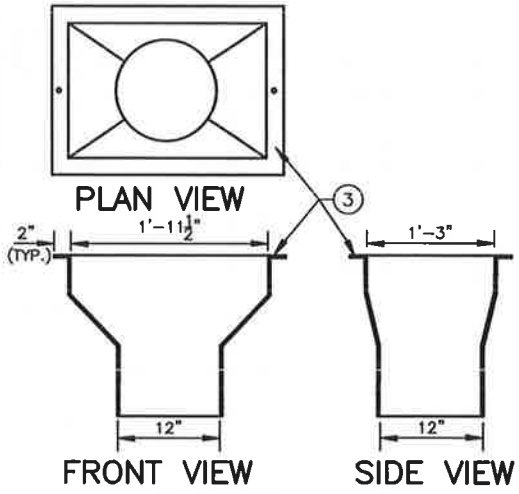
I. TYPE C BOX MAY NOT BE SUBSTITUTED FOR TYPE A OR TYPE B WITHOUT THE APPROVAL OF THE OWNER.

2015

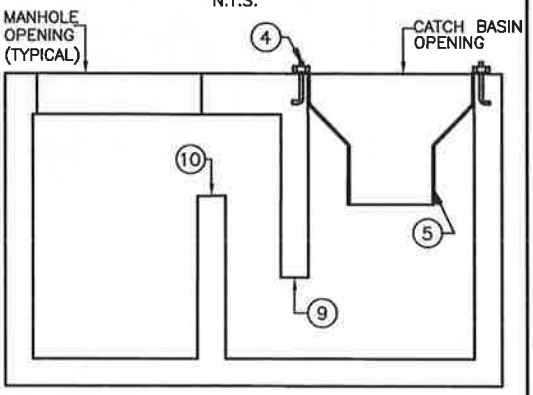
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CATCH BASIN/SEDIMENT BOX – TYPE C	STANDARD DRAWING NO. SD–608



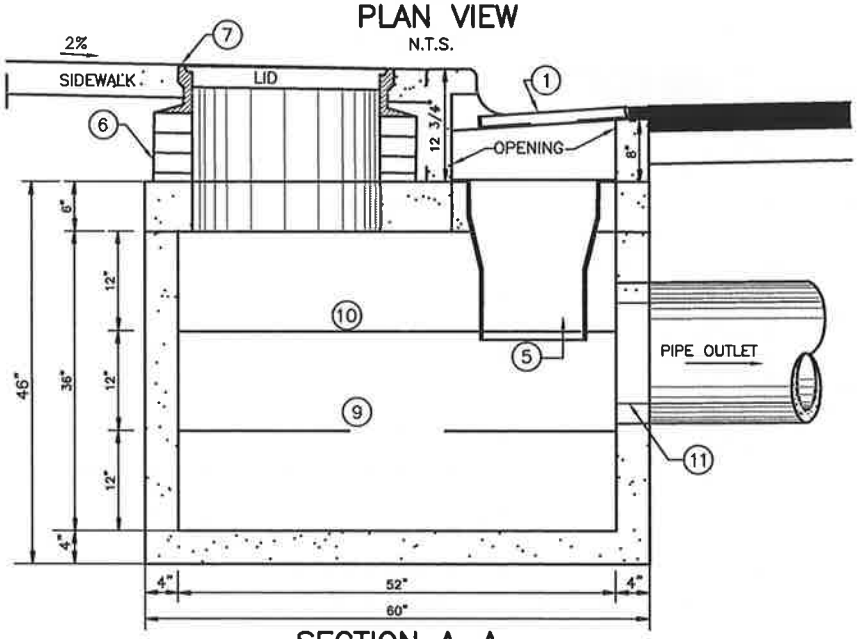
PLAN VIEW
N.T.S.



FUNNEL INSERT
N.T.S.



SECTION B–B
N.T.S.



SECTION A–A
N.T.S.

LEGEND

1. STD. GRATE & GRATE FRAME SEE STD. DRAWING.
2. SPECIAL DIAMOND FINISH MANHOLE COVER WITH "STORM DRAIN" CAST IN COVER. FRAME PER SD-616 (TYPICAL).
3. 2" LIP TO ATTACH TO TOP OF SED BOX.
4. ATTACH FUNNEL WITH 1/2" GALVANIZED STEEL ANCHOR BOLTS (TYP.).
5. 12" POLYETHYLENE REMOVABLE FUNNEL.
6. CONCRETE RISER RINGS. (MAX. 12").
7. STANDARD RING.
8. BACK OF CURB LINE.
9. BAFFLE WALL "A".
10. BAFFLE WALL "B".
11. FL ELEV. PER DESIGN PLANS.
12. 2"x2"x1/4" STEEL ANGLE.
13. LIP OF GUTTER.

NOTES:

A. DESIGN LOAD: AASHTO HS-25 HIGHWAY LOADING AND CL-4000 CONCRETE.

B. ALL REINFORCING STEEL SHALL BE GRADE 60.

C. DETAILED DRAWING OF A PRECAST BOX OR A POURED IN PLACE BOX DESIGN MUST BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.

D. CONSTRUCT CATCH BASIN PORTION ABOVE BOX LIKE INLET CATCH BASIN, TYPE V PER STANDARD DRAWING SD-605.

E. STEEL ANGLE GRATE AND GRATE FRAME PER SD-605.

F. TANK CAPACITY IS APPROXIMATELY 500 GALLONS OR 69 CUBIC FEET.

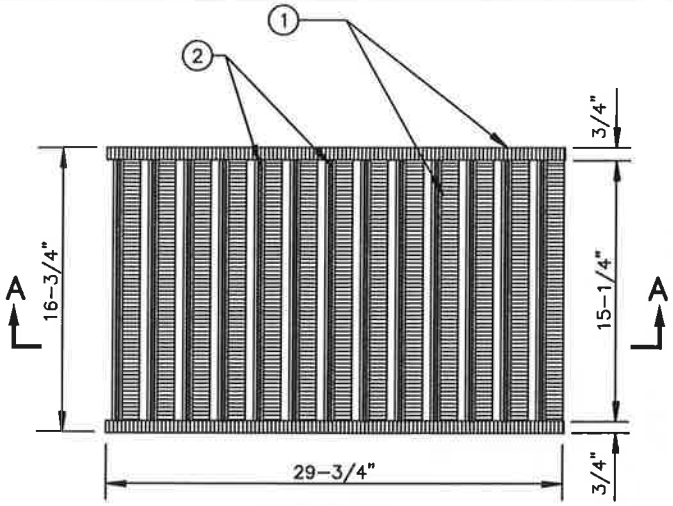
G. BEFORE THESE BOXES ARE USED THE APPLICATION MUST BE APPROVED BY THE ENGINEER.

H. RAISE MANHOLES TO MATCH TOP BACK OF CURB ELEVATION. CONCRETE COLLARS ARE REQUIRED AROUND MANHOLES THAT ARE PLACED IN LANDSCAPED AREAS.

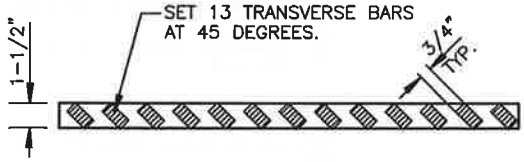
I. EXTEND 12" POLYETHYLENE FUNNEL 1" BELOW TOP OF BAFFLE WALL "B".

2015

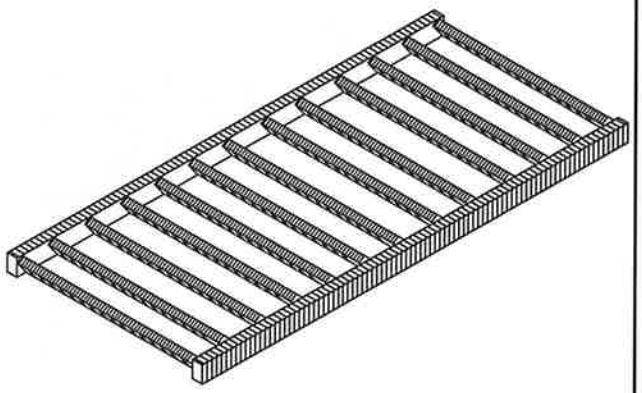
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CATCH BASIN/SEDIMENT BOX – TYPE D	STANDARD DRAWING NO. SD-608A



TOP VIEW



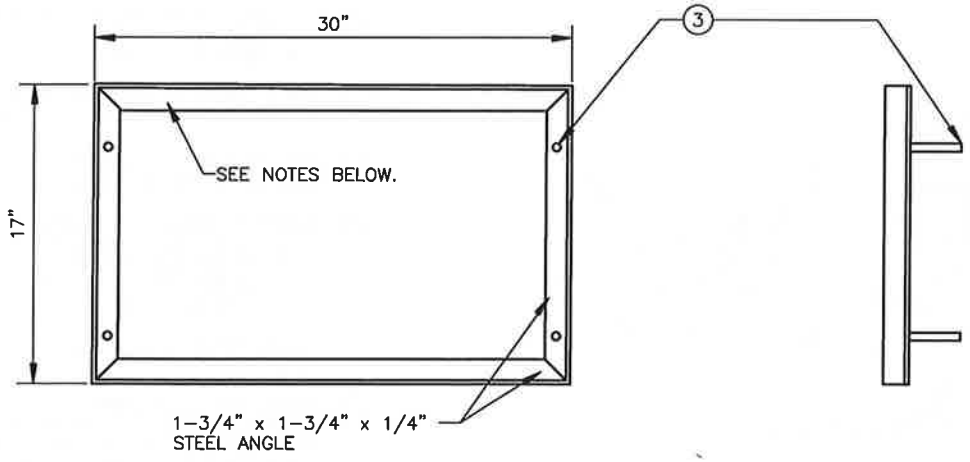
SECTION A–A



ISOMETRIC

GRATE TYPE I

N.T.S.



TOP VIEW

END VIEW

GRATE FRAME DETAIL

N.T.S.

NOTES

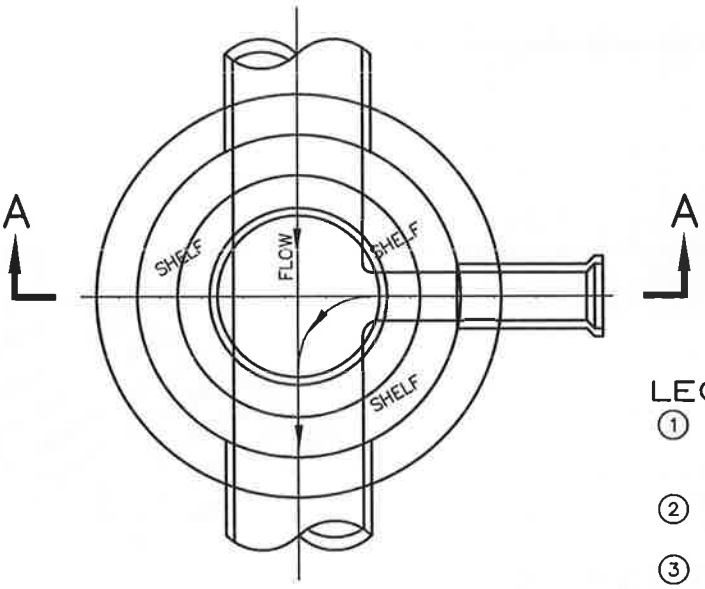
1. FOUR-SIDED FRAME IS REQUIRED.
2. CONTRACTOR HAS THE OPTION OF WELDING THE BACK STEEL ANGLE BAR INTO PLACE AFTER SLIP FORMS FOR BOX HAVE BEEN REMOVED. ENSURE GRATE FRAME IS SQUARE BEFORE DOING A FULL PENETRATION WELD TO ATTACH BACK STEEL ANGLE BAR.

LEGEND

1. 1-1/2" x 3/4" STEEL BARS (TYP.).
2. 1/4" FILLET WELD ALL BARS 4 PLACES (TYP.).
3. WELD (4) 1/2"x3" STUDS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CATCH BASIN GRATE TYPE I	STANDARD DRAWING NO. SD-609



PLAN

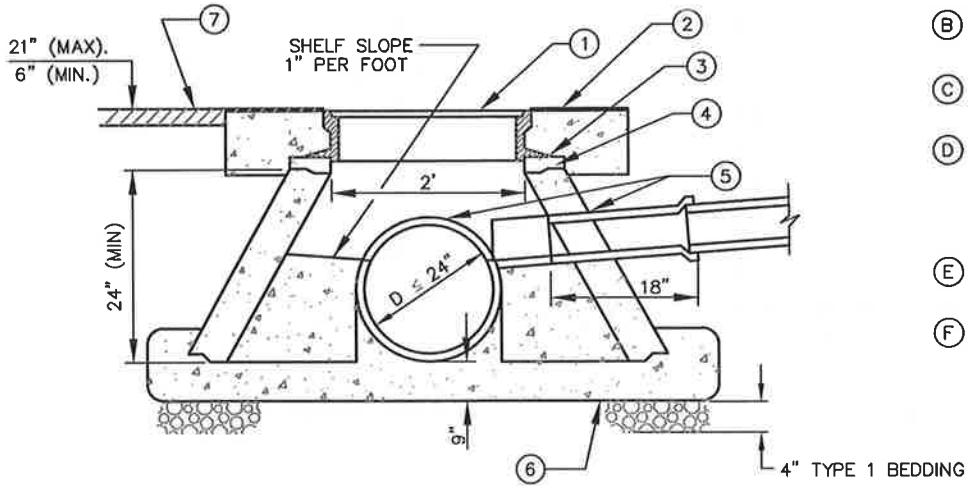
N.T.S.

LEGEND

1. FRAME AND COVER PER STANDARD DRAWING SD-507. (WITH "STORM SEWER" IN LIEU OF "SANITARY SEWER" ON COVER).
2. CONCRETE COLLAR IN PAVED SECTIONS PER SD-616.
3. FRAME TO BE GROUTED TO GRADE RINGS.
4. GRADE RINGS GROUTED IN PLACE.
5. CORE-DRILL THROUGH PRE-CAST SECTION.
6. CAST IN PLACE OR PRECAST CONCRETE BASE.
7. SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).

NOTES:

- (A) OPTIONAL PRECAST MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL.
- (B) PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.
- (C) FOR DIAMETER, D, GREATER THAN 24", SEE SD-607 "STANDARD MANHOLE TYPE B".
- (D) MANHOLE FRAME AND COVER:
  - A. REFER TO DRAWING NO. SD-507.
  - B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.
  - C. "STORM DRAIN" ON COVER.
- (E) GRADE RINGS NOT TO EXCEED 1-FOOT IN HEIGHT.
- (F) WHERE PVC IS UTILIZED, A RUBBER RING OR GASKET COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.



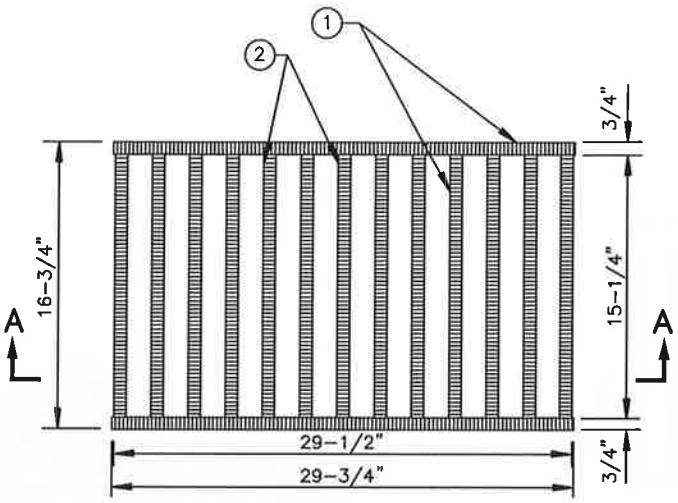
SECTION A-A

≥ 30" DEEP AND ≤ 48" DEEP

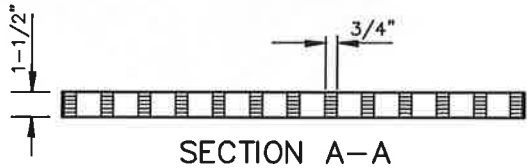
N.T.S.

2015

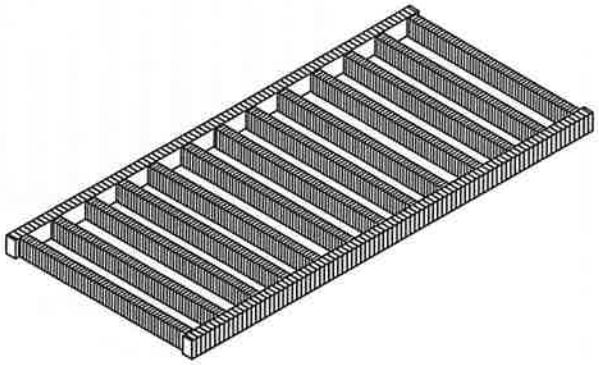
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD SHALLOW MANHOLE	STANDARD DRAWING NO. SD-609A



TOP VIEW



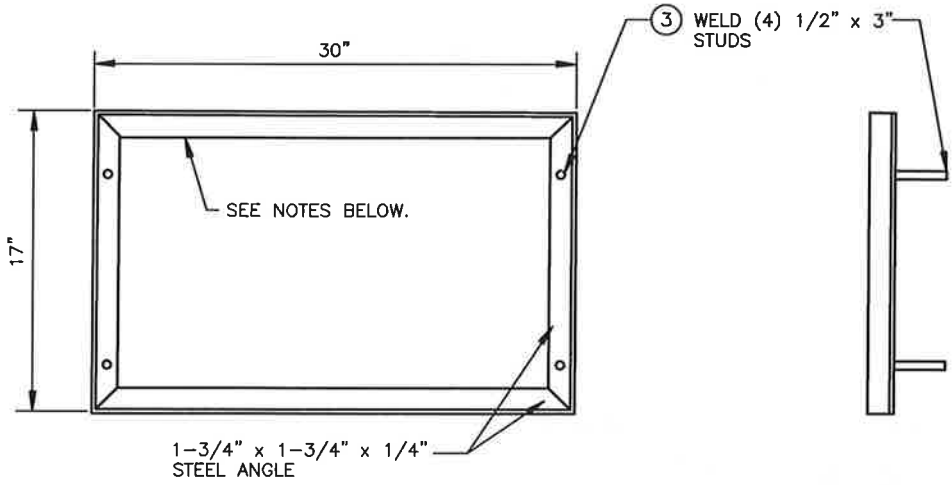
SECTION A–A



ISOMETRIC

GRATE TYPE II

N.T.S.



TOP VIEW

END VIEW

GRATE FRAME DETAIL

N.T.S.

NOTES

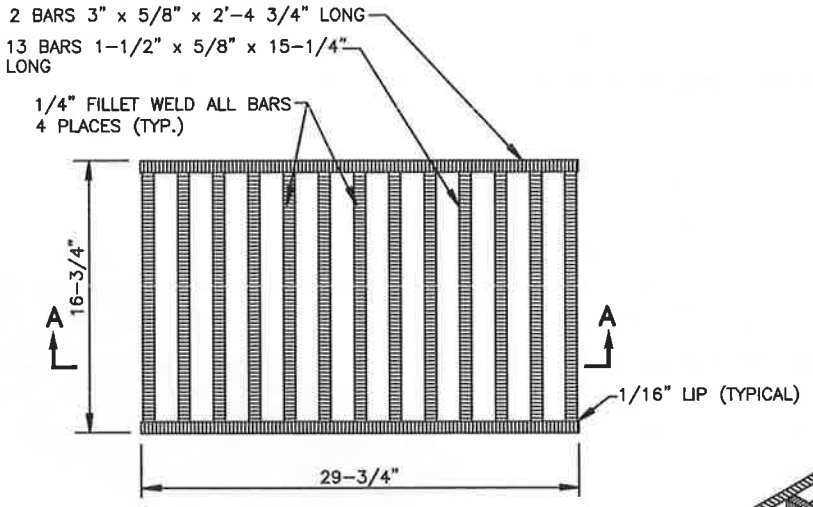
1. FOUR–SIDED FRAME IS REQUIRED.
2. CONTRACTOR HAS THE OPTION OF WELDING THE BACK STEEL ANGLE BAR INTO PLACE AFTER SLIP FORMS FOR BOX HAVE BEEN REMOVED. ENSURE GRATE FRAME IS SQUARE BEFORE DOING A FULL PENETRATION WELD TO ATTACH BACK STEEL ANGLE BAR.

LEGEND

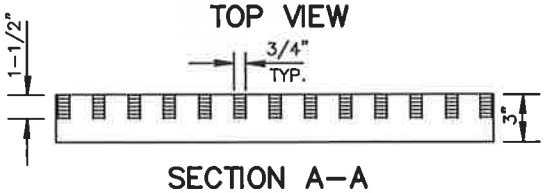
1. 1–1/2" x 3/4" STEEL BARS (TYP.).
2. 1/4" FILLET WELD ALL BARS 4 PLACES (TYP.).
3. WELD (4) 1/2"x3" STUDS.

2015

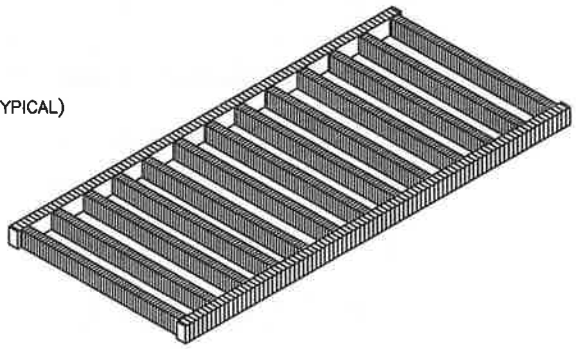
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CATCH BASIN GRATE TYPE II	STANDARD DRAWING NO. SD–610



TOP VIEW

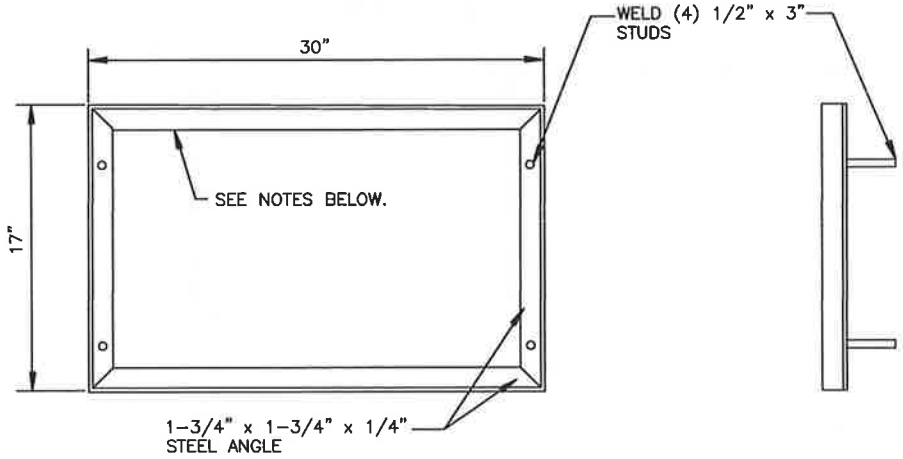


SECTION A-A



ISOMETRIC

GRATE TYPE III



TOP VIEW

END VIEW

GRATE FRAME DETAIL

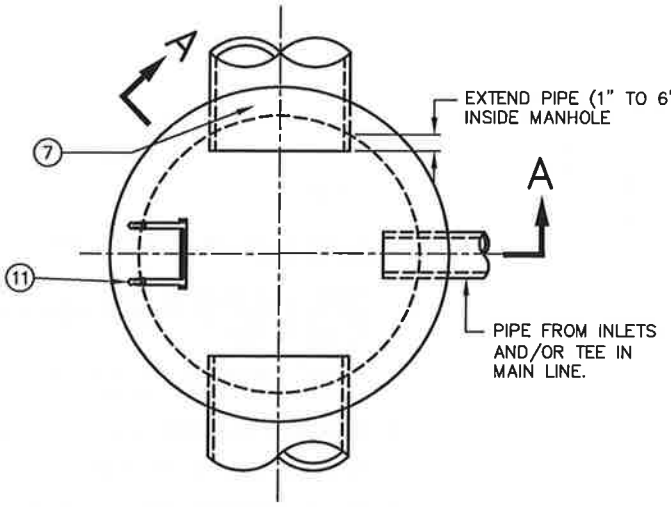
NOTES

(A) FOUR-SIDED FRAME IS REQUIRED.

(B) CONTRACTOR HAS THE OPTION OF WELDING THE BACK STEEL ANGLE BAR INTO PLACE AFTER SLIP FORMS FOR BOX HAVE BEEN REMOVED. ENSURE GRATE FRAME IS SQUARE BEFORE DOING A FULL PENETRATION WELD TO ATTACH BACK STEEL ANGLE BAR.

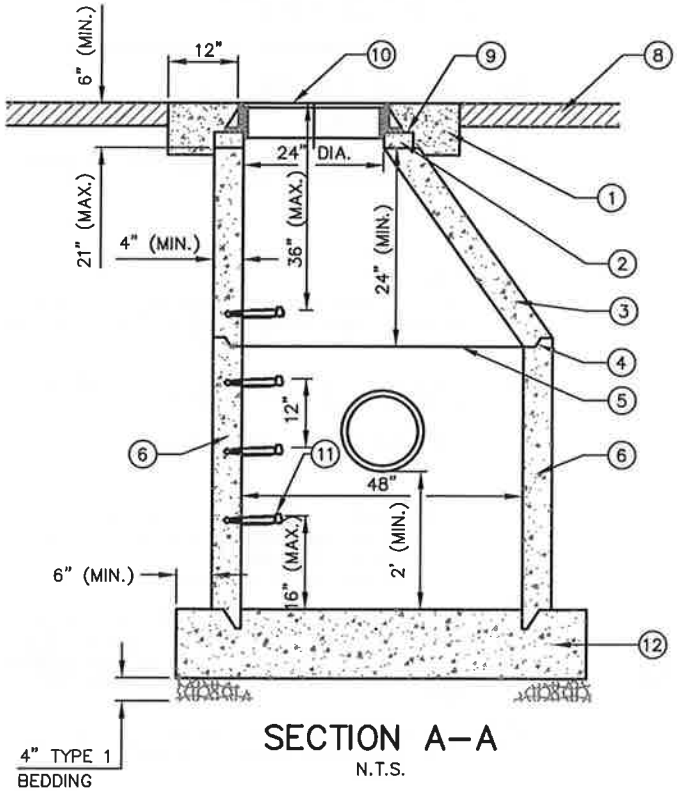
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CATCH BASIN GRATE TYPE III	STANDARD DRAWING NO. SD-610A



PLAN

N.T.S.



SECTION A–A

N.T.S.

LEGEND

(1) CONCRETE COLLAR IN PAVED STREET SECTIONS PER SD–616.

(2) GRADE RINGS GROUTED WATERTIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.

(3) PRECAST MONOLITHIC ECCENTRIC CONE SECTION. (REBAR NOT SHOWN).

(4) RAMNEK OR APPROVED GASKETS AT ALL JOINTS.

(5) PROPERLY ALIGN ALL INTERIOR JOINTS.

(6) PRECAST CONCRETE MANHOLE BARREL SECTION (REBAR NOT SHOWN).

(7) PRECAST GASKETED HUB RING OR RUBBER GASKETED COLLAR.

(8) SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AS SHOWN).

(9) FRAME TO BE GROUTED TO GRADE RINGS.

(10) FRAME AND COVER PER SD–617.

(11) MANHOLE STEPS.

(12) SEE SD–501 FOR CAST IN PLACE MANHOLE BASE. SEE SD–501A FOR PREFABRICATED BASE.

NOTES:

(A) OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–501A.

(B) PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

(C) FOR INLET PIPE DIAMETER, D, GREATER THAN 24", SEE SD–613 OR SD–614.

(D) MANHOLE FRAME AND COVER:
- A. REFER TO DRAWING NO. SD–617.
- B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.
- C. "STORM DRAIN" ON COVER.

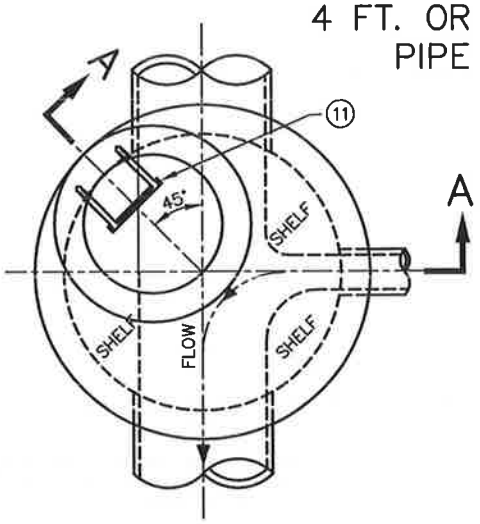
(E) WHERE PVC PIPE IS UTILIZED, INSTALL A RUBBER RING OR GASKET COLLAR WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

(F) EITHER BASE ON SD–501 OR SD–501A MAY BE USED WITH EITHER MANHOLE DESIGN.

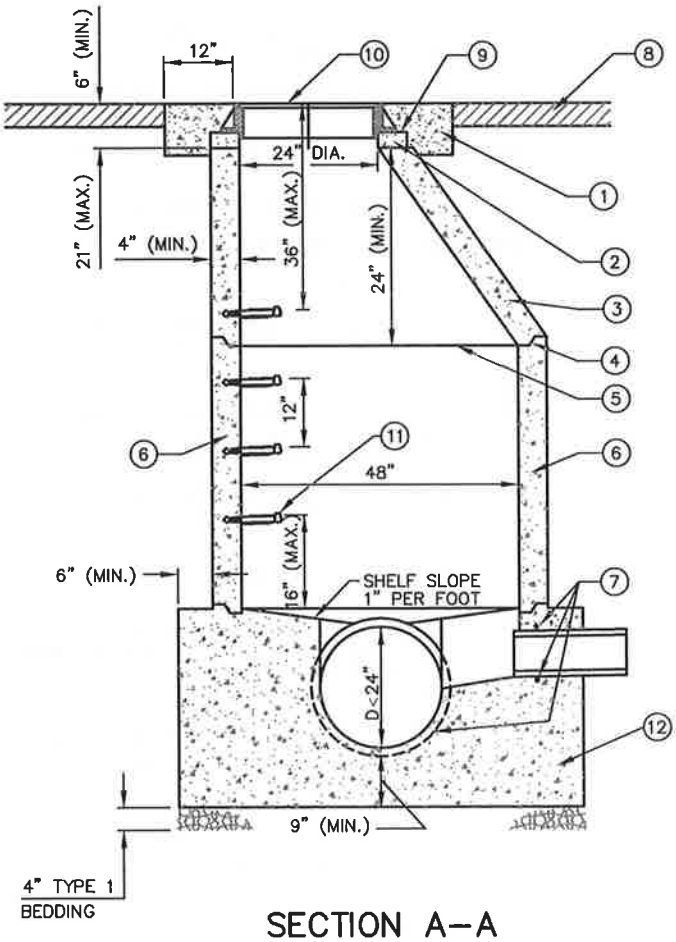
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD CONCRETE CATCH MANHOLE	STANDARD DRAWING NO. SD–611

4 FT. OR GREATER DEPTH, PIPE DIA. ≤ 24"



PLAN
N.T.S.



SECTION A–A
N.T.S.

LEGEND

1. CONCRETE COLLAR IN PAVED STREET SECTIONS PER SD–616.
2. GRADE RINGS GROUTED WATERTIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.
3. PRECAST MONOLITHIC ECCENTRIC CONE SECTION. (REBAR NOT SHOWN).
4. RAMNEK OR APPROVED GASKETS AT ALL JOINTS.
5. PROPERLY ALIGN ALL INTERIOR JOINTS.
6. PRECAST CONCRETE MANHOLE BARREL SECTION (REBAR NOT SHOWN) 54"–72" RCP.
7. PRECAST GASKETED HUB RING OR RUBBER GASKETED COLLAR.
8. SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).
9. FRAME TO BE GROUTED TO GRADE RINGS.
10. FRAME AND COVER PER SD–617.
11. MANHOLE STEPS.
12. CAST–IN–PLACE MANHOLE BASE. SEE SD–501A FOR PREFABRICATED BASE.

NOTES:

A. OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–501A.

B. PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

C. FOR DIAMETER, D, GREATER THAN 24", SEE SD–613 OR SD–614.

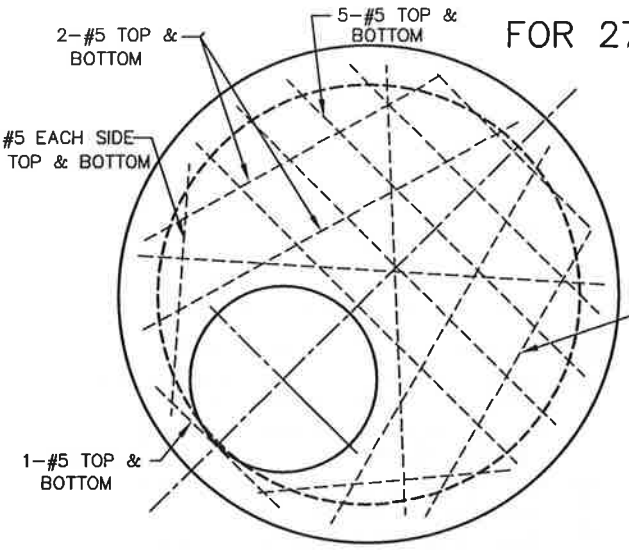
D. MANHOLE FRAME AND COVER:
   A. REFER TO DRAWING NO. SD–617.
   B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.
   C. "STORM DRAIN" ON COVER.

E. WHERE PVC PIPE IS UTILIZED, INSTALL A RUBBER RING OR GASKET COLLAR WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

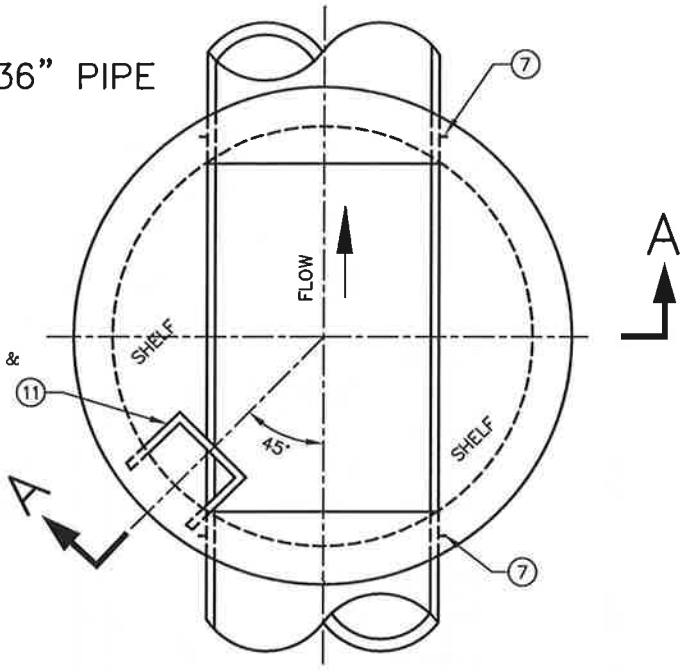
F. EITHER BASE ON SD–501 OR SD–501A MAY BE USED WITH EITHER MANHOLE DESIGN.

2015

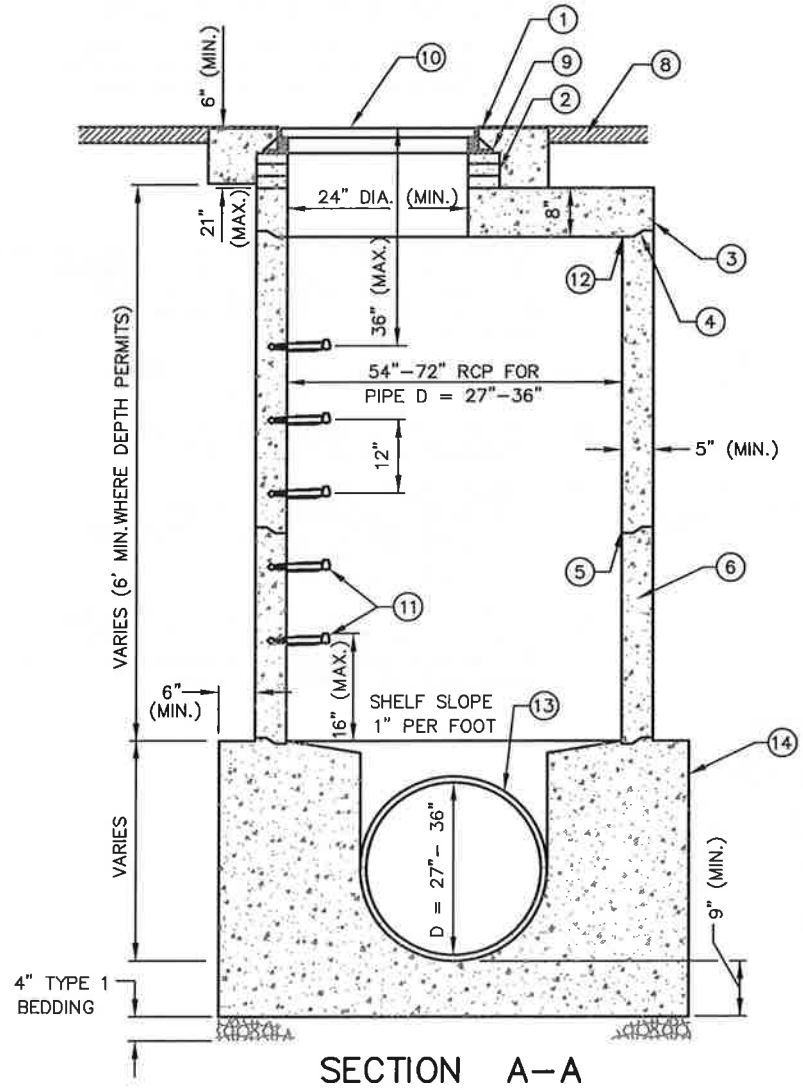
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE TYPE A	STANDARD DRAWING NO. SD–612



STANDARD REDUCER SLAB TOP DETAILS
N.T.S.



PLAN
N.T.S.



SECTION A–A
N.T.S.

LEGEND

1. CONCRETE COLLAR IN PAVED AND GRAVEL AREAS PER SD–616.
2. GROUT GRADE RINGS WATERTIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.
3. REINFORCED CONCRETE REDUCER SLAB.
4. RAMNEK OR APPROVED GASKETS AT ALL JOINTS.
5. PROPERLY ALIGN ALL INTERIOR JOINTS.
6. PRECAST CONCRETE MANHOLE BARREL SECTION (REBAR NOT SHOWN) 54"–72" RCP.
7. PRECAST GASKETED HUB RING OR RUBBER GASKETED COLLAR.
8. SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).
9. FRAME TO BE GROUTED TO GRADE RINGS.
10. FRAME AND COVER PER SD–617.
11. MANHOLE STEPS.
12. GROUT SMOOTH ALL INTERIOR JOINTS.
13. CUT OUT RCP MANHOLE TO CONFORM TO PIPE.
14. CAST–IN–PLACE MANHOLE BASE. SEE SD–502A FOR PREFABRICATED BASE.

NOTES:

(A) OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–502A.

(B) PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

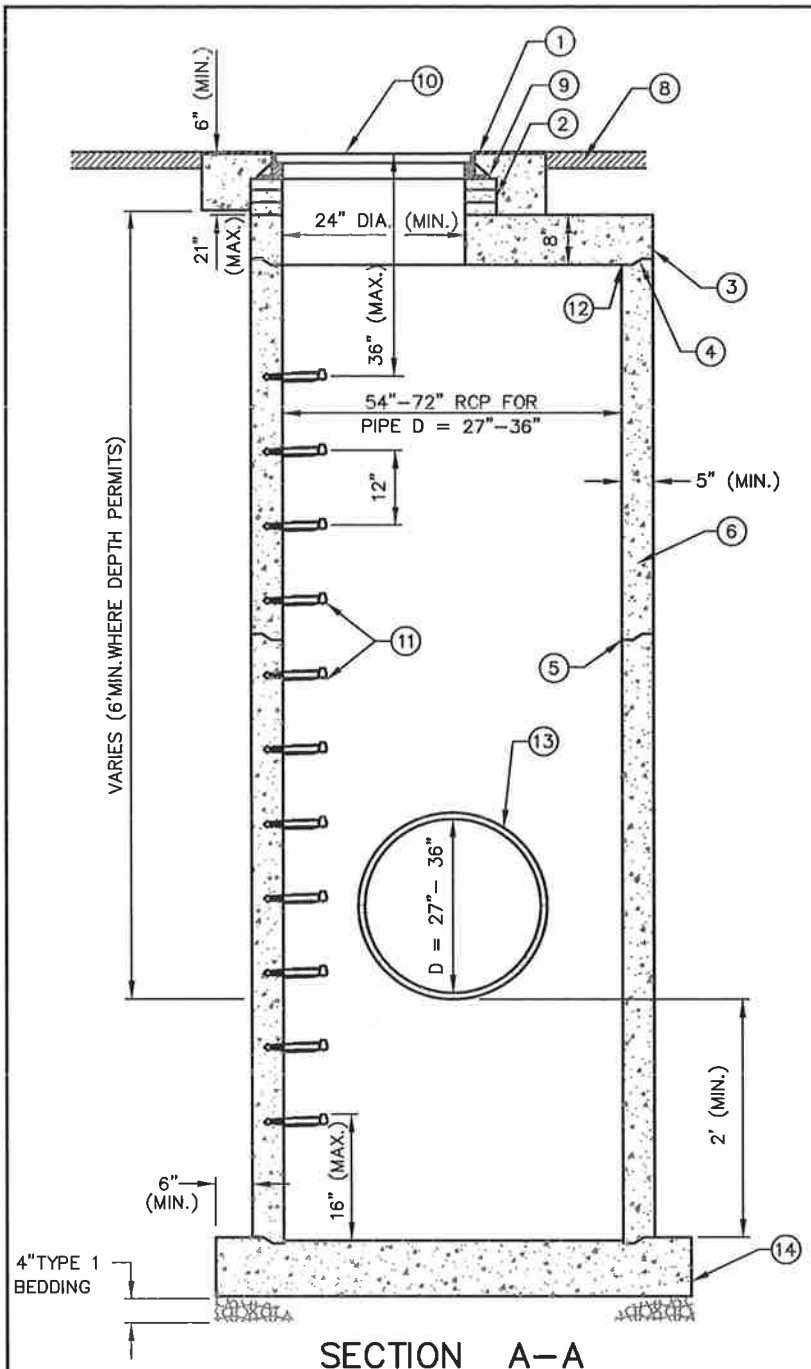
(C) FOR EXTRA DEPTH MANHOLE, SEE SD–614 "STANDARD MANHOLE TYPE B, DEEP".

(D) MANHOLE FRAME AND COVER:
- A. REFER TO DRAWING NO. SD–617.
- B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.
- C. "STORM DRAIN" ON COVER.

(E) WHERE PVC IS UTILIZED, INSTALL A RUBBER RING OR GASKET COLLAR WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE TYPE B	STANDARD DRAWING NO. SD–613



SECTION A–A
N.T.S.

LEGEND

1. CONCRETE COLLAR IN PAVED AND GRAVEL AREAS PER SD–616.
2. GROUT GRADE RINGS WATERTIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.
3. REINFORCED CONCRETE REDUCER SLAB.
4. RAMNEK OR APPROVED GASKETS AT ALL JOINTS.
5. PROPERLY ALIGN ALL INTERIOR JOINTS.
6. PRECAST CONCRETE MANHOLE BARREL SECTION (REBAR NOT SHOWN) 54"–72" RCP.
7. PRECAST GASKETED HUB RING OR RUBBER GASKETED COLLAR.
8. SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).
9. FRAME TO BE GROUTED TO GRADE RINGS.
10. FRAME AND COVER PER SD–617.
11. MANHOLE STEPS.
12. GROUT SMOOTH ALL INTERIOR JOINTS.
13. CUT OUT RCP MANHOLE TO CONFORM TO PIPE.
14. CAST–IN–PLACE MANHOLE BASE. SEE SD–502A FOR PREFABRICATED BASE FOR SANITARY SEWER ONLY. THIS DOES NOT APPLY TO STORM DRAIN MANHOLES.

NOTES:

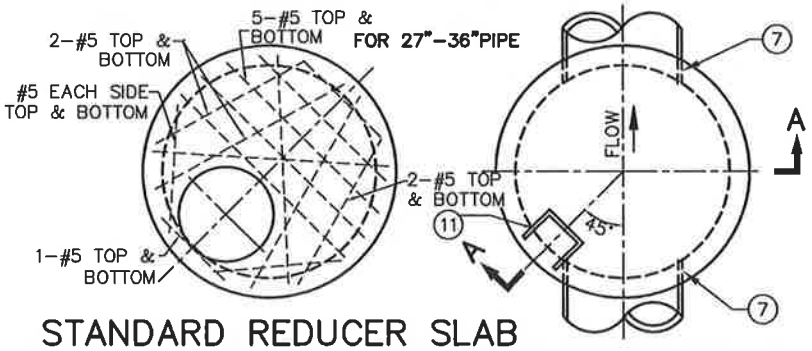
(A) OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–502A FOR SANITARY SEWER ONLY. THIS DOES NOT APPLY TO STORM DRAIN MANHOLES.

(B) PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

(C) FOR EXTRA DEPTH MANHOLE, SEE SD–614 "STANDARD MANHOLE TYPE B, DEEP".

(D) MANHOLE FRAME AND COVER:
- A. REFER TO DRAWING NO. SD–617.
- B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.
- C. "STORM DRAIN" ON COVER.

(E) WHERE PVC IS UTILIZED, INSTALL A RUBBER RING OR GASKET COLLAR WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

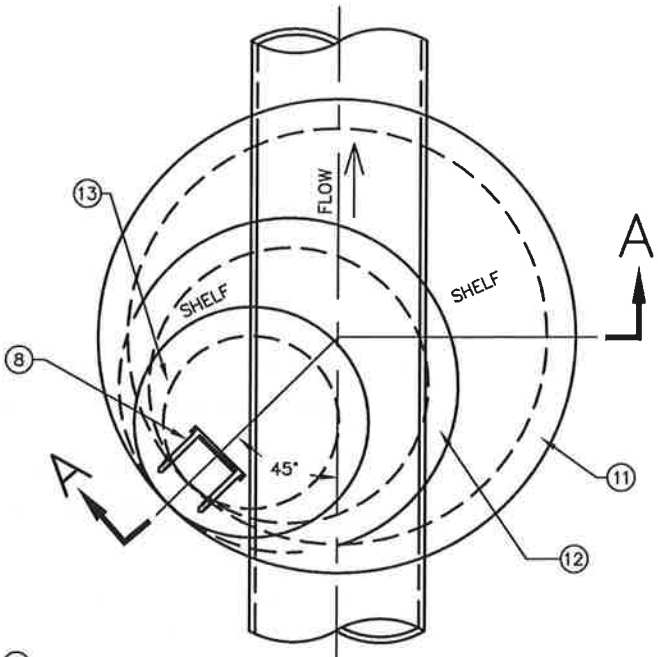


STANDARD REDUCER SLAB TOP DETAILS
N.T.S.

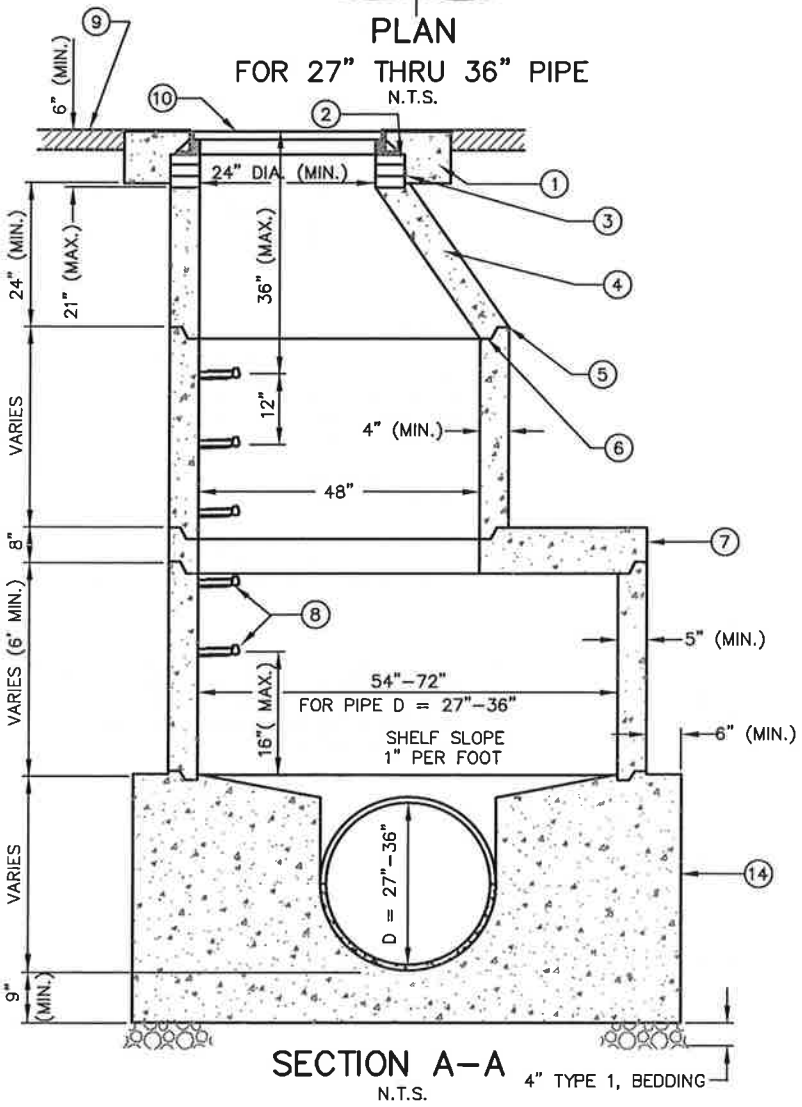
PLAN
N.T.S.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE TYPE B – RAISED INVERT	STANDARD DRAWING NO. SD–613A



PLAN
FOR 27" THRU 36" PIPE
N.T.S.



SECTION A-A
N.T.S.

LEGEND

1. CONCRETE COLLAR IN PAVED AND GRAVEL STREET SECTIONS PER SD-616.
2. FRAME TO BE GROUTED TO GRADE RINGS.
3. GRADE RINGS GROUT WATER TIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.
4. PRECAST MONOLITHIC ECCENTRIC CONE.
5. RAMNEK OR APPROVED GASKETS AT ALL JOINTS.
6. PROPERLY ALIGN ALL INTERIOR JOINTS.
7. REINFORCED CONCRETE REDUCER SLAB AS APPROVED BY THE ENGINEER.
8. MANHOLE STEPS.
9. SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).
10. FRAME AND COVER PER SD-617.
11. 54" RCP THRU 72" PIPE.
12. 48" DIAMETER BARREL SECTION.
13. GRADE RINGS.
14. CAST-IN-PLACE MANHOLE BASE. SEE SD-502A FOR PREFABRICATED BASE.

NOTES:

A. OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD-502A.

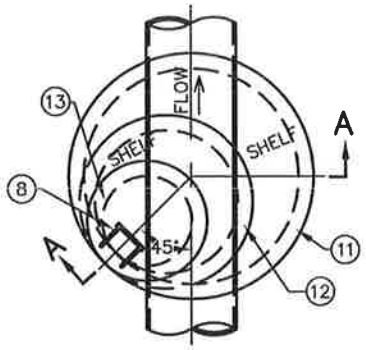
B. PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

C. MANHOLE FRAME AND COVER:
   A. REFER TO DRAWING NO. SD-617.
   B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.
   C. "STORM DRAIN" ON COVER.

D. WHERE PVC IS UTILIZED, A RUBBER RING OR GASKET COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

2015

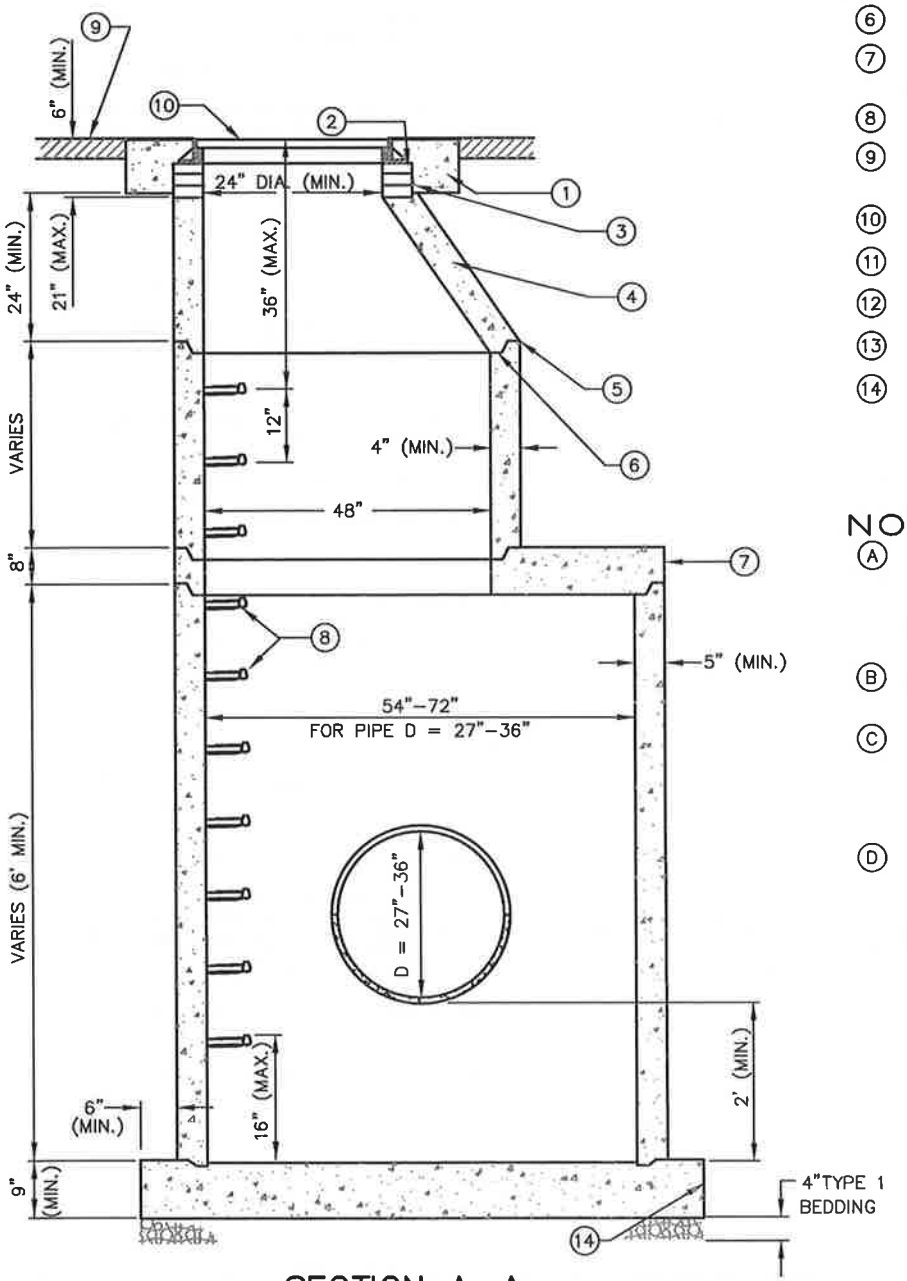
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE TYPE B, DEEP	STANDARD DRAWING NO. SD-614



PLAN

FOR 27" THRU 36" PIPE

N.T.S.



SECTION A–A

N.T.S.

LEGEND

1. CONCRETE COLLAR IN PAVED AND GRAVEL STREET SECTIONS PER SD–616.
2. FRAME TO BE GROUTED TO GRADE RINGS.
3. GRADE RINGS GROUT WATER TIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.
4. PRECAST MONOLITHIC ECCENTRIC CONE.
5. RAMNEK OR APPROVED GASKETS AT ALL JOINTS.
6. PROPERLY ALIGN ALL INTERIOR JOINTS.
7. REINFORCED CONCRETE REDUCER SLAB AS APPROVED BY THE ENGINEER.
8. MANHOLE STEPS.
9. SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).
10. FRAME AND COVER PER SD–617.
11. 54" RCP THRU 72" PIPE.
12. 48" DIAMETER BARREL SECTION.
13. GRADE RINGS.
14. CAST–IN–PLACE MANHOLE BASE. SEE SD–502A FOR PREFABRICATED BASE FOR SANITARY SEWER ONLY. THIS DOES NOT APPLY TO STORM DRAIN MANHOLES.

NOTES:

A. OPTIONAL PREFABRICATED MANHOLE BASE WITH APPROVED PIPE CONNECTIONS MAY BE USED WITH ENGINEERS APPROVAL, SEE SD–502A FOR SANITARY SEWER ONLY. THIS DOES NOT APPLY TO STORM DRAIN MANHOLES.

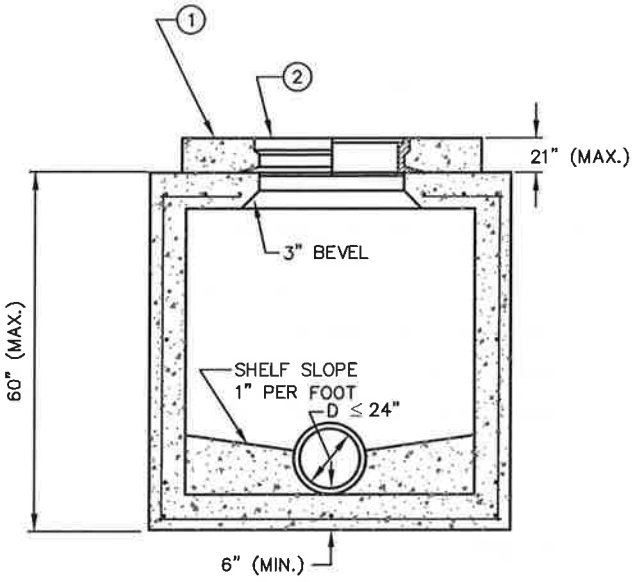
B. PLACE VERTICAL WALL ON UPSTREAM SIDE OF MANHOLE, ROTATED 45 DEGREES.

C. MANHOLE FRAME AND COVER:
   A. REFER TO DRAWING NO. SD–617.
   B. FRAME AND COVER SHALL BE FLUSH WITH SLOPE OF PAVEMENT.
   C. "STORM DRAIN" ON COVER.

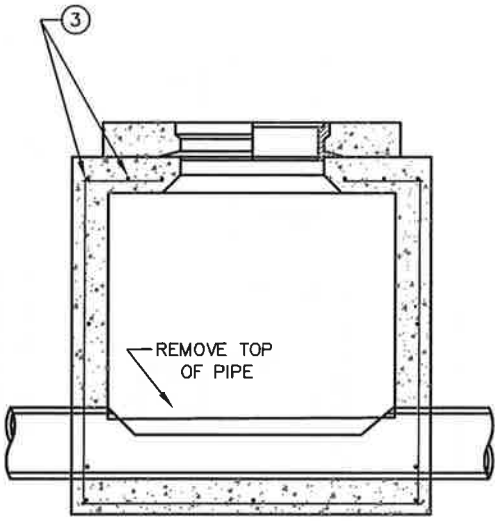
D. WHERE PVC IS UTILIZED, A RUBBER RING OR GASKET COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE BASE AND/OR MANHOLE CHANNEL, IN ORDER TO INSURE A WATERTIGHT SEAL.

2015

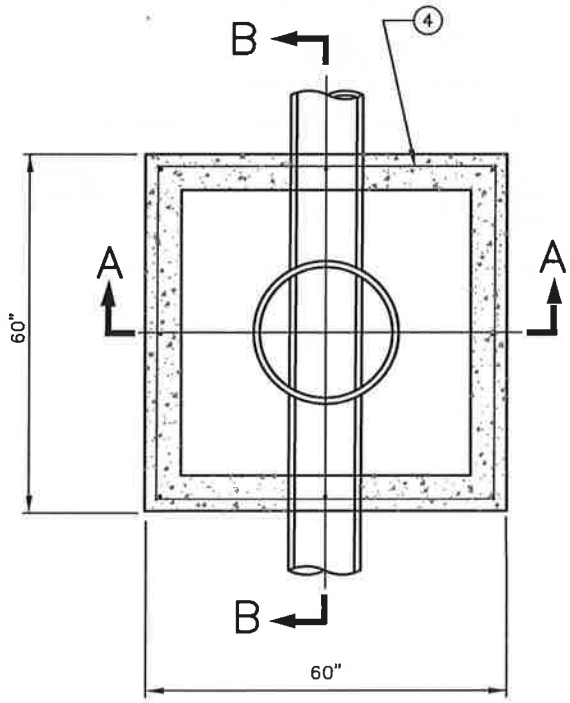
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE TYPE B DEEP – RAISED INVERT	STANDARD DRAWING NO. SD–614A



SECTION A–A
N.T.S.



SECTION B–B
N.T.S.



TOP VIEW
NTS

LEGEND

(1) CONCRETE COLLAR PER SD–616.

(2) FRAME AND COVER WITH GRADE RINGS AS REQUIRED.

(3) #4 BARS 6" O.C BOTH WAYS, CUT TO MISS OPENING IN TOP.

(4) #4 BARS ALL CORNERS AND 24" O.C.

NOTES:

(A) ALL WALLS AND BOTTOM MINIMUM 6" THICK.

(B) USE WITH MANHOLES GREATER THAN 30" DEEP AND LESS THAN 48" DEEP TO FLOWLINE OF PIPE.

(C) A CONCENTRIC CONE SECTION TO BE USED FOR STANDARD SHALLOW MANHOLES PER SD–612.

(D) MANHOLE FRAME AND COVER:
- A. PER SD–617.
- B. FRAME AND COVER SHALL BE FLUSH WITH FINISH GRADE OF PAVEMENT.
- C. "STORM DRAIN" ON COVER.

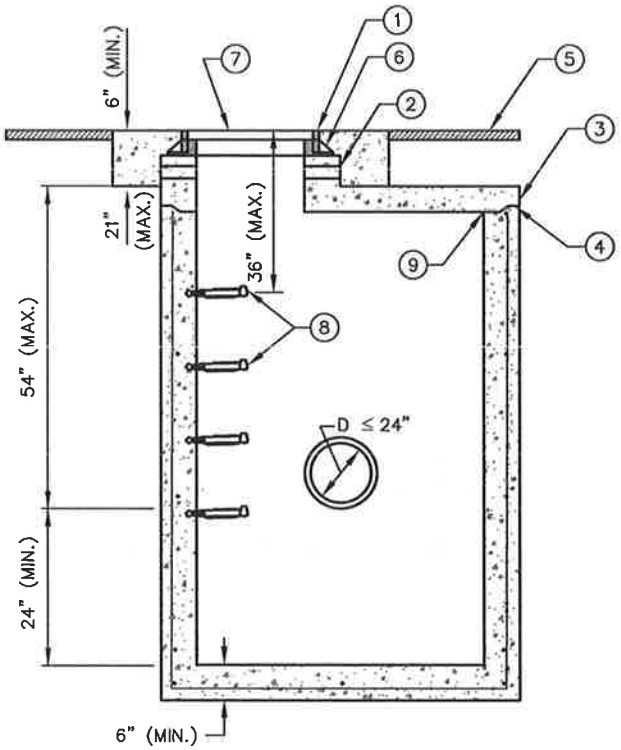
(E) USE WITH 8" DIAMETER THROUGH 24" DIAMETER PIPE ONLY.

(F) WHERE PVC IS UTILIZED, A RUBBER RING OR GASKETED COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE CHANNEL, IN ORDER TO INSURE WATERTIGHT SEAL.

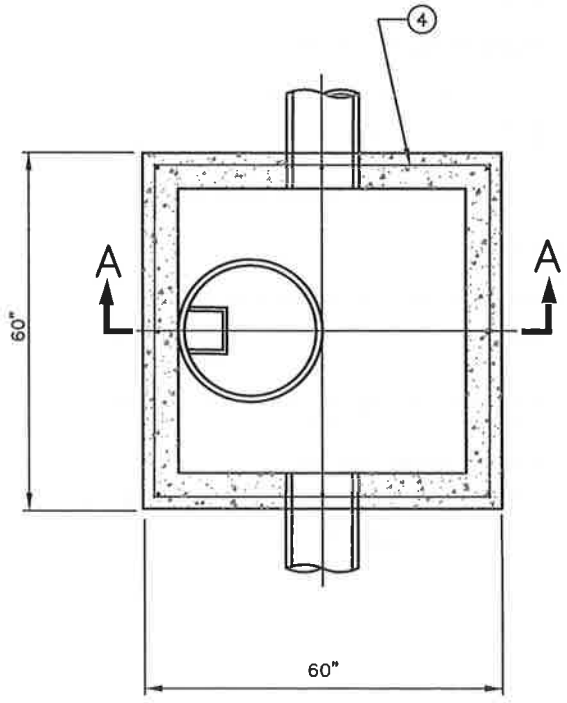
(G) SHALLOW MANHOLE TYPE 1 SUBJECT TO ENGINEER'S APPROVAL.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	SHALLOW MANHOLE TYPE 1	STANDARD DRAWING NO. SD–615



SECTION A–A
N.T.S.



TOP VIEW
N.T.S.

LEGEND

(1) CONCRETE COLLAR IN PAVED AND GRAVEL AREAS PER SD–616.

(2) GROUT GRADE RINGS WATERTIGHT IN PLACE, NOT TO EXCEED 21" FROM FINISHED SURFACE TO TOP OF CONE.

(3) REINFORCED CONCRETE REDUCER SLAB.

(4) RAMNEK OR APPROVED GASKETS AT ALL JOINTS.

(5) SURFACING TO MATCH FLUSH WITH EXISTING SURFACING (AC SHOWN).

(6) FRAME TO BE GROUTED TO GRADE RINGS.

(7) FRAME AND COVER PER SD–617.

(8) MANHOLE STEPS.

(9) GROUT SMOOTH ALL INTERIOR JOINTS.

NOTES:

(A) ALL WALLS AND BOTTOM MINIMUM 6" THICK.

(B) USE WITH MANHOLES GREATER THAN 30" DEEP AND LESS THAN 48" DEEP TO FLOWLINE OF PIPE.

(C) A CONCENTRIC CONE SECTION TO BE USED FOR STANDARD SHALLOW MANHOLES PER SD–612.

(D) MANHOLE FRAME AND COVER:
- A. PER SD–617.
- B. FRAME AND COVER SHALL BE FLUSH WITH FINISH GRADE OF PAVEMENT.
- C. "STORM DRAIN" ON COVER.

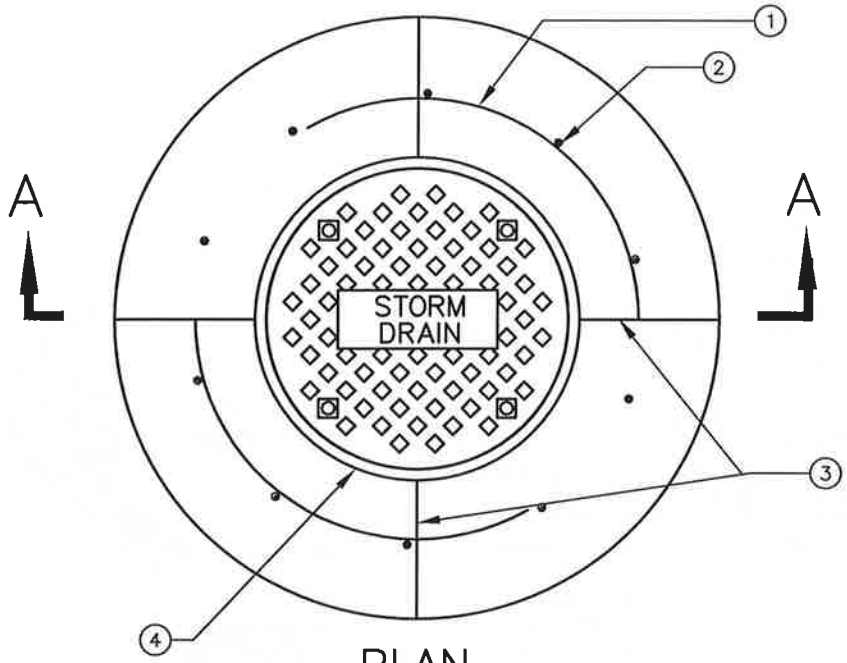
(E) USE WITH 8" DIAMETER THROUGH 24" DIAMETER PIPE ONLY.

(F) WHERE PVC IS UTILIZED, A RUBBER RING OR GASKETED COLLAR IS TO BE INSTALLED WHERE THE PIPE IS IN CONTACT WITH MANHOLE CHANNEL, IN ORDER TO INSURE WATERTIGHT SEAL.

(G) SHALLOW MANHOLE TYPE 1 SUBJECT TO ENGINEER'S APPROVAL.

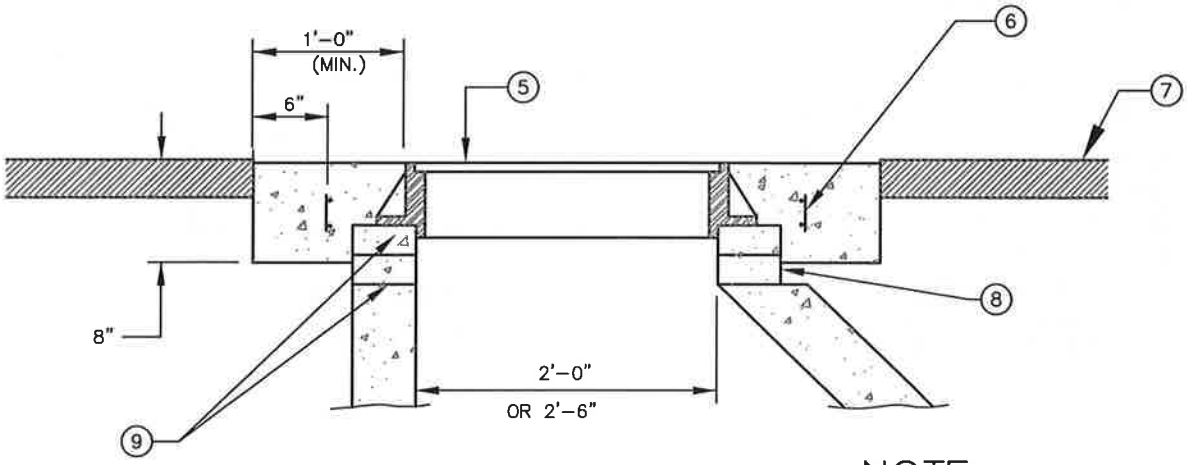
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	SHALLOW MANHOLE TYPE 1 – RAISED INVERT	STANDARD DRAWING NO. SD–615A



PLAN

N.T.S.



SECTION A-A

N.T.S.

NOTE:

(A) TOP OF COLLAR TO BE FLUSH WITH MANHOLE COVER.

(B) FIBER-REINFORCED CONCRETE MAY BE USED IN LIEU OF REBAR WITH ENGINEER'S APPROVAL.

LEGEND

(1) #4 REBAR (2 EACH) SEE SECTION A-A).

(2) #4 REBAR AT 20" SPACING.

(3) SCORES.

(4) RIM.

(5) FRAME AND COVER PER SD-617.

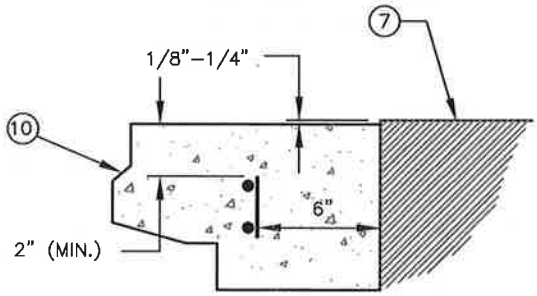
(6) SEE "DETAIL A" FOR REBAR IN COLLAR.

(7) FINISHED GRADE.

(8) SEE OTHER STANDARD DRAWINGS OF MANHOLES FOR MAXIMUM HEIGHT.

(9) GROUT BETWEEN RING AND COVER AND GRADE RINGS.

(10) FRIBILLATED POLYPROPYLENE FIBER (ADDED PER MANUFACTURER'S RECOMMENDATIONS) MAY BE USED IN LIEU OF #4 REBAR IN CONCRETE COLLARS.

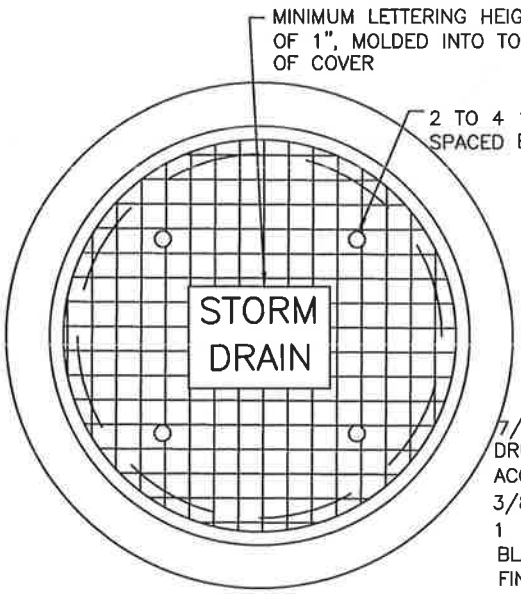


DETAIL A

N.T.S.

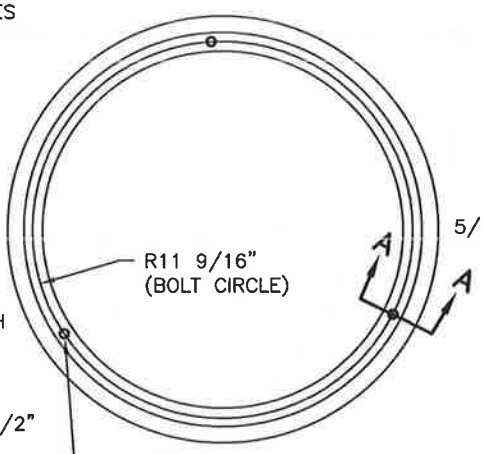
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	MANHOLE COLLAR	STANDARD DRAWING NO. SD-616

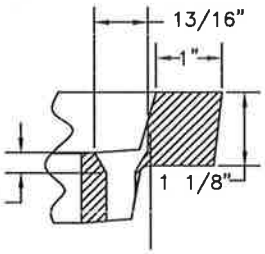


TOP VIEW
MANHOLE COVER & FRAME

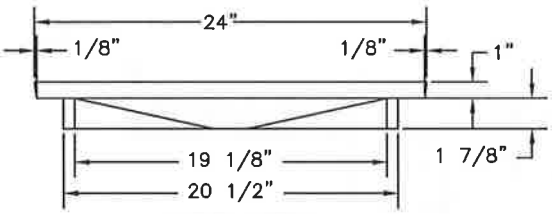
7/16 THROUGH DRILL TO ACCOMODATE 3/8" x 16TPI 1 1/2" – 2 1/2" BLACKHAWKS FINISH–FLAT COUNTERSUNK SOCKET HEAD (3) REQ'D. (EQ. SP.)



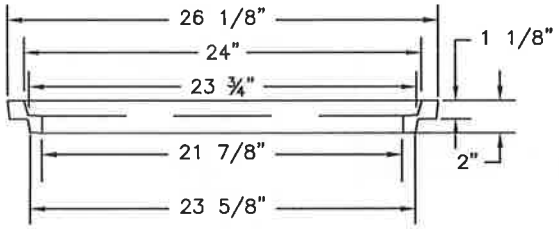
TOP VIEW
MANHOLE RISER



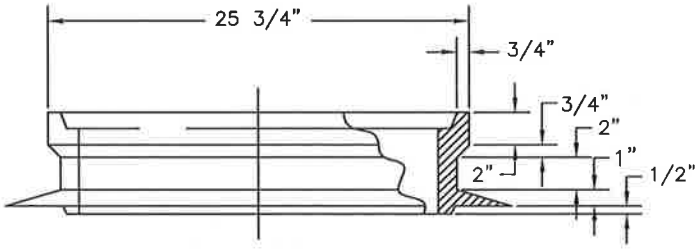
SECTION A–A
SCALE: X4



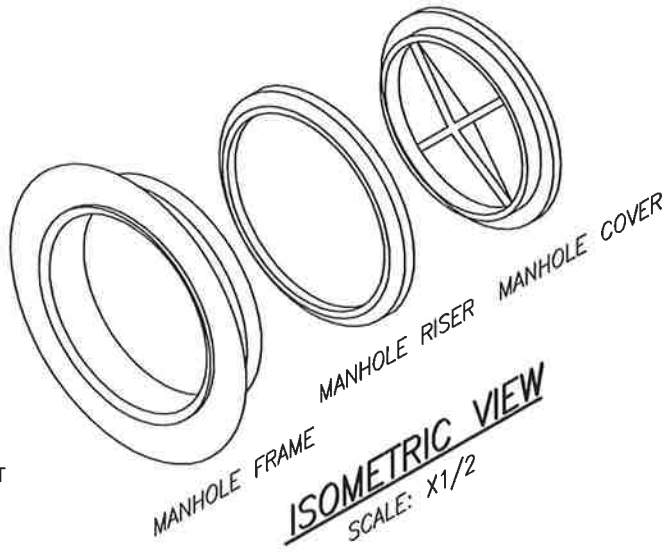
SIDE VIEW
MANHOLE COVER
MIN. WEIGHT 93 LBS



SIDE VIEW
MANHOLE RISER



SIDE VIEW
MANHOLE COVER FRAME
MIN. WEIGHT 147 LBS



ISOMETRIC VIEW
SCALE: X1/2

NOTES:

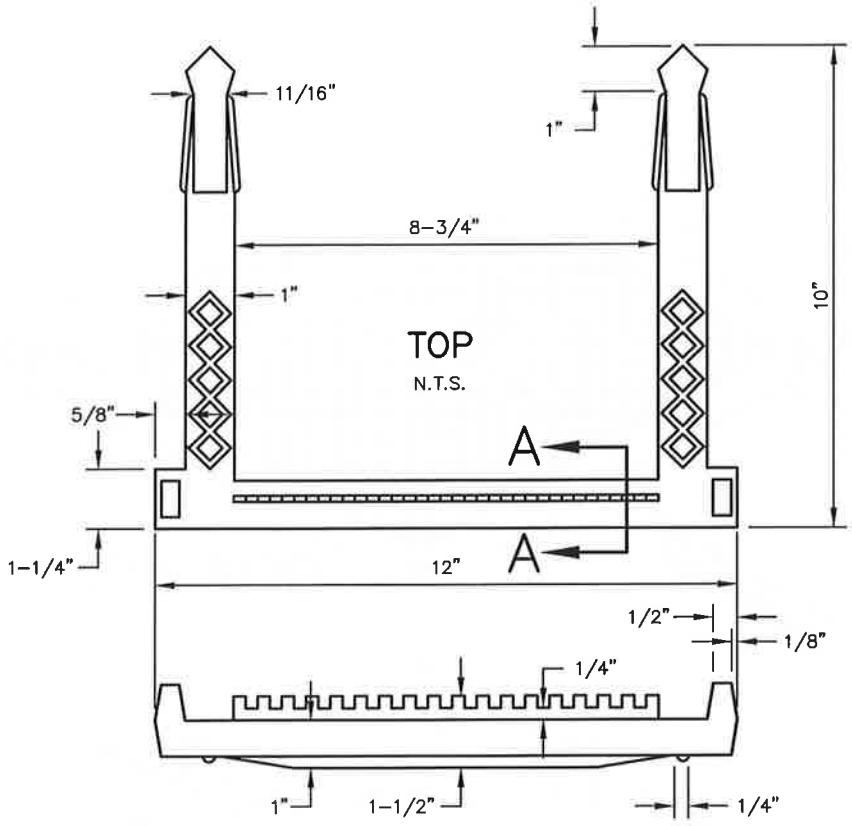
(A) FIBERGLASS DUST PAN REQUIRED ON ALL MANHOLES THAT ARE NOT ON PAVED STREETS.

(B) MANHOLE FRAMES & COVERS SHALL HAVE A TOLERANCE OF 1/8"±. COVERS SHALL NOT BE WARPED AND ANY THAT ARE, UPON TRAVEL SHALL BE REPLACED. MACHINE ALL MATCHING SURFACES.

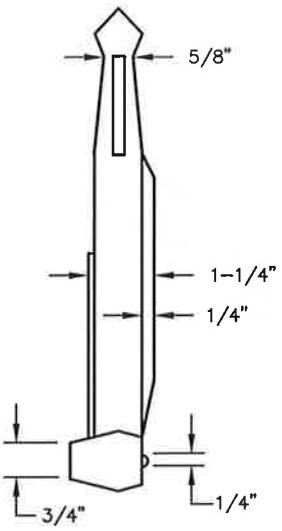
(C) REFER TO SD–507A FOR MANHOLE COVER AND FLAT FRAME (30" OPENING).

2015

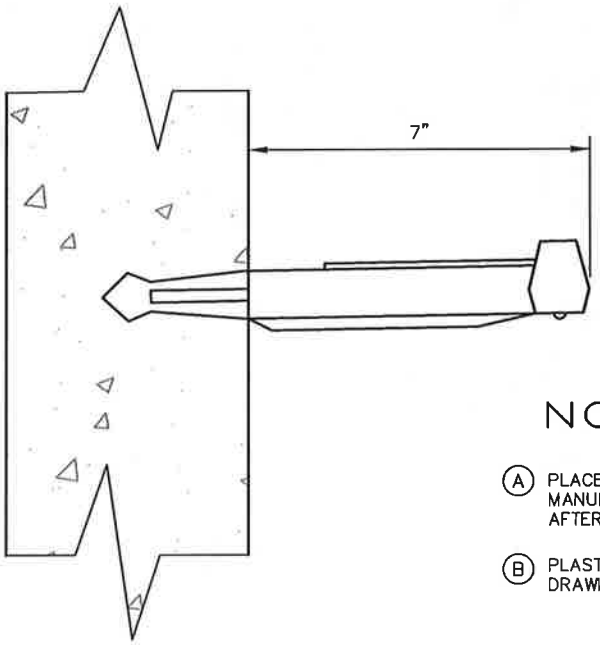
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD MANHOLE FRAME, COVER AND RISER	STANDARD DRAWING NO. SD–617



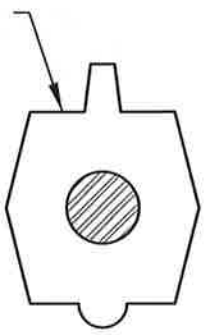
FRONT
N.T.S.



SIDE
N.T.S.



STEP IN MH WALL
N.T.S.



SECTION A-A
N.T.S.

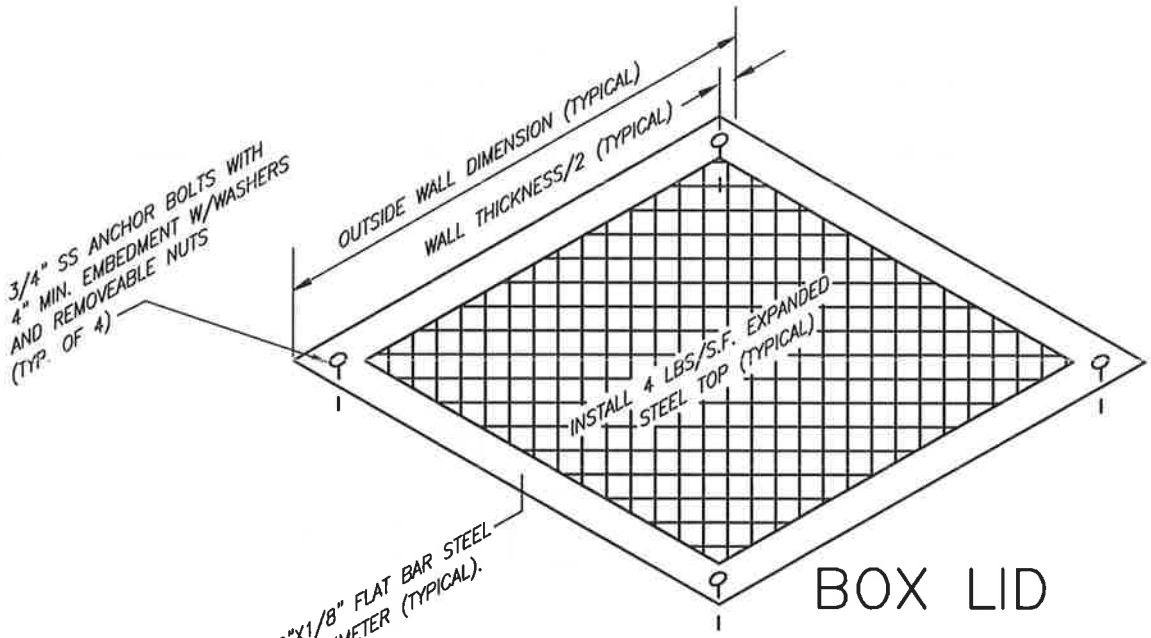
NOTES:

(A) PLACE INTO WET CONCRETE WALL DURING MANUFACTURE OR MORTAR INTO HOLES AFTER CONCRETE HAS SET.

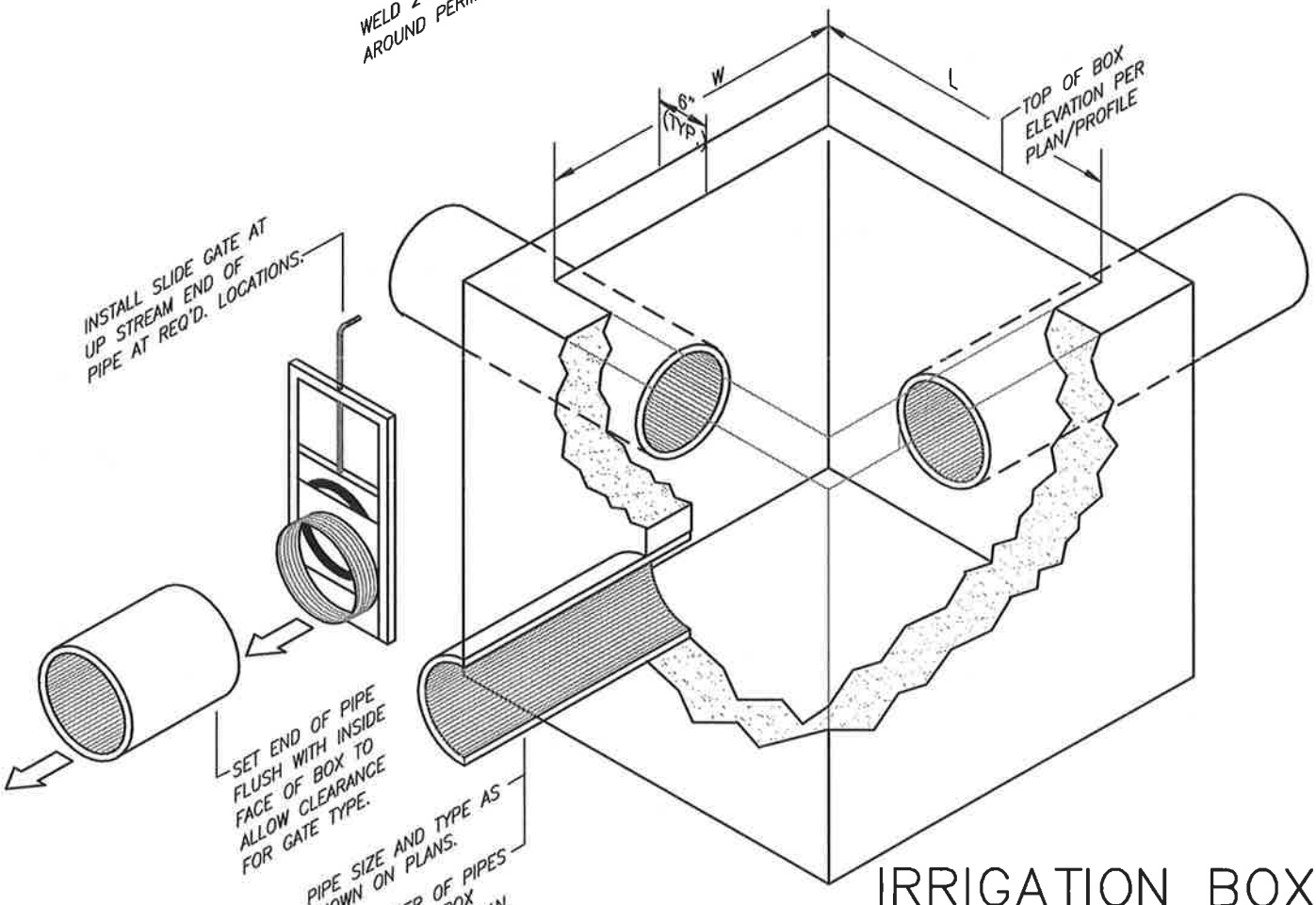
(B) PLASTIC COATED STEPS AS PER THIS STANDARD DRAWING OR AS APPROVED BY THE ENGINEER.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PLASTIC COATED MANHOLE STEPS	STANDARD DRAWING NO. SD-618



BOX LID



IRRIGATION BOX

NOTE:

(A) PLACE SUFFICIENT REINFORCING STEEL TO ALLOW FOR SITE SPECIFIC LOADING CONDITIONS AND ACCOMMODATE PIPE PENETRATIONS.

(B) TYPICAL MANUFACTURER'S SIZING REFERS TO STRUCTURE INTERIOR DIMENSIONS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD IRRIGATION BOX	STANDARD DRAWING NO. SD-619

NOTE:

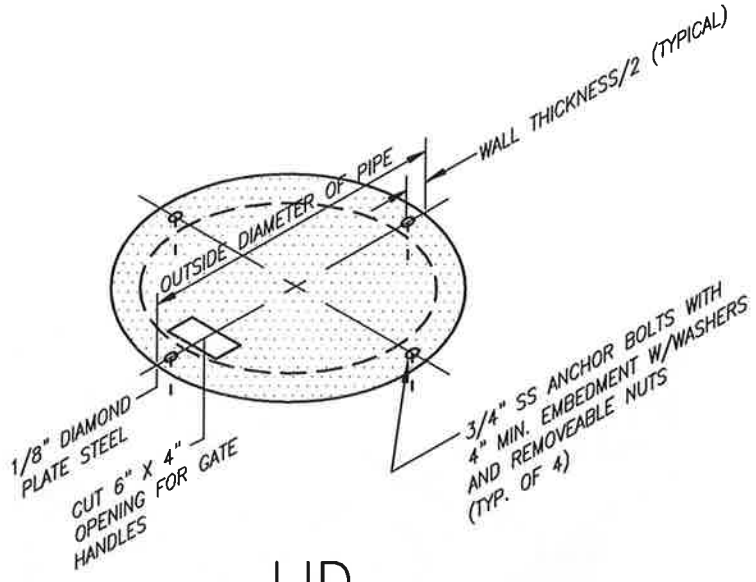
(A) PLACE SUFFICIENT REINFORCING STEEL TO ALLOW FOR SITE SPECIFIC LOADING CONDITIONS AND PER ASTM C-478.

(B) DIAMETER OF STAND PIPE TO BE REQUIRED TO ALLOW FOR SLIDE GATE AND PIPE CLEARANCE, 30" MIN.

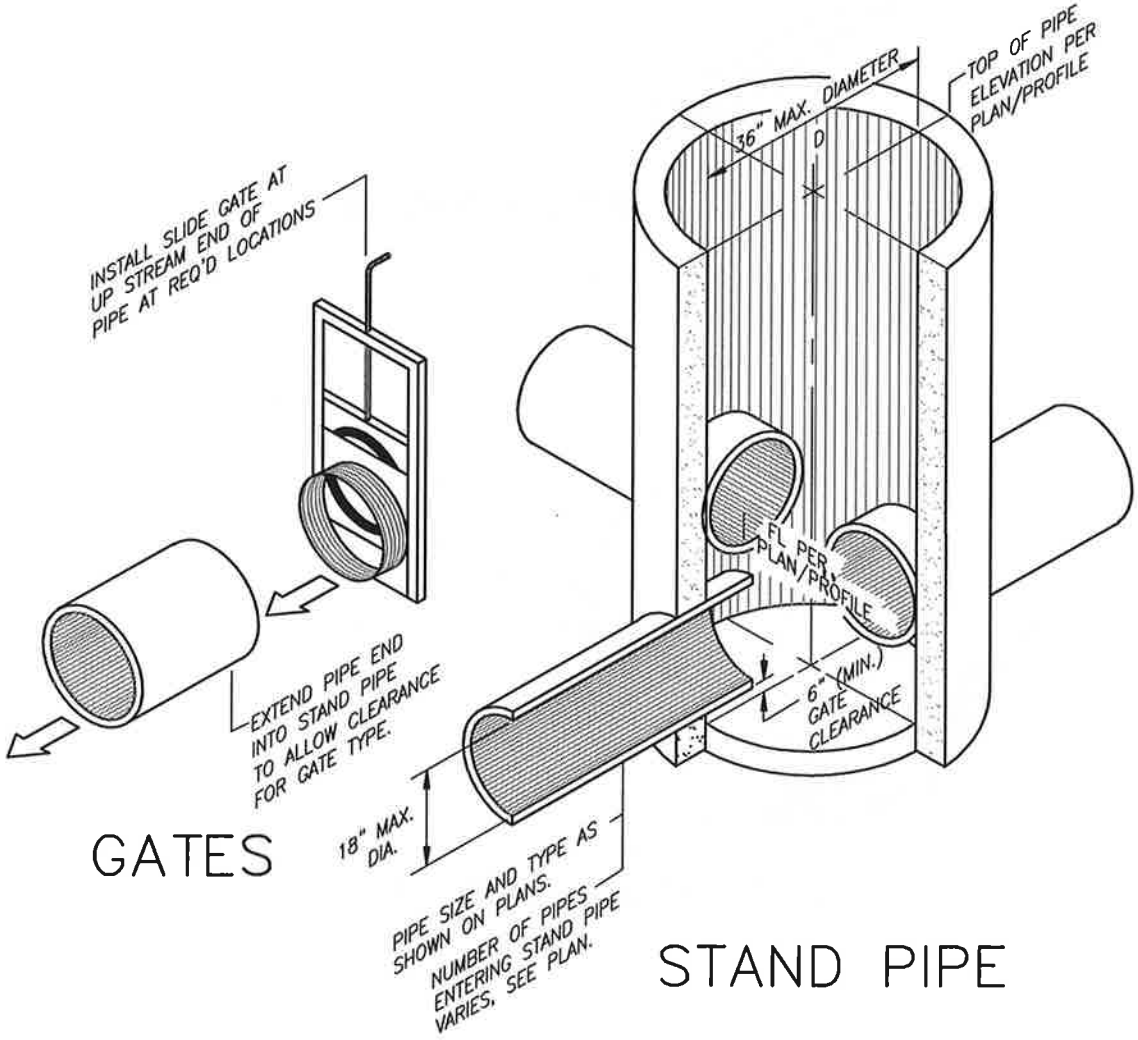
(C) MAXIMUM 18" DIAMETER INLET-OUTLET PIPE.

(D) MINIMUM 6" GATE CLEARANCE.

(E) TYPICAL MANUFACTURER'S SIZING REFERS TO STRUCTURE INTERIOR DIMENSIONS.



LID

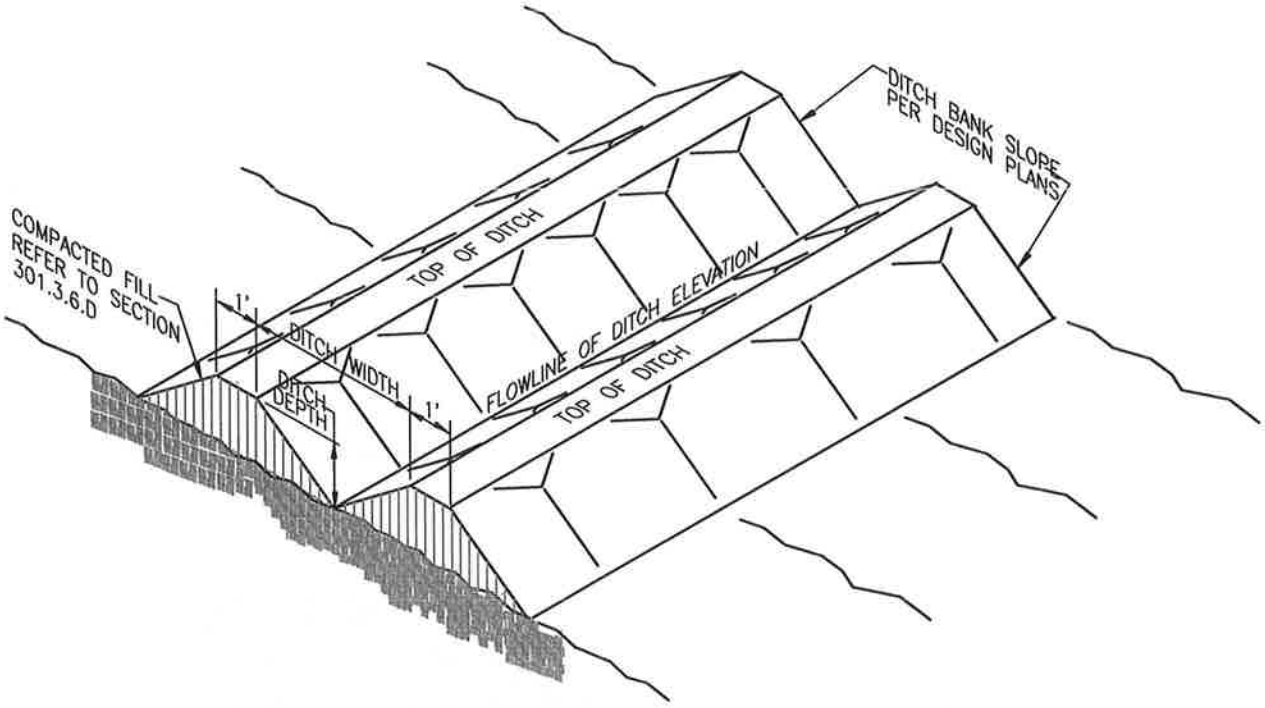


GATES

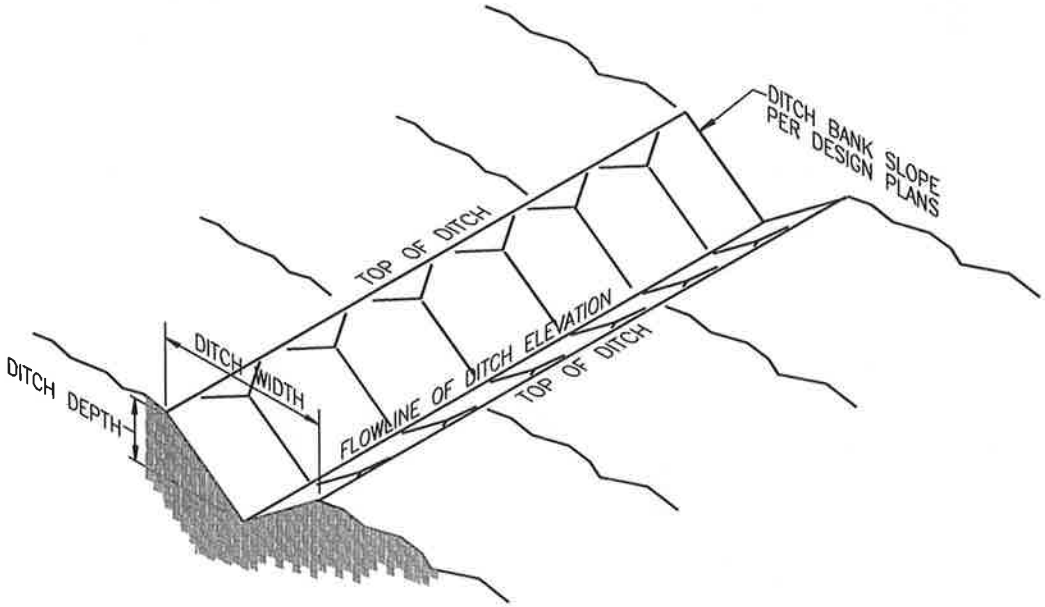
STAND PIPE

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD IRRIGATION STAND PIPE	STANDARD DRAWING NO. SD-620



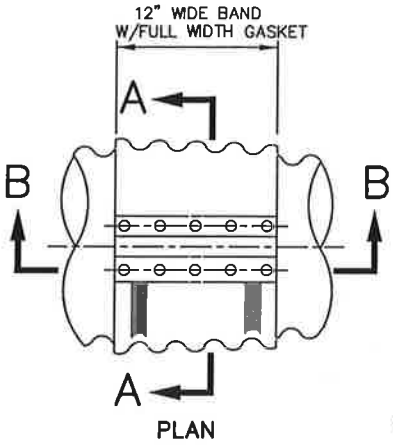
ELEVATED DITCH–TYPE B



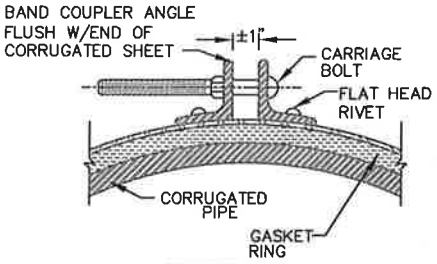
CUT DITCH–TYPE A

2015

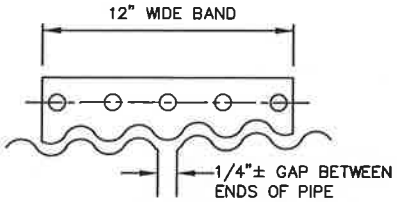
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	IRRIGATION DITCHES	STANDARD DRAWING NO. SD–621



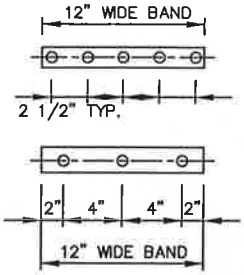
PLAN



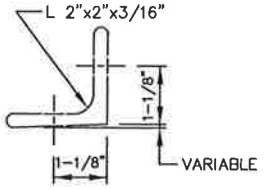
SECTION A–A



SECTION B–B

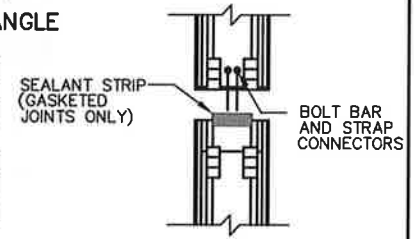


BAND COUPLER ANGLE



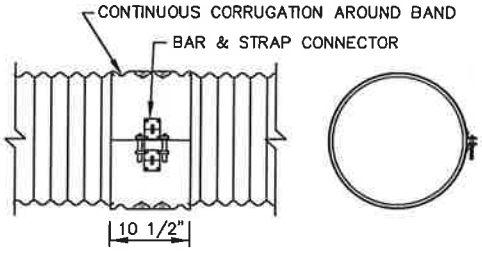
ANGLE DETAIL

	PIPE ø	GASKETø
ONE PIECE BAND	8"	8 1/4"
	10"	10 1/4"
	12"	12 1/4"
	15"	15"
	18"	18"
	21"	20 1/4"
	24"	23 1/8"
	30"	29"
TWO PIECE BAND	36"	35"
	42"	40 1/2"
	54"	51 1/2"
	60"	57"



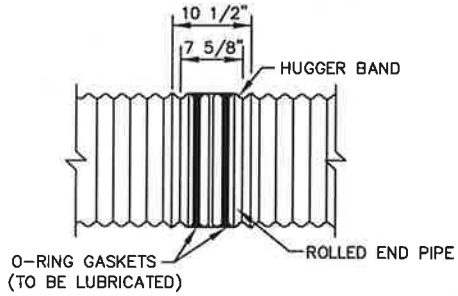
BAR & STRAP CONNECTOR
(DOUBLE HARNESS)

BAND TYPE I

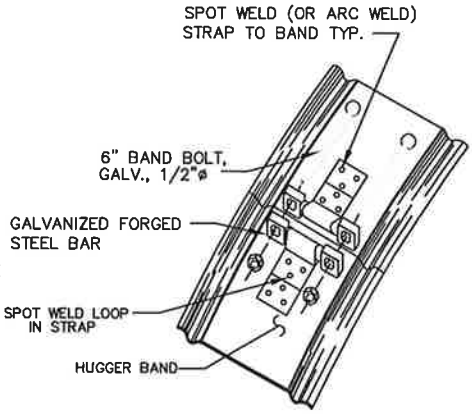


PLAN

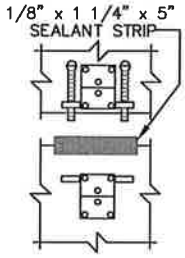
END VIEW



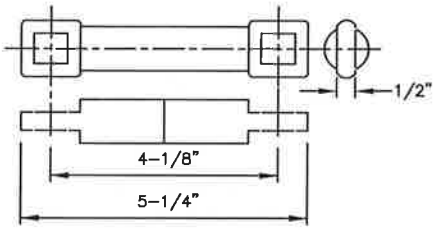
SECTION VIEW



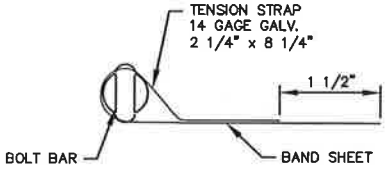
BAR & STRAP CONNECTOR
(SINGLE HARNESS)



CONNECTION
DETAIL
(SHOWING SEALANT APPLICATION)

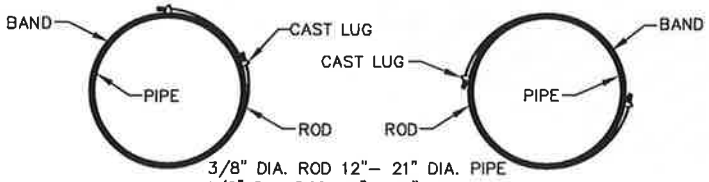


BAR DETAIL

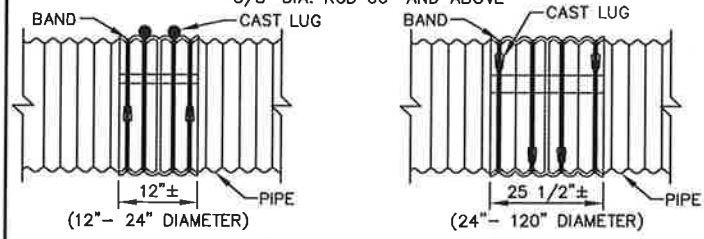


STRAP DETAIL

BAND TYPE II



3/8" DIA. ROD 12"– 21" DIA. PIPE
1/2" DIA. ROD 24"– 54" DIA. PIPE
5/8" DIA. ROD 60" AND ABOVE



(12"– 24" DIAMETER)

(24"– 120" DIAMETER)

BAND TYPE III

2015

NOTES:

Ⓐ TYPE I BAND MAY BE USED WITH ANNULAR OR RE–CORRUGATED HELICALLY CORRUGATED PIPE UP TO 10' OF HEAD.

Ⓑ TYPE II BAND MAY BE USED WITH ANNULAR OR RE–CORRUGATED HELICALLY CORRUGATED PIPE UP TO 50' OF HEAD. GASKETED CONSTRUCTION IS ONE–PIECE 12" THROUGH 30" AND TWO–PIECE 36" AND ABOVE. FROM 12" THROUGH 36", USE 13/16" DIAMETER O–RING GASKET AND USE 7/8" DIAMETER O–RING GASKET FOR PIPES 72" AND LARGER. FROM 36" TO 48", USE TWO–PIECE BAND WITH SINGLE BOLT BAR STRAP HARDWARE AND USE TWO–PIECE BAND WITH DOUBLE BOLT BAR STRAP HARDWARE AT EACH LAP FOR 54" AND ABOVE.

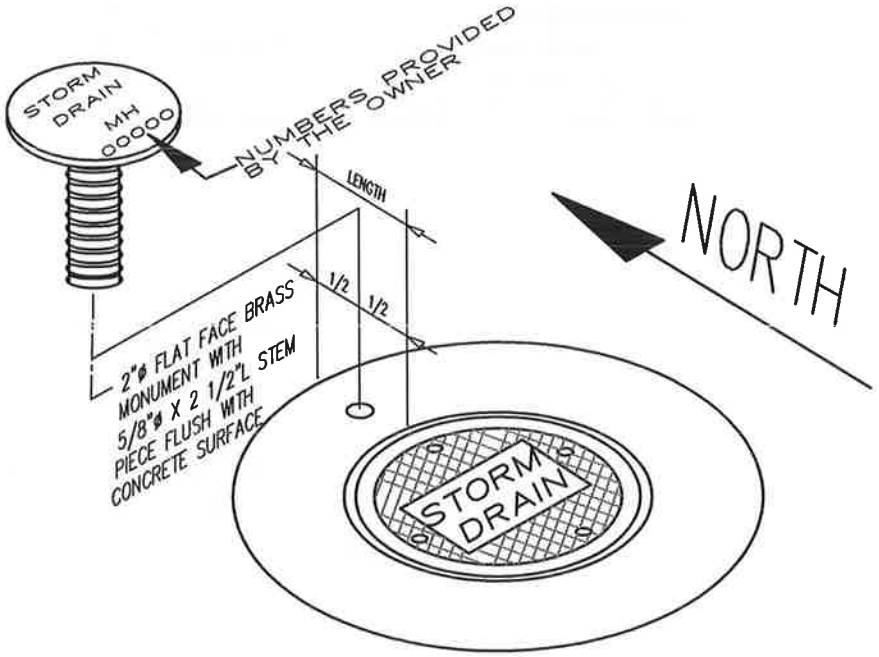
Ⓒ TYPE III BAND MAY BE USED WITH ANNULAR OR RE–CORRUGATED HELICALLY CORRUGATED PIPE UP TO 35' OF HEAD. GASKET SHALL BE BUTT–CEMENTED OR VULCANIZED SYNTHETIC, CLOSED–CELL SPONGE RUBBER 3/8" THICK OF A WIDTH EQUAL TO THE BAND WIDTH AND CENTERING ON THE JOINT. FOR PIPES 12" OR LESS IN DIAMETER, THE GASKET THICKNESS MAY BE 3/16".

Ⓓ ACCEPTABLE DEFORMING GASKET MATERIAL THAT PROVIDES FULL WIDTH GASKET MAY BE USED WITH BAND TYPE I.

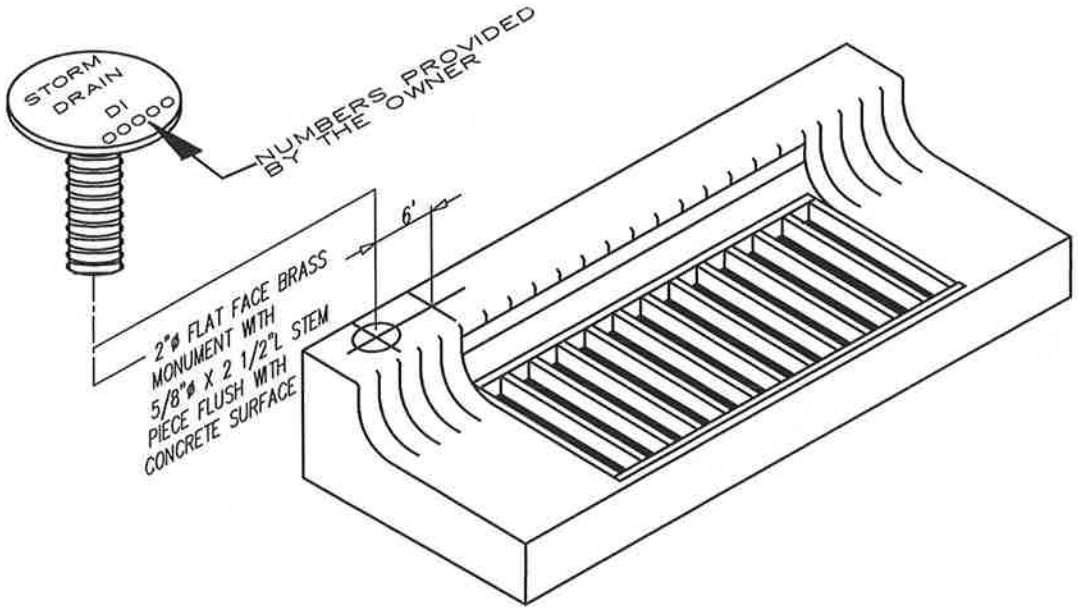
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

CONNECTING BANDS FOR CMP

STANDARD DRAWING NO. SD–622



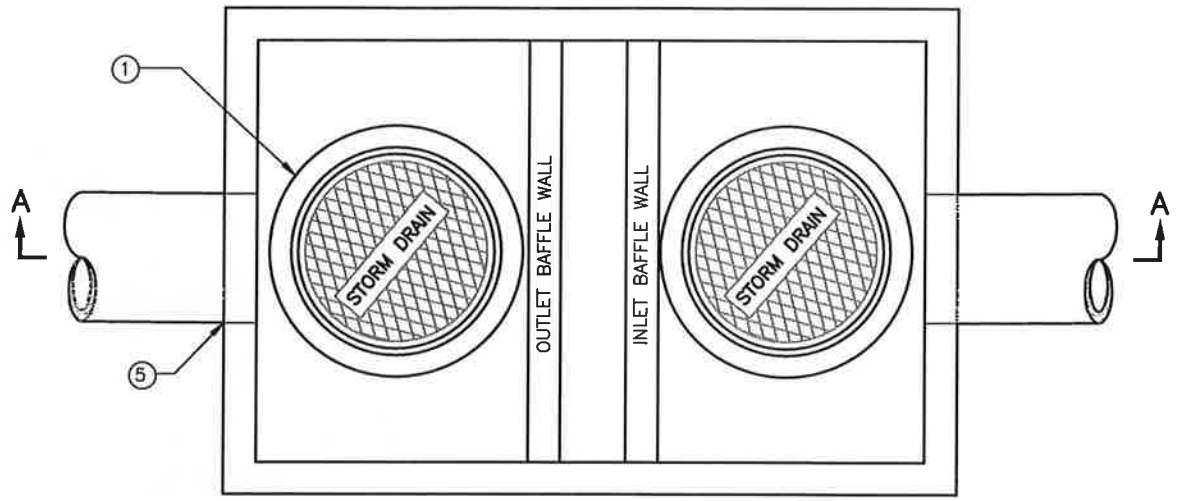
STORM DRAIN MANHOLE



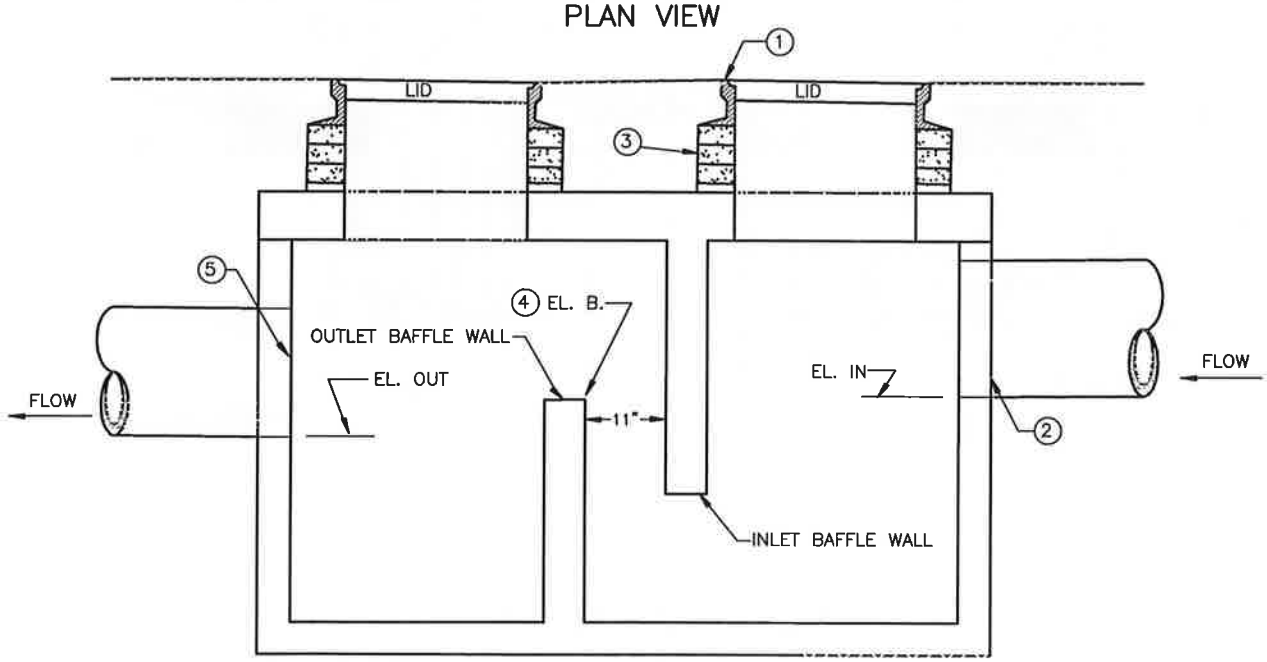
STORM DRAIN INLET

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STORM DRAIN MONUMENT	STANDARD DRAWING NO. SD-623



PLAN VIEW



SECTION A–A

NOTES

(A) DESIGN LOAD: AASHTO HS–25 HIGHWAY LOADING.

(B) ALL REINFORCING STEEL SHALL BE GRADE 60.

(C) DETAILED DRAWING OF A PRECAST BOX OR A POURED IN PLACE BOX DESIGN MUST BE APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.

(D) HEIGHT OF OUTLET BAFFLE WALL AND LENGTH OF INLET BAFFLE WALL DETERMINED BY TANK CAPACITY AND FLOW RATE, PER MANUFACTURER.

(E) BEFORE THESE BOXES ARE USED THE APPLICATION MUST BE APPROVED BY THE ENGINEER.

(F) MANHOLE FRAME, COLLAR AND COVER SHALL BE PER SD–616 AND SD–617.

(G) PROVIDE STEPS WHEN THE DISTANCE FROM TOP OF MANHOLE FRAME TO TOP OF BOX EXCEEDS 24".

LEGEND

(1) MANHOLE FRAME AND COVER PER SD–617 (TYPICAL).

(2) LOCATION AND FLOW LINE ELEV. PER DESIGN PLANS (TYPICAL).

(3) H≤12" USE GRADE RINGS (TYPICAL). 12"<H 24" USE 24" DIA. RCP RISER. 24"<H 120" USE MANHOLE CONE AND 48" DIA. RISERS.

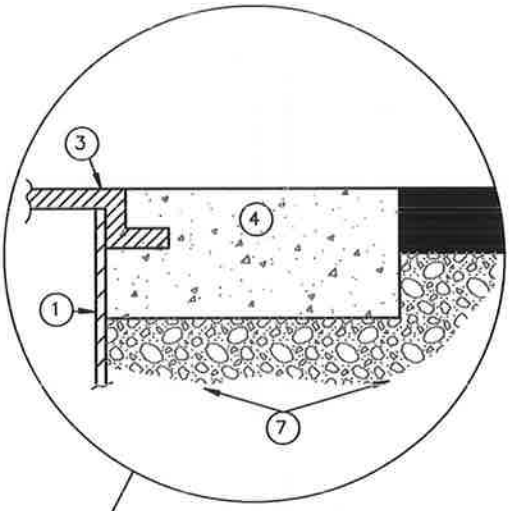
(4) EL. IN > EL. B BY 1" MIN. EL. OUT < EL. B BY MIN. OF 0.25' UNLESS OTHERWISE APPROVED BY THE ENGINEER.

(5) WATERTIGHT SEAL.

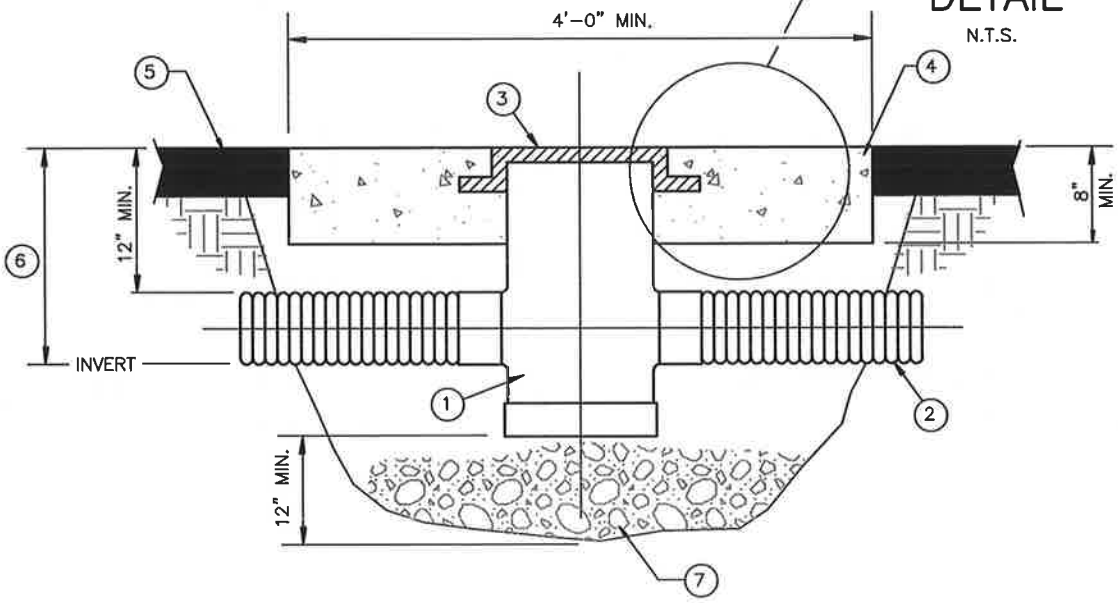
(6) PRECAST BOX MANUFACTURER SHALL MARK FLOW DIRECTION AND LABEL INLET OR OUTLET ON SIDE OF BOX.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	SAND AND GREASE TRAP	STANDARD DRAWING NO. SD–624



DETAIL
N.T.S.



TYPICAL INSTALLATION
N.T.S.

LEGEND

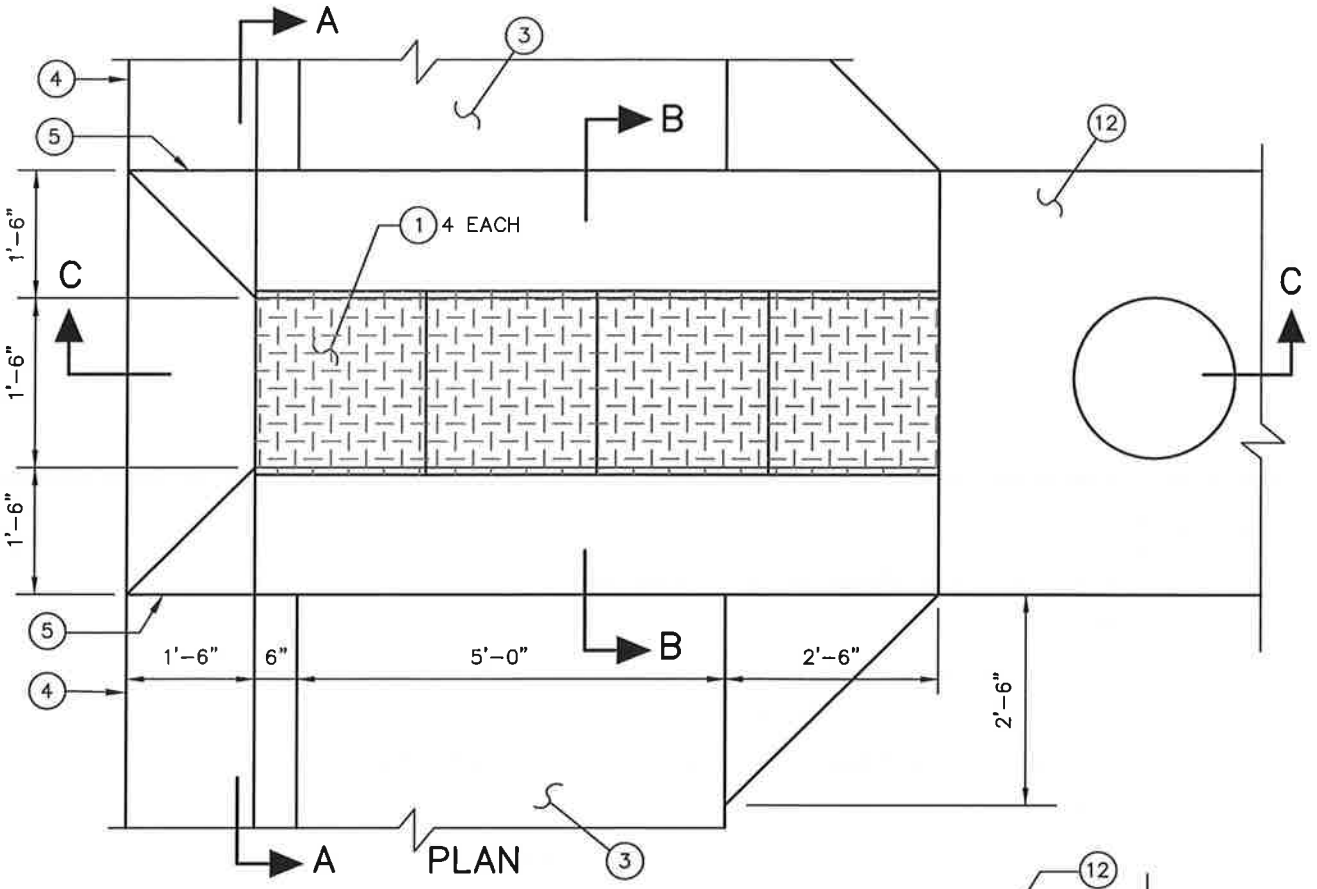
1. PVC DRAINAGE STRUCTURE.
2. CONNECTING STORM DRAIN PIPING.
3. FRAME AND GRATE.
4. CONCRETE COLLAR FOR TRAFFIC AREAS. REFER TO SD-616.
5. ASPHALT OR OTHER SURFACING.
6. INVERTS AS SHOWN ON PLANS.
7. TYPE 1 AGGREGATE BACKFILL MATERIAL PLACED UNIFORMLY IN 12" LIFTS AND COMPACTED TO 95% PER AASHTO T-99.

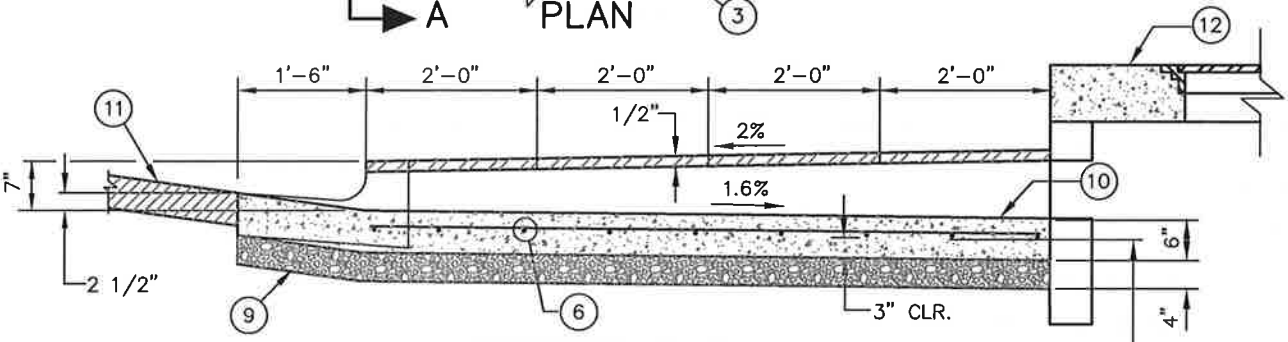
NOTES:

- (A) INSTALL PVC DRAINAGE STRUCTURE PER MANUFACTURER'S RECOMMENDATIONS AND SECTION 602.
- (B) IN TRAFFIC AREAS, LOAD SHALL BE ACCOMMODATED BY THE GRATE, FRAME AND CONCRETE COLLAR AND SHALL NOT BEAR ON THE PVC STRUCTURE.
- (C) PRODUCT TO BE NYLOPLAST-ADS OR OTHER PRE-APPROVED EQUIVALENT.

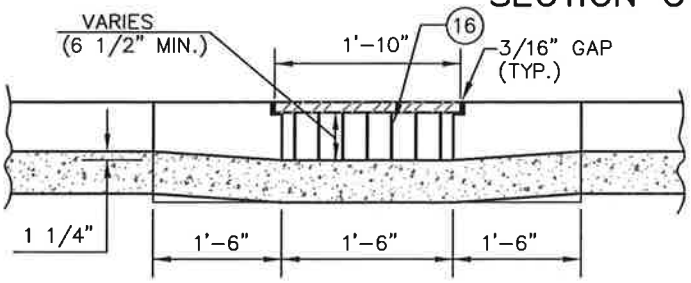
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PVC DRAIN BASIN STRUCTURE	STANDARD DRAWING NO. SD-625

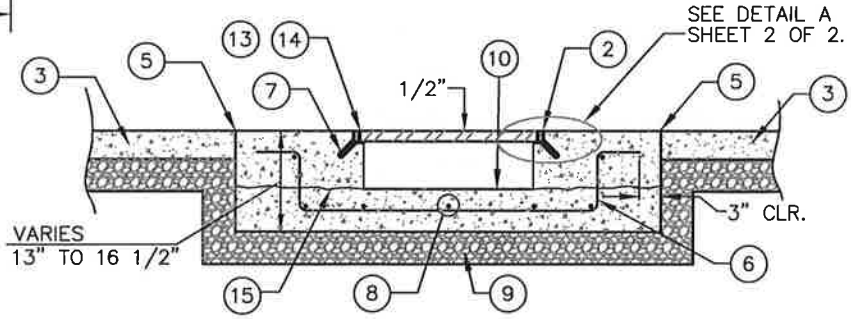




SECTION C–C



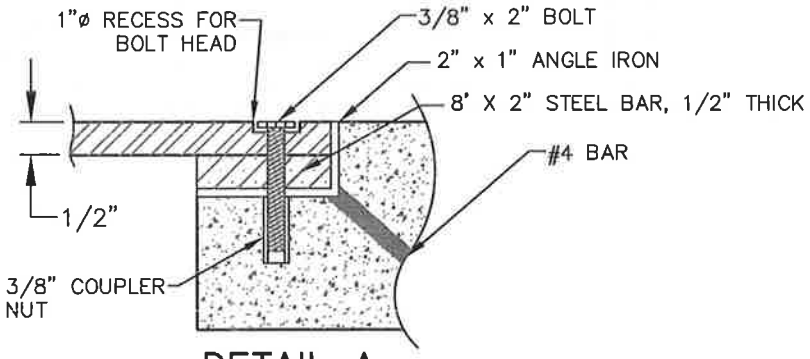
SECTION A–A



SECTION B–B

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CURB OPENING INLET	STANDARD DRAWING NO. SD–626 1 OF 2



DETAIL A

LEGEND

(1) 1–22"Wx24"L 1/2"T STEEL TRENCH COVER (DIAMOND PLATED).

(2) 2" x 1" ANGLE IRON.

(3) CONCRETE SIDEWALK, SEE SD–709.

(4) 6" VERTICAL CURB AND GUTTER, SEE SD–701.

(5) 1/2" EXPANSION JOINT (PREFORMED EXPANSION JOINT MATERIAL CONFORMING TO AASHTO M213.

(6) #3 BARS AT 12" O.C.

(7) #4 BAR, 24" LONG, CONNECT CENTER OF BAR TO ANGLE IRON WITH 2" WELD AND BEND EACH END AT 45° ANGLE. SPACED @ 24" O.C.

(8) #3 BAR (TYPICAL).

(9) 4–INCHES COMPACTED DEPTH OF 3/4" MINUS CRUSHED AGGREGATE BASE MATERIAL. COMPACTED TO EXCEED 95% OF STANDARD PROCTOR.

(10) CONCRETE CL 4000.

(11) PAVEMENT SURFACE.

(12) SAND/GREASE TRAP OR OTHER APPROVED WATER QUALITY BMP.

(13) 3/8" STAINLESS STEEL BOLTS.

(14) 3/8" STAINLESS STEEL NUTS, TACK WELDED TO ANGLE IRON @ 12" O.C.

(15) ACCEPTABLE CONSTRUCTION JOINT LOCATION.

(16) #3 BAR WELD TO PLATE, SPACED NO MORE THAN 4" APART.

NOTES:

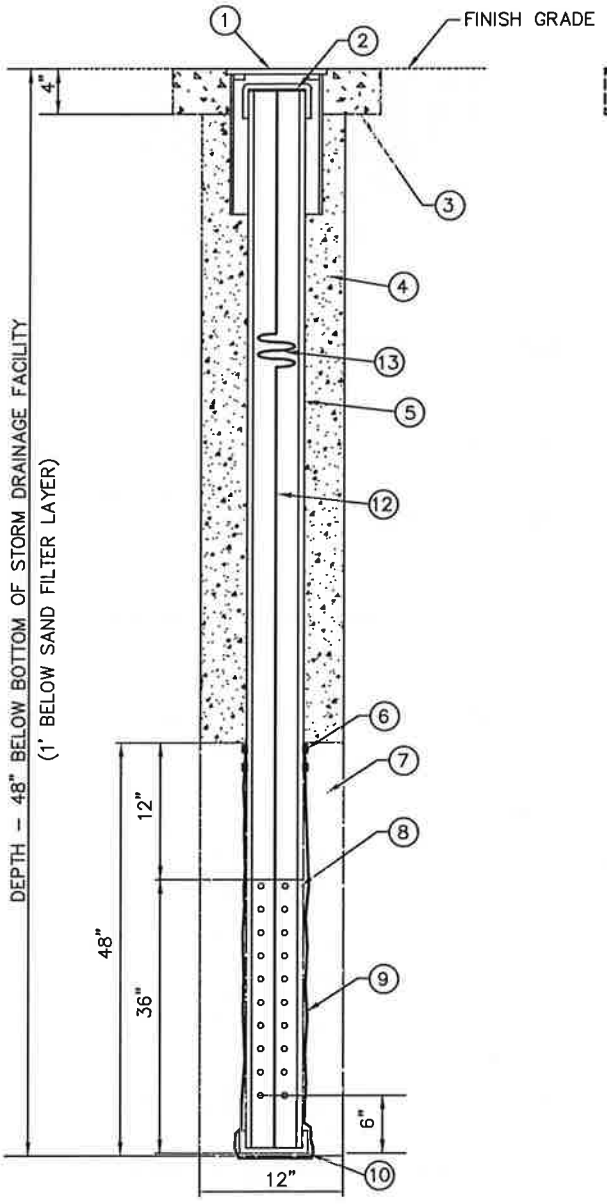
(A) GRADE AND ALIGNMENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND PUBLIC AGENCY HAVING JURISDICTION.

(B) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH I.S.P.W.C. SPECIFICATIONS.

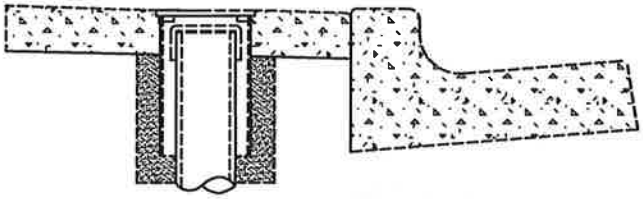
(C) BACKFILL AS PER SECTION–706.

(D) ALL REINFORCING SHALL BE GRADE 60.

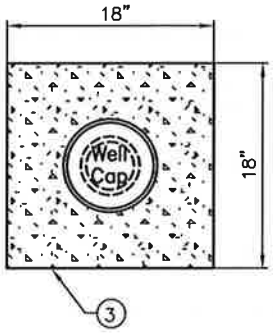
(E) TROWEL SMOOTH TROUGH FLOOR AND WALLS. EXPOSED SURFACE TO MATCH ADJACENT SIDEWALK AND CURB FINISH.



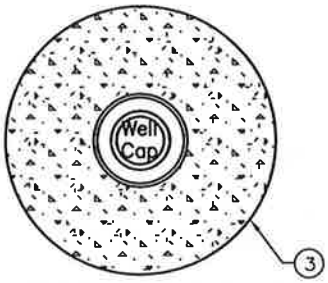
WELL SECTION



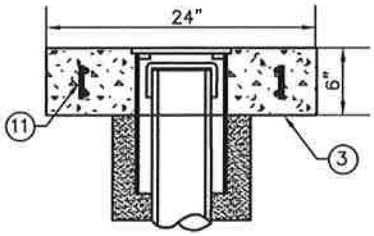
WELL COVER IN SIDEWALK



PLAN VIEW
CONCRETE COLLAR NON–TRAFFIC AREAS



PLAN VIEW
CONCRETE COLLAR – TRAFFIC AREAS



SECTION
CONCRETE COLLAR

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	GROUND WATER OBSERVATION WELL	STANDARD DRAWING NO. SD–627 1 OF 2

LEGEND

(1) WELL COVER, 8" DIAM. WATERTIGHT GALVANIZED STEEL COVER AND CANISTER.

(2) PVC CAP, GASKETED (WATERTIGHT).

(3) CONCRETE (COLLAR), CLASS 3000 (ISPWC SECTION 703).

(4) 3/4" MINUS CRUSHED AGGREGATE FOR BASE (ISPWC SECTION 802) OR MATERIAL REQUIRED FOR STORM DRAINAGE FACILITY (I.E. 3" DRAIN ROCK, FILTER SAND).

(5) PVC PIPE, 4" DIAMETER ASTM D-3034 SDR 35.

(6) 2 - STAINLESS STEEL HOSE CLAMPS AT 3" SPACING. SECURE GEOTEXTILE IN PLACE.

(7) FILTER SAND (ISPWC SECTION 801).

(8) PERFORATED PVC PIPE, ASTM D-3035 SDR 35 WITH 6 - 3/8" DIA. HOLES AT 3" ON CENTER.

(9) DRAINAGE GEOTEXTILE, TYPE I (ISPWC SECTION 2060).

(10) PVC CAP, SOLVENT WELDED OR GASKETED (WATERTIGHT).

(11) (2) #4 REBAR HOOPS WITH #4 VERTICALS.

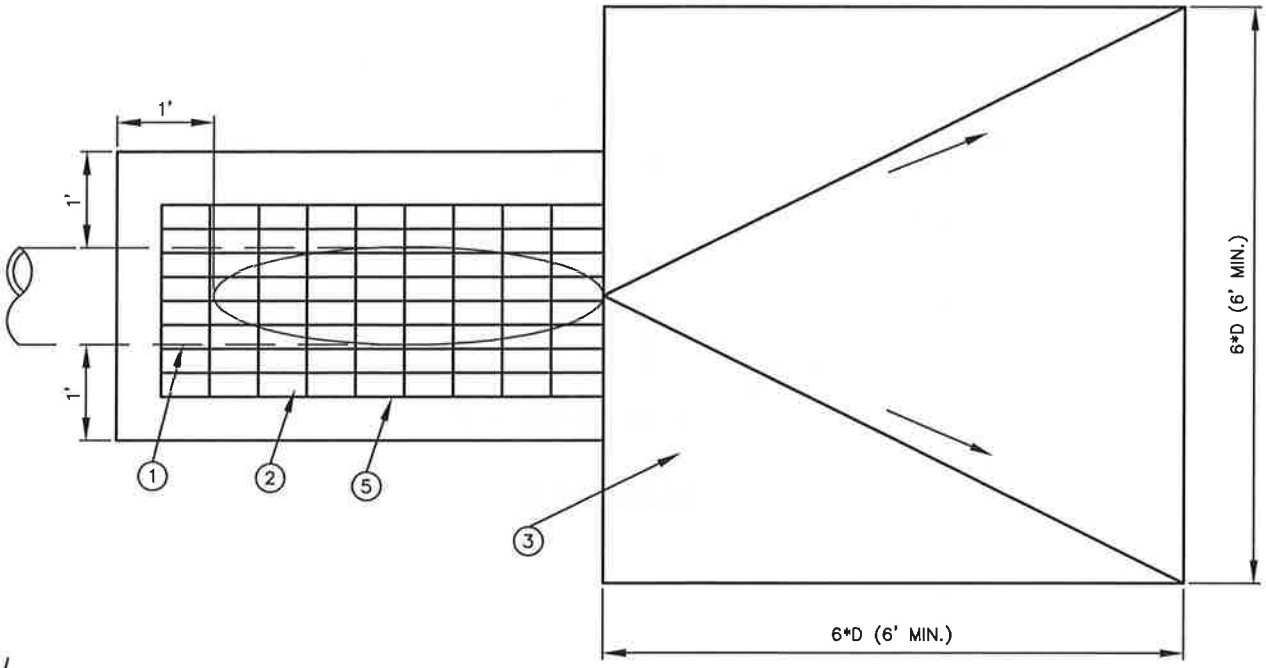
(12) NO. 12 AWG. GALVANIZED FINDER WIRE.

(13) THREE 6" DIAMETER COILS.

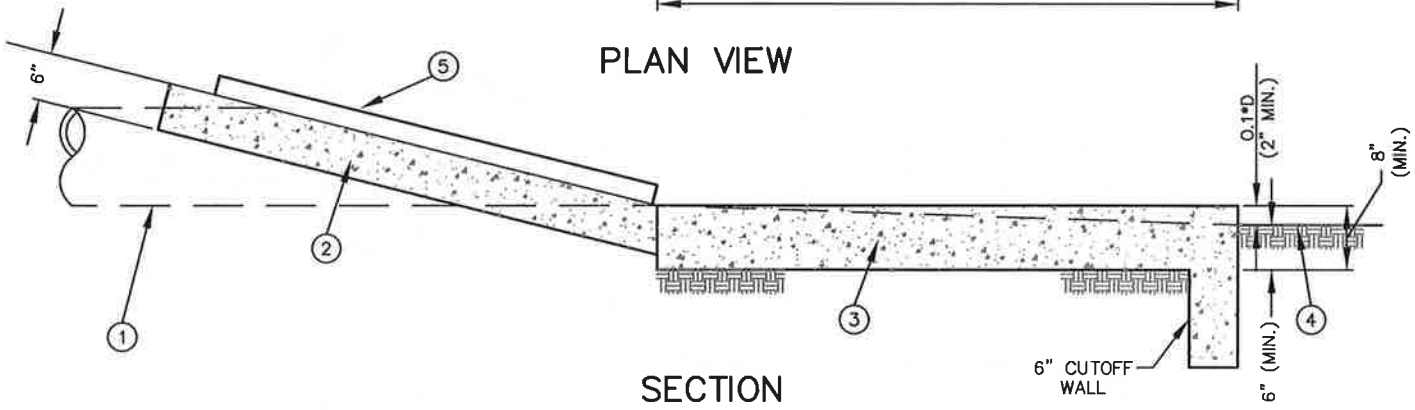
NOTES:

(A) WELLS ARE FOR OBSERVATION OF GROUNDWATER LEVEL NEAR STORM DRAINAGE FACILITIES.

(B) LOCATION OF GROUNDWATER OBSERVATION WELLS SHALL BE APPROVED BY ENGINEER.



PLAN VIEW



SECTION

LEGEND

(1) INLET PIPE (12" MIN.).

(2) HEADWALL. CONCRETE CL. 4000 PER ISPWC SECTION 703.

(3) INLET PROTECTION APRON. CONCRETE CL. 4000 PER ISPWC SECTION 703.

(4) STORMWATER FACILITY FLOOR.

(5) CHILD PROTECTION GRATE (MAX. 4"X6" OPENINGS).

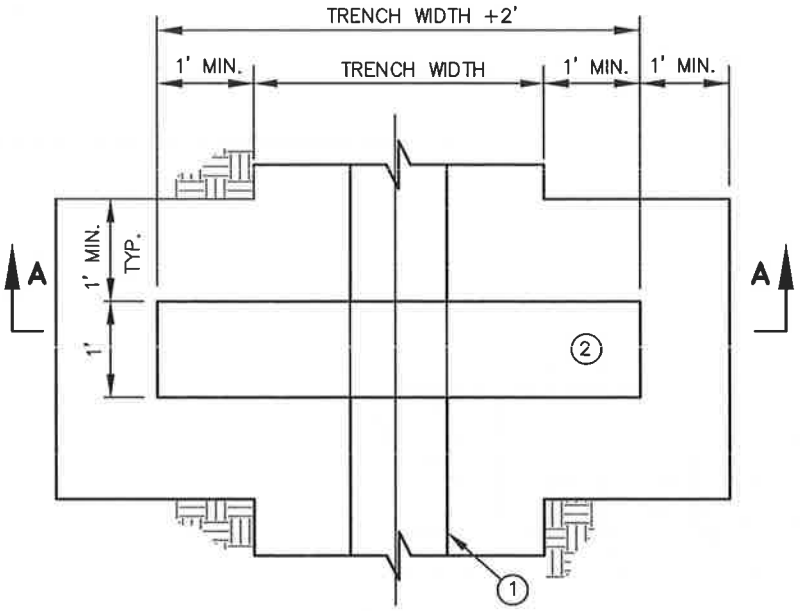
NOTES:

(A) "D" EQUALS THE DIAMETER OF THE INLET PIPE IN FEET.

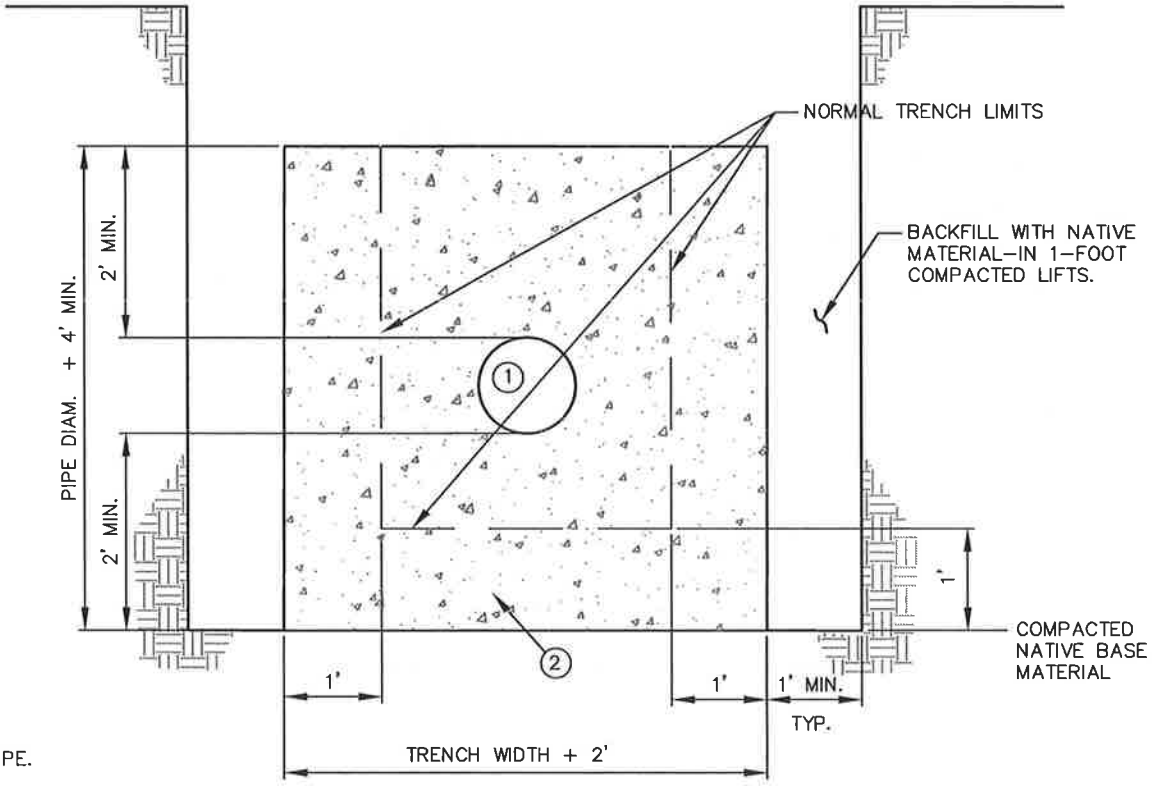
(B) BEVEL INLET PIPE TO MATCH SIDE SLOPE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	INLET PIPE AND PROTECTION APRON	STANDARD DRAWING NO. SD-628



PLAN VIEW



SECTION A–A

LEGEND

(1) STORM DRAIN PIPE.

(2) SEAL CONCRETE (I.S.P.W.C. 703).

NOTES:

(A) EXCAVATE FOR ANTI–SEEP COLLAR INTO UNDISTUBED SOILS OR COMAPCTED EMBANKMENT MATERIAL.

(B) CLEAN PIPE OF DIRT AND FOREIGN MATERIAL BEFORE POURING CONCRETE COLLAR.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	ANTI–SEEP COLLAR	STANDARD DRAWING NO. SD–629

ISPWC – DIVISION 700

Concrete

Section 701 – Concrete Formwork
Section 702 – Concrete Reinforcement
Section 703 – Cast-in-Place Concrete
Section 704 – Precast Concrete
Section 705 – Portland Cement Concrete Pavement
Section 706 – Other Concrete Construction

SECTION 701

CONCRETE FORMWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in place concrete, including falsework, shoring, bracing and anchorage.

B. Permanent metal concrete forms.

C. Openings for other work.

D. Form accessories.

E. Form stripping.

F. Water stops.

1.2 RELATED SECTIONS

A. Section 702 - Concrete Reinforcement.

B. Section 703 - Cast-in-Place Concrete.

C. Section 705 – Concrete Pavement.

D. Section 706 – Other Concrete Construction.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation, Materials and Methods of Sampling and Testing, Part I and II.

B. ITD Standard Specifications for Highway Construction, Latest Edition.

C. ASTM A 653/A 653M: Steel Sheet, Zinc Coated or Zinc-Iron Alloy Coated.

D. ACI 347: Recommended Practice for Concrete Formwork.

E. PS 1: Construction and Industrial Plywood.

1.4 DESIGN REQUIREMENTS

A. Design, engineer and construct falsework, formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, lines, dimensions, and grades.

B. As a minimum, design for the following dead, live and horizontal loads.

1. Dead Loads: Include the weight of concrete, reinforcing steel, forms and falsework. The weight of concrete including reinforcing steel shall be assumed to be 160 pcf for normal concrete.

2. Live Loads: Include the actual weight and distribution of any equipment to be supported by falsework, plus a uniform load applied over the area supported as shown in the following table.

Deck forms	30 psf
Permanent metal deck forms	50 psf
Falsework	20 psf
Walkways	75 psf

3. Horizontal Loads: Design the falsework bracing system for the sum of the actual horizontal loads due to equipment, construction sequence, concrete fluid pressure, or other causes and an allowance for wind, but in no case less than 2% of the total dead load.

4. Maximum allowable deflection due to the weight of concrete shall be l/360 of the falsework span to achieve specified tolerances.

1.5 SUBMITTALS

A. Formwork submittals are not required for footings or walls when the height above grade for cured concrete is less than 8 feet, unless called for by the Contract Documents.

B. Provide working drawings, loading assumptions, allowable material stress used in design calculations for proposed falsework and formwork.

C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of panel joints, ties, tie hole pattern, and form lines.

1.6 QUALITY ASSURANCE

A. Prepare formwork design submittal under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Idaho. Calculations to be stamped.

1.7 REGULATORY REQUIREMENTS

A. Conform to ACI 347 or other applicable code for design, fabrication, erection and removal of formwork.

PART 2 MATERIALS

2.1 FORM MATERIALS

A. Form Materials: At the discretion of the Contractor. All form material used must be in good condition to leave a smooth finish on the concrete. Where Contract Documents indicate any special architectural finish, forms to be approved by the Engineer prior to use on project.

2.2 STAY-IN-PLACE METAL FORMS

A. Stay-in-place metal forms may only be used when specifically permitted by the Contract Documents or approved by the Engineer.

B. Permanent Metal Concrete Forms: Use zinc-coated (galvanized) steel sheet conforming to ASTM A 653M (Grades A through C) with coating Designation 600 (G165) for permanent metal forms for concrete floor slabs. Meet all other requirements relevant to steel permanent metal forms and the placing of concrete as specified herein.

2.3 FORMWORK ACCESSORIES

A. Form Ties: Snap-off type, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.

B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Corners: Chamfered, 3/4 inch x 3/4 inch size unless otherwise noted on Contract Documents.

D. Water Stops: Polyvinyl chloride, minimum 1750 psi tensile strength, minimum 50°F to plus 175°F working temperature range, maximum possible lengths, preformed corner sections, heat welded jointing; of style and size as noted in the Contract Documents.

PART 3 WORKMANSHIP

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

A. Earth forms may be used only when specifically permitted by the Contract Documents.

B. Hand trim sides and bottom of earth forms and remove loose soil prior to placing concrete. .

3.3 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

D. Align joints and make watertight. Keep form joints to a minimum.

E. Obtain approval before framing openings in structural members that are not indicated in the Contract Documents.

F. Provide chamfer strips on external corners.

G. Coordinate this section with other sections of work which require attachment of components to formwork.

H. Erect formwork in order to provide required concrete cover over reinforcing steel.

3.4 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are effected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to pass through concrete work.

B. Locate and set in place items that will be cast directly into concrete.

C. Coordinate with work of other sections in forming and placing openings, slots, recesses, sleeves, bolts, anchors, inserts, and components of other work.

D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.

E. Install water stops in accordance with manufacturer's instructions continuous without displacing reinforcement. Heat seal joints watertight.

3.6 FORM CLEANING

A. Clean forms as erection proceeds. Remove all foreign matter from forms.

B. Clean formed cavities of debris prior to placing concrete.

C. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction is within heated enclosures. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

A. Construct formwork allowable tolerances specified in the Contract Documents.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.

3.8 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and design loads.

B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view. Store removed forms in manner that surface to be in contact with fresh concrete will not be damaged. Discard damaged forms.

PART 4 MEASUREMENT AND PAYMENT

4.1 Formwork is considered incidental to other work, and no separate payment will be made.

END OF SECTION

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SECTION 702

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.2 RELATED SECTIONS

A. Section 701 - Concrete Formwork.

B. Section 703 - Cast-in-Place Concrete.

C. Section 704 – Precast Concrete.

D. Section 705 – Concrete Pavement.

E. Section 706 – Other Concrete Construction.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation, Materials and Methods of Sampling and Testing, Part I and II.

B. ITD Standard Specifications for Highway Construction.

C. AASHTO Standard Specifications for Highway Bridges.

D. ACI SP-66: American Concrete Institute - Detailing Manual.

E. AASHTO M 55: Welded Steel Wire Fabric for Concrete Reinforcement.

F. ASTM A 615/A 615M: Deformed and Plain Billet Steel Bars for Concrete Reinforcement, Grade 60 ksi.

G. ASTM A 706/A 706M: Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

H. ASTM A 1035: Deformed and Plain Low Carbon Chromium Steel Bars for Concrete Reinforcement.

I. AASHTO M 254: Corrosion Resistant Coated Dowel Bars.

J. AASHTO M 284/M 284M: Epoxy-Coated Reinforcing Steel Bars.

K. AWS D1.4: Structural Welding Code for Reinforcing Steel.

L. AWS D12.1: Welding Reinforcement Steel, Metal Inserts and Connections in Reinforced Concrete Construction.

M. CRSI: Concrete Reinforcing Steel Institute - Manual of Practice.

N. CRSI 63: Recommended Practice for Placing Reinforcing Bars.

O. CRSI 65: Recommended Practice for Placing Bar Supports, Specifications and Nomenclature.

1.4 SUBMITTALS

A. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules. Prepare in accordance with CRSI Manual of Standard Practice.

B. Manufacturer's Certificate: Provide steel mill certificates or otherwise certify that products meet or exceed specified requirements.

C. Welders' Certificates: Verifying AWS qualification within the previous 6 months.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with CRSI 63, 65 and Manual of Practice.

PART 2 MATERIALS

2.1 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615, 60 ksi, yield grade; deformed billet.

B. Reinforcing Steel: ASTM A 706, 60 ksi, yield grade; deformed low-alloy steel bars, unfinished. Use whenever rebar requires welding.

C. Epoxy Coated Reinforcing Steel: ASTM A 615, 60 ksi, yield grade; deformed billet bars, epoxy coated in accordance with AASHTO M 284 finish. Use where epoxy coated rebar is specified on the Contract Documents. Upon Engineer's pre-approval, corrosion-resistant micro-composite reinforcing steel meeting the requirements of ASTM A 1035 (MMFX2, or approved substitution) may be used in lieu of epoxy-coated reinforcing steel.

D. Welded Steel Wire Fabric: AASHTO M 55; in flat sheets or coiled rolls; unfinished. Smooth Dowel Bars.

E. Smooth Dowel Bars: AASHTO M 254 or ASTM A 615, as specified on the Contract Documents.

F. Deformed Welded Wire Fabric: ASTM A 497, 60 ksi yield grade.

2.2 ACCESSORIES

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor barrier puncture.

2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice.

B. Weld reinforcement in accordance with AWS D1.4. Weld only ASTM A 706M reinforcement.

C. Locate reinforcing splices not indicated on the Contract Documents at point of minimum stress. Review location of splices with the Engineer prior to fabrication.

PART 3 WORKMANSHIP

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required positions.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Conform to applicable code for concrete cover over reinforcement. Unless otherwise directed or noted on the Contract Documents conform to AASHTO Standard Specifications for Highway Bridges as shown in Table 1.

Table 1
COVER REQUIREMENTS FOR CAST-IN-PLACE CONCRETE

Condition	Min. Cover
Concrete cast against and permanently exposed to earth	3 inches
Concrete exposed to earth or weather:	
Primary reinforcement	2 inches
Stirrups, ties, and spirals	1-1/2 inches
Concrete deck slabs which have no positive corrosion protection and are frequently exposed to deicing salts:	
Top reinforcement	2-1/2 inches
Bottom reinforcement	1 inch
Concrete not exposed to weather or in contact with ground:	
Primary reinforcement	1-1/2 inches
Stirrups, ties, and spirals	1 inch

E. Use plastic coated tie wire and plastic coated metal bar supports for epoxy coated reinforcing.

F. Before any concrete is placed, repair all damage to epoxy coating of reinforcing steel.

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement and payment for reinforcing steel for precast concrete.

A. Reinforcing steel is incidental to the cost of precast concrete and no separate payment will be made.

4.2 Measurement and payment for reinforcing steel for cast-in-place concrete. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Reinforcing Steel: By the pound for type of reinforcing steel specified. Includes fabrication, delivery and placement. If not separately indicated in the Bid Schedule, reinforcing steel to be incidental to other bid items.

1. Bid Schedule Payment Reference: 702.4.2.A.1.
2. Bid Schedule Description: Reinforcing Steel…pound (LB).

3. Bid Schedule Payment Reference: 702.4.2.A.3.
4. Bid Schedule Description: Epoxy Coated Metal Reinforcement …pound (LB).

B. Welded Wire Fabric: By the square foot.

1. Bid Schedule Payment Reference: 702.4.2.B.1.
2. Bid Schedule Description: Welded Wire Fabric…square foot (SF).

C. Smooth Dowels: By the pound.

1. Bid Schedule Payment Reference: 702.4.2.C.1.
2. Bid Schedule Description: Smooth Dowels…pound (LB).

END OF SECTION

SECTION 703

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete for footings, water, wastewater, irrigation structures, retaining walls, roadway bridge structures, elevated slabs, walls, foundation walls, and ancillary facilities.

B. Concrete mix specifications for all concrete in Division 700.

C. Control, expansion and contraction joint devices associated with concrete work, including joint sealant.

D. Equipment pads, light and sign pole bases, flagpole bases, and thrust blocks.

1.2 RELATED SECTIONS

A. Section 701 - Concrete Formwork.

B. Section 702 - Concrete Reinforcement.

C. Section 704 – Precast Concrete.

D. Section 705 – Concrete Pavement.

E. Section 706 – Other Concrete Construction.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation, Materials and Methods of Sampling and Testing, Parts I and II.

B. ITD Standard Specifications for Highway Construction.

C. AASHTO M 6: Fine Aggregate for Portland Cement Concrete.

D. AASHTO T 96: Resistance to Degradation of Small Size Coarse Aggregates by Abrasion and Impact in the Los Angles Machine.

E. AASHTO M 85: Portland Cement.

F. AASHTO M 154: Air Entraining Admixtures for Concrete.

G. ASTM C 494: Chemical Admixtures for Concrete.

H. WAQTC: Western Alliance for Quality Transportation Construction.

I. AASHTO M 241: Concrete Made by Volumetric Batching and Continuous Mixing.

1.4 SUBMITTALS

A. Concrete Mix: Provide mix design data and supporting test documentation to the Engineer.

B. Product Data: Provide data on joint devices, attachment accessories admixtures and curing compounds.

C. Samples: Submit 4 inch long samples of expansion/contraction joints and control joints when specified on the Contract Documents.

D. Placement Drawing: Identifying joint types and locations.

E. Gradation Sheets: For coarse and fine aggregate.

F. Detailed Procedures for hot weather and cold weather concrete placement and curing.

PART 2 MATERIALS

2.1 CONCRETE MATERIALS

A. Portland Cement: AASHTO M 85 Type I, or II. Type III to be used only with Engineer's pre-approval. Cement in concrete in contact with water, storm water, or waste water: AASHTO M 85 Type II.

B. Do not use Portland cement containing more than 0.6% total alkali.

C. Unless otherwise permitted, use only the product of only 1 mill or other brand and type of Portland cement in any one component of a structure, i.e., abutments, columns, stringers, deck, etc.

D. Fine Aggregates: No. 4 mesh material consisting of natural sand with hard, strong, durable particles. All aggregate must be furnished from one source.

1. Deleterious Substances: Coal and lightweight pieces to be less than 1.0% by weight (AASHTO T-113). Clay lumps to be less than 1.0% by weight (AASHTO T-112). Material to be reasonably free of shale, alkali, mica, coated grains, and soft flaky particles.

2. Soundness: Total corrected percentage loss less than 10% by weight based on five cycles of the sodium sulfate soundness test (AASHTO T-104).

3. Organic Impurities: Aggregate producing a color darker than the standard in AASHTO T-21, Alternate B colormetric test is subject to rejection unless they pass the mortar strength test. At request of Owner, test aggregate darker than that submitted to demonstrate suitability.

4. Mortar-Making Properties: 7-day compressive strength (Type II cement) of not less than 90% of the strength of a mortar prepared with the same cement (AASHTO T-71 or ASTM C 87).

5. Gradation: Graded coarse to fine as follows:

Passing Sieve Size	Percent Passing
3/8 inch	100
No. 4 mesh	95-100
No. 8 mesh	65-95
No. 16 mesh	45-80
No. 50 mesh	10-30
No. 100 mesh	2-10
No. 200 mesh	0-4

Fineness modulus to be between 2.50 and 3.10 (AASHTO M-6). Sand equivalent to be a minimum of 70.

E. Coarse Aggregate: Crushed stone, gravel, or blast-furnace slag having hard, strong, durable pieces reasonably free from adherent coatings. All aggregate must be furnished from one source.

1. Deleterious Substances: Coal and lightweight pieces to be less than 1.0% by weight (AASHTO T-113). Clay lumps to be less than 0.25% by weight (AASHTO T-112). Soft fragments to be less than 5.0% by weight. Material to be reasonably free of shale, alkali, mica, coated grains, and soft flaky particles.

2. Soundness: Total corrected percentage loss less than 12% by weight based on five cycles of the sodium sulfate soundness test (AASHTO T-104).

3. Percentage of Wear: Total percentage of wear to be less than 40% (AASHTO T-96 Los Angeles Method).

4. Gradation: 3 sizes of coarse aggregate may be furnished. Use 1-1/2 inch minus only with pre-approval of the Owner. Use 1/2 inch minus aggregate for extruded concrete median curb and colored/stamped concrete for flatwork. Graded aggregate coarse to fine as follows:

Passing Sieve Size	Percent Passing		
	(1-1/2 inch) minus	(3/4 inch) minus	(1/2 inch) minus
2 inch	100	100	100
1-1/2 inch	95-100	100	100
1 inch	---	100	100
3/4 inch	35-70	95-100	100
1/2 inch	---	---	95-100
3/8 inch	10-30	20-55	50-70
No. 4 mesh	0-5	0-10	0-10
No. 8 mesh	0	0-5	---
No. 200 mesh	---	---	0-2

F. Water: Clean and not detrimental to concrete.

2.2 ADMIXTURES

A. Air Entrainment: AASHTO M 154.

B. Chemical: ASTM C 494, water reducing and retarding.

C. Fly Ash: Per ITD Standard Specifications for Highway Construction, Section 714.

D. All admixtures must be furnished by one manufacturer.

E. Concrete pavements and cast-in-place bridge decks shall contain a 3-pound polypropylene fiber admixture per cubic yard of concrete.

2.3 ACCESSORIES

A. Vapor Retarder: 6 mil thick clear polyethylene film, type recommended for below grade application. Use where called for on the Contract Documents.

B. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 6000 psi in 28 days.

2.4 CONCRETE MIX

A. Proportion and mix Portland cement concrete in accordance with these Contract Documents. Submit a proposed mix design to the Engineer for review.

B. Separate bids may be taken for separate classes of concrete as shown on the Contract Documents and in the Bid Schedule.

C. Use the following classes of concrete where required in the Contract Documents per Table 1 and Table 2:

Table 1
BASIC MIX DESIGN PARAMETERS
WHEN FLY ASH CONCRETE IS NOT REQUIRED*

Concrete [(a)] Class in (psi) (28 day)	Minimum Cement Content	Max. Water Cement Ratio	Max. Slump (inch)	Air Content Percent
	Lb./CY[b]			
4000A	560	.44	2.5±1.0	6.5±1.5
4000B	560	.44	5	6.5±1.5
3000	560	.49	5	6.5±1.5
1500	380	.60	8	0-6

Table 1 Footnotes:

(a) Classes of concrete are the minimum compressive strengths when tested in accordance with applicable tests.

(b) It may not always be possible to produce concrete of the required strength using the minimum cement content. No separate payment will be made for additional cement required to meet minimum strength.

Table 2
BASIC MIX DESIGN PARAMETERS
WHEN FLY ASH CONCRETE IS REQUIRED*

Concrete) [(a)] Class in psi (28 day)	Minimum[(b)] Cement Content	Minimum[(b)] Fly Ash Content	Max Water to Cement (Plus Fly Ash) Ratio	Slump (inch)	Air Content Percent
	Lb./CY	Lb./CY			
4000AF	467	116	.42	2.5±1.0	6.5±1.5
4000BF	467	116	.42	5 Max	6.5±1.5
3000F	467	116	.47	5 Max	6.5±1.5
1500F	317	79	.58	8 Max	0-6
Flowable Fill – 300 psi	50	250	2.0	6-8	N/A
Compactable Fill (High Density)	110		4.0	0-1	N/A

Table 2 Footnotes:

(a) Numerical part of class designation is the compressive strength when tested in accordance with applicable test.

(b) It may not always be possible to produce concrete of the required strength using the minimum cement and fly ash contents. If additional cement and fly ash are needed to meet strength requirements, add at the ratio of 1 pound fly ash per 4 pounds cement. No separate payment will be made for additional cement and fly ash required to meet minimum strength.

*Use Class F Fly Ash when called for in the Contract Documents (as in situations when aggregate is alkali reactive or when seeking to modify workability). Base replacement on 1/6 of cement in non-fly ash concrete, at a ratio of 1.25 pounds of fly ash per 1.0 pound of cement replaced, with no increase in weight of water. Do not exceed 1.5% available alkalis in the fly ash (as Na_20).

D. Unless otherwise specified in the Contract Documents or approved by the Engineer, use Class 3000F concrete with 3/4 inch minus coarse aggregate.

E. Maximum slump variation: 1 inch from the average during any one placement. Should an increase in slump be desirable for the concrete as batched, maintain the ratio of the weight of water to cement by either making proportional increases of cement with increases in water or by reducing the total weight of aggregates incorporated in the mixture.

F. Use accelerating admixtures in cold weather only when approved by the Engineer. Use of admixtures will not relax cold weather placement requirements.

G. Do not use calcium chloride admixtures.

H. Use set retarding admixtures during hot weather only when approved by the Engineer.

I. Flowable Fill (CDF) shall meet the requirements of Table 2 and use 3,200 lbs of (SSD) aggregates per cubic yard with a blend of 70% fine aggregate and 30% coarse aggregate (3/8 inch to No. 4) per ASTM C33.

J. High Density Fill 3200 lbs of (SSD) aggregates per cubic yard with a blend of 50% ¾" coarse aggregate and 50% fine sand.

2.5 HANDLING, MEASURING AND BATCHING CONCRETE

A. Batch concrete to the specifications of the laboratory mix design using acceptable materials. Make corrections as directed by the Engineer based on laboratory or field determinations.

1. Water: Measure water by weight or volume with equipment accurate to 1.0%. Use approved water meters not affected by pressure variations in supply.

2. Cement: Measure cement by weight or volume. Volume to be per mean 94 pounds full bag as packed by the manufacturer. No partial bags are allowed. For weight measurement, use a separate scale accurate to 1.0%.

3. Aggregate: Use State-Certified weighing equipment sized to not delay production. Scales must be accurate to 1.0% and certified as such on a yearly basis. Scale gradations to be approved by the Owner and must permit weighing of aggregate to the specified tolerances. Suspended hopper scales must indicate 50-pound increments at a location that is easy to read.

4. Batching Plant: A single weighing hopper with accumulative scale is permitted provided a separate scale is used to weigh cement, meeting the following requirements:

    a) The batch plant scales are maintained within the maximum tolerances specified for weighing cement.

    b) The cement is always weighed in a separate inner hopper of conventional design.

    c) The cement is always batched and weighed first in the batching sequence.

    d) Coarse and fine aggregate moisture tests shall be performed at least once each day.

    e) Prepare a batch ticket for each batch of concrete delivered to the project. The ticket shall be a form acceptable to the Engineer. The ticket, at a minimum, shall indicate the project name, project number, supplier name, mix design number, bid item number, date and time batched, load number, truck number, volume batched, and the weight measurement of each of the individual components of the mix added to the batch. Load numbers shall be assigned sequentially for each load batched for delivery to the project. Supply all labor necessary to prepare batch tickets as required. Deliver the batch ticket to the Engineer at the point of discharge before incorporating the batch into the work. On the batch ticket, record the revolution counts at the first addition of water or just prior to discharge.

Batching plants will be permitted which are equipped to proportion aggregates and bulk cement by automatic weighing devices approved by the Engineer. Provide 10 standard 50-pound test weights at each batching plant. Equip each batching plant with a device to read moisture content of the fine aggregate positioned for easy reading.

5. Consistency: Concrete shall be of such consistency that it will flow around reinforcing steel, but individual particles of the coarse aggregate, when isolated, shall show a coating of mortar containing its proportionate quantity of sand. The consistency of concrete will be gauged by the ability of the equipment to properly place the concrete in its final position and not by the difficulty of mixing or transporting. The quantity of mixing water used shall be the minimum necessary to provide workability within the ranges of slump specified. The design quantity of the mixing water shall not be varied without approval of the Owner.

B. Thoroughly mix concrete in a manner to positively ensure a uniform distribution of the materials throughout the mass. Concrete shall be mixed only in quantities required for immediate use and shall be used within the time limits specified. Any concrete in which initial set has begun shall be wasted. In no case will retempering of concrete be allowed. Aggregates or bags of cement containing lumps or crusts of hardened material shall not be used. Concrete mixing and delivery shall meet the following minimum requirements:

1. The capacity of the plant and the transportation equipment shall be sufficient to ensure delivery at a rate which will permit proper handling, placing and finishing at the point of delivery. The rate of delivery of concrete shall be such as to provide for continuous operation of placing, handling and finishing concrete.

   The interval between delivery of loads shall be such that layers or lifts of concrete in-place shall not harden before succeeding layers or lifts are placed. In general, no lift or layer of concrete shall remain exposed for more than 20 minutes before being covered by fresh concrete. This provision shall not apply to concrete slabs placed monolithically over columns or walls. Place such concrete as directed by the Engineer.

2. Unless otherwise approved, the concrete shall be delivered to the jobsite and completely discharged within 1-1/2 hours, or before the drum has revolved 300 revolutions, whichever comes first, after introduction of water to the cement. When the air temperature is 85˚F or above, the concrete shall be placed in its final position within one hour after the introduction of the mixing water and cement. No water shall be added at the jobsite without permission of the Owner.

3. A suitable revolution counter shall be provided on each truck which will register the number of revolutions of the drum. This counter shall be mounted in such a position that it can be easily read from the ground by both the operator and the Owner.

4. Generally, no mixed or agitated concrete shall be used which has remained in the drum of the truck agitator, or truck mixer, more than 10 minutes without agitation.

5. Mixed in an approved mixer that volumetrically measures the concrete ingredients and continuously produces concrete that meets the requirements of AASHTO M 241.

C. Site mixed concrete for small concrete jobs, less than 9 cubic yards, is only permitted when approved by the Owner.

PART 3 WORKMANSHIP

3.1 PREPARATION

A. Clean and roughen existing concrete surfaces in contact with new concrete 1/4 inch amplitude and expose clean, sound aggregate.

B. Ensure substrate is properly compacted. Place and install forms, vapor barriers, reinforcement, inserts, embedded parts, formed expansion and contraction joints as called for on the Contract Documents.

C. Prepare previously placed concrete by cleaning with steel brush and applying a 1/2-inch layer of sand-cement grout.

D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with epoxy cement.

E. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

F. Notify the Engineer for final inspection of forms, rebar, inserts and embedded parts, 24 hours prior to placement.

G. Notice will be given to the Engineer or his representative, via Fax, telephone, in-person, or-e-mail, a minimum of 24 hours and a maximum of 48 hours prior to concrete placing in order to accommodate inspection and materials testing. Notice will not be given on Owner Holidays, weekends, or outside of normal Owner work hours. Concrete will not be scheduled to be placed on Owner Holidays, weekends, or outside of normal Owner work hours without the Engineer's approval. Any change in scheduled placing, including date, time, or quantity, will require the placing to be rescheduled necessitating new notice of placing. Concrete will be on order with supplier, and not on "will-call" at time of request to place concrete. If notice is not properly given, the placing will not be allowed, and any resulting additional cost or contract time shall be considered incidental to the cost of the project and no additional payment or time shall be made. The Contractor may, at his own expense, and with the approval of the Engineer or his representative, provide a private Testing Lab to perform the required testing services if proper notice is not given.

H. A safe location that is in close proximity to placing and delivery with adequate access and egress will be provided for all testing. Testing results will be obtained from the Engineer or his representative, and not from testing personnel.

3.2 WEATHER AND TEMPERATURE LIMITATIONS

A. Cold weather concrete, as defined by the American Concrete Institute (ACI) is a period when, for more than 3 consecutive days, the following conditions exist: (1) the average daily air temperature is less than 40°F and (2) the air temperature is not greater than 50°F for more than one-half of any 24-hour period. The average daily air temperature is the average of the highest and the lowest temperatures occurring during the period from midnight to midnight. When there is a probability that cold weather concrete conditions will occur, submit a cold weather concreting and curing plan for approval by the Engineer. Include details of the methods and equipment which will be used to assure that the limitations of Parts B and C are met.

B. Limitations of Mixing: Unless otherwise authorized in writing by the Engineer, discontinue operations when descending air temperature reaches 35°F or lower. The Engineer, at his sole discretion, may allow covering or use of pre-heated forms for temperatures 35°F or lower.

C. Cold Weather Limitations & Concreting Procedures:

1. Before any concrete is placed, completely remove all ice, snow and frost. Furnish concrete that will have a temperature of at least 50°F and not more than 80°F at the time of placing. Do not place against any material whose temperature is 32°F or less.

2. When necessary, in order to produce concrete of the specified temperature, heat either the mix water or the aggregates, or both, prior to batching. Heat in a manner which is not detrimental to the mix and does not prevent the entrainment of the required amount of air. Use methods that heat the materials uniformly. Do not heat aggregates directly by gas or oil flame or on sheet metal over fire. Do not heat either aggregates or water to over 150°F. If either are heated to over 100°F, mix together prior to the addition of the cement so that the cement does not come into contact with materials which are in excess of 100°F.

3. Protection of Concrete. Maintain the temperature of the concrete at a minimum of 50°F for 7 days or 70°F for 3 days after placement except when steam curing is used. When fly ash is used, increase the time to 10 days for 50°F and 5 days for 70°F. Where uniform surfaces of concrete such as decks are involved, maintain the temperature at the surface at the temperatures and times as determined above. Where water cure is required for concrete, prevent water from freezing during the curing period at all times.

a. Concrete may be protected and cured under water provided that the temperature of the water does not fall below 35°F and at least 6 in. of water is maintained over the concrete for a minimum of 10 days.

b. Block combustion heaters up off the surface of the concrete and vent to the outside of the enclosure.

c. Do not exceed a temperature within the enclosure of 120°F when the concrete is protected by any means other than steam.

d. For protection methods other than the use of steam, limit the maximum drop in temperature of the concrete throughout the first 24 hours after the end of protection to 50°F.

e. When steam is used in the protection of the concrete, conform to the methods and requirements elsewhere in this Section under Steam Curing.

f. Furnish calibrated recording thermometers with the range of 0 to 212°F.

g. Temperatures will be taken with an accurate thermometer for the 7-day (or 3-day if maintained at 70°) period. The Contractor's inspection personnel should keep a record of the date, time, temperature of concrete as placed with location of temperature taken, outside air temperature and weather conditions (calm, windy, clear, and cloudy, etc.). The tester's name and temperature information gathered will be furnished to the Engineer. Take temperatures at least two (2) times per day.

h. On small quantities of concrete used in minor structures and sign foundations, protect the concrete from freeze damage by covering the concrete with suitable blanketing materials per Engineer's approval. Maintain such protective covering for a minimum of 5 days. Use recording thermometers to show that concrete used in minor structures was not exposed to freezing temperatures.

D. Hot Weather Limitations & Concreting: Do not exceed concrete temperature of 80°F at time of placement. When the combination of ambient air temperature, concrete temperature, humidity and wind is such that rapid evaporation of moisture from the concrete surface will take place, take measures to slow evaporation to tolerable limits. Such measures may include, but are not limited to, erecting sunshades or placing at night or early morning. Ice may be used as a part of the mixing water providing it has completely melted by the time mixing is completed. Limit the temperature of the surface to be covered by concrete to 90°F or less.

3.3 CONCRETE PLACEMENT

A. Place concrete as close as practical to its final position. Avoid moving with vibrators. Do not allow concrete to segregate from distance of fall, deflection from forms, over consolidation, or other reasons. Do not drop concrete more than 5 feet without an approved tube or tremie. Keep tube full of concrete and lower end of the tube buried in new concrete.

B. Consolidate concrete with vibrators operating within concrete, unless directed otherwise by the Contract Documents or other portions of these specifications.

1. Transmit 5,000 impulses per minute minimum; 10,800 for deck concrete.

2. Operate vibrators fully submerged.

3. Provide a resilient covering on probes used with epoxy coated rebar.

4. Space vibrator insertions at 18 inches to 24 inches each way.

5. Work concrete thoroughly, around reinforcement, embedded fixtures, and into corners.

6. Do not use vibrator to move concrete horizontally. Do not over vibrate causing segregation.

7. Notify the Engineer a minimum 24 hours prior to commencement of operations.

8. Notify the Engineer for final inspection of forms, rebar and inserts/embedded parts.

9. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.

3.4 CONCRETE FINISHING

A. Provide formed concrete surfaces to be left exposed with Ordinary Surface Finish, if not otherwise specified.

B. Provide a Rubbed Surface Finish where specified on the Contract Documents.

C. Finish concrete slab surfaces to requirements of Section 705 – Concrete Pavement or Section 706 – Other Concrete Construction.

3.5 CURING AND PROTECTION

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. Provide continuous watering for 7 days unless otherwise authorized by the Engineer.

B. Concrete Decks and Major Structures:

1. Protect and cure concrete in cold weather as required in Section 3.2.

2. Protect and cure concrete in hot weather as required in Section 3.2.

3. Apply approved curing compounds and moisture to decks and other flatwork as specified in Section 705 – Concrete Pavement.

4. Other curing methods may be permitted by the Engineer.

C. Protect minor structures such as sign foundations, sidewalks, curb and gutter, small irrigation boxes, etc. from freezing by covering with burlap or insulation blankets. Repair or replace freeze-damaged concrete as directed by the Engineer.

D. Steam Curing for Precast Work:

1. When steam curing is used, provide a minimum 2-hour period through which the concrete is protected within a temperature range of 10°F to 50°F. Following this initial period, increase the temperature at a maximum rate of 40°F per hour, to a temperature between 100°F and 175°F.

2. Continue curing at this temperature until cylinder strengths are above the release strength for prestressed reinforced concrete or above 80 percent of the intended 28-day strength, whichever is greater.

3. Upon completion of the cure cycle, when ambient air temperatures are below 40°F, cool the concrete gradually by decreasing its temperature at a rate not to exceed 40°F per hour until the temperature differential between the concrete and outside air does not exceed 25°F.

4. Expose no member to below freezing temperatures until at least six days after fabrication, or until the 28-day strength has been achieved.

E. Cure and protect concrete flatwork as specified in Section 705 – Concrete Pavement.

3.6 FIELD QUALITY CONTROL

A. Provide free access to work and cooperate with appointed firm.

B. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.

C. Prior to placing concrete, provide aggregate samples to an approved laboratory for gradation testing and submit results to Engineer for review. If aggregates fail to meet specifications, resubmit and retest at no additional cost to the Owner. Acceptance of the tested samples does not assure acceptance of the material source.

D. Test in accordance with the following standard methods:

1. Air Content of Freshly Mixed Concrete by the Pressure Method: AASHTO T 152.

2. Compressive Strength of Cylindrical Concrete Specimens: AASHTO T 22.

3. Obtaining and Testing Drilled Cores and Sawed Beams of Concrete: AASHTO T 24.

4. Making and Curing Concrete Test Specimens in the Laboratory: AASHTO T 126 except cylinders shall be molded only in single-use molds made of sheet metal or plastic.

5. Determining Surface Smoothness: Idaho T-87.

6. Evaporation: Idaho T-133.

7. Slump of Portland Cement Concrete: AASHTO T 119.

8. Weight Per m^3 (cubic foot), Yield and Air Content (Gravimetric) of Concrete: AASHTO T 121.

9. Sampling Freshly Mixed Concrete: WAQTC – TM 2. Except that when concrete is pumped, acceptance sampling shall be done at the placement end of the line where practical.

10. Making and Curing Concrete: AASHTO T 23. Compressive and flexural test specimens in the field except mold cylinders only in single-use molds made of sheet metal or plastic.

E. Take 3 concrete test cylinders for every 100 or less cubic yards of each class of concrete placed. Take 1 additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

1. Curing: Cure and test cylinders at an Owner-approved laboratory.

2. Test Timing: Test 1 of each 3 at 7 days and the other 2 at 28 days.

3. Test Criteria: The average of any five consecutive tests for each class of concrete must be greater than the specified strength, and not more than 10% of the tests are to have strength values less than 90% of the specified strength. A test is considered the average of 2 cylinders broken at 28 days.

4. Test Failure: If concrete fails, the Owner has the right to reject the concrete, change the mix proportions, or both, at no additional cost to the contract. Additional coring, sampling and testing may be required at no additional cost to the contract. Should in-situ testing also fail, the Contractor is to make necessary modifications to the satisfaction of the Owner to replace the defective concrete or structure(s) at no additional cost to the contract, or through pay reduction per Subsection 3.8.

F. Test for slump from first truckload, then for every 100 or less cubic yards of each class of concrete placed.

G. Test for air content from first load, then every 100 or less cubic yards of each class of concrete placed.

3.7 PATCHING

A. Allow the Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify the Engineer upon discovery.

C. Fill holes from form ties.

D. Patch imperfections as directed by the Engineer.

3.8. DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements. Acceptance of strength will be determined from the results of 28-day strength tests.

B. Repair or replacement of defective concrete will be determined by the Engineer. Conventionally reinforced concrete or paving concrete which fails to meet the intended minimum strength for the class required may be accepted at a reduced price provided the strength is not more than 10% below the intended minimum strength. Concrete of this type represented by tests falling more than 10% below intended minimum strength, is subject to rejection.

1. The price adjustment for conventionally reinforced concrete or paving concrete which fails to meet the intended strength, but is allowed to remain in place, will be in accordance with Table 3.

Table 3
PAY REDUCTION

Percent of Specified Strength	Pay Factor
95 – 99	0.95
90 – 94	0.80

C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of the Engineer for each individual area.

D. For roadway work, any work necessary to repair cracking or any other defects of new concrete pavement will, in addition to the foregoing, be done at the discretion of the Engineer in accordance with the guidelines of the “Construction Specification Guideline for Concrete Pavement Streets and Local Roads” published by the American Concrete Pavement Association.

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement and payment for Concrete (Cast-In-Place) for footings, walls, elevated slabs, and other structural concrete includes forming, stripping, finishing, curing, joints, hauling and placing required for installation to the lines and grades shown on the Contract Documents. If not listed elsewhere, concrete to include reinforcing steel. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Concrete (Cast-In-Place) by the cubic yard for class of concrete specified.

1. Bid Schedule Payment Reference: 703.4.1.A.1.
2. Bid Schedule Description: Concrete (Cast-In-Place) - Class _____…cubic yard (CY).

END OF SECTION

SECTION 704

PRECAST CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wetwells.

B. Vaults and Meter Boxes.

C. Tanks, Septic Tanks and Fuel Containment.

D. Head Gates and Check Gates.

E. Non-Prestressed Bridges and Box Culverts.

F. Grout Packing.

G. Connection and Supporting Devices.

1.2 RELATED SECTIONS

A. Section 502 - Manholes.

B. Section 602 - Stormwater Inlets, Catch Basins, Manholes, and Gravity Irrigation Structures.

C. Section 702 - Concrete Reinforcement.

D. Section 703 - Cast-in-Place Concrete.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Part I and II.

B. ITD Standard Specifications for Highway Construction.

C. ANSI/AWS D1.1: Structural Welding Code - Steel.

D. ANSI/AWS D1.4: Structural Welding Code - Reinforcing.

E. AASHTO Standard Specifications for Highway Bridges.

F. AASHTO M 199/M 199M: Precast Reinforced Concrete Manhole Sections.

G. AASHTO M 259/M 259M: Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers.

H. AASHTO M 273/M 273M: Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with less than 2 feet of Cover Subjected to Highway Loadings.

I. National Precast Concrete Association Quality Control Manual For Precast Concrete Plants.

J. Interim Guidelines for the Use of Self-consolidating Concrete in Pre-cast/Pre-stressed Concrete Institute Member Plants, TR-6.

1.4 DESIGN REQUIREMENTS

A. Size components to withstand applicable code specified loads.

B. Design traffic rated items and bridges to the requirements of AASHTO Standard Specifications for Highway Bridges MS 22.5 (HS 25-44).

C. Design and supply box culverts per AASHTO M 259/M 259M or M 273/ M 273M.

D. Design and supply manholes per AASHTO M 199/M 199M (ASTM C 478/C 478M), Section 502 - Manholes, and Section 602 – Stormwater Inlets, Catch Basins and Manholes.

E. Design members exposed to the weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

F. Design system to accommodate construction tolerances, deflection of other structural members, and clearance of intended openings.

1.5 SUBMITTALS

A. Submit shop drawings and calculations for items that are not ISPWC Standard Drawing items or detailed in AASHTO Standard Specifications. Calculations to be sealed by a Professional Engineer registered in the State of Idaho.

B. Submit shop drawings indicating layout, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items, dimensions, openings, and relationship to adjacent materials.

C. Indicate design loads, deflections, cambers, bearing requirements, and special conditions.

D. Submit fabricator’s installation instructions.

1.6 QUALIFICATIONS

A. Fabricator: Company specializing in manufacturing the work of this section with minimum 3 years documented experience.

B. Design precast concrete members under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State of Idaho.

C. Welder: Qualified within previous 6 months in accordance with ANSI/AWS D1.1 and ANSI/AWS D1.4.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code for design load and construction requirements applicable to work of this section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Handle precast members in position consistent with their shape and design. Lift and support only from designated support points.

B. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

C. Protect members to prevent staining, chipping, or spalling of concrete.

D. Mark each member with plant, date of production and final position in structure, unless directed otherwise by the Engineer.

PART 2 MATERIALS

2.1 MATERIALS

A. Cement: Grey Portland, as specified in Section 703 – Cast-In-Place Concrete, except Type III is allowed.

B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements. Deviations from the requirements of Section 703 – Cast-In-Place Concrete to be approved by the Engineer.

2.2 REINFORCEMENT

A. Reinforcing Steel: Per Section 702 – Concrete Reinforcement.

B. Coating: Supply galvanized or epoxy coated reinforcement if specified on the Contract Documents.

2.3 ACCESSORIES

A. Connection and Supporting Devices: Designed by precaster. Coat and protect as required and as shown on the Contract Documents.

B. Grout: Non-shrink, non-metallic, minimum yield strength of 6000 psi at 28 days. Meet the requirements of ITD Standard Specifications for Highway Construction Grout Type “B”, Class I.

2.4 FABRICATION

A. Maintain plant records and quality control program during production of precast members. Make records available upon request.

B. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on the Contract Documents.

C. Provide required openings and embed accessories provided by other sections, at indicated locations.

2.5 FINISHING

A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.

B. Cure members under identical conditions to develop required concrete quality, and minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

C. Plant Finish: Normal plant finish; surface may contain small surface holes caused by air bubbles, minor chips, or spalling at edges or ends, without major discoloration.

2.6 TOLERANCES

A. Conform to accepted industry standard for product being produced or as specified on Contract Documents.

2.7 TESTS

A. Test in accordance with Section 703 – Cast-In-Place Concrete. If self-consolidating concrete, test in accordance with the guidelines in Section 704.1.3.I and Section 704.1.3.J.

PART 3 WORKMANSHIP

3.1 EXAMINATION

A. Verify that site conditions are ready to receive work and field measurements are as shown on drawings.

B. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

A. Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

3.3 INSTALLATION

A. Install members without damage to structural capacity, shape, or finish. Replace or repair damaged members.

B. Align and maintain uniform horizontal and vertical joints, as erection progresses.

C. Maintain temporary bracing in place until final support is provided. Protect members from staining.

D. Provide temporary lateral support to prevent bowing, twisting, or warping of members.

E. Adjust differential camber between precast members to tolerance before final attachment.

F. Secure units in place. Perform welding in accordance with ANSI/AWS D1.1.

3.4 INSTALLATION TOLERANCES

A. Install members level and plumb within allowable tolerances.

B. When members cannot be adjusted to conform to design or tolerance criteria, cease work and advise the Engineer. Execute modifications as directed.

3.5 PROTECTION

A. Protect members from damage caused by field welding or installation operations.

B. Provide non-combustible shields during welding operations.

C. Paint with two coats of rust inhibiting paint all weldments and welds, or provide other suitable protective coating.

3.6 CLEANING

A. Clean weld marks, dirt, or blemishes from surface of exposed members.

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement and payment for precast concrete includes design, fabrication, reinforcement, concrete, imbedded items, openings, delivery, installation, bearing pads, sealant, connection devices and grouting. Measurement and payment for other precast construction items are listed in other sections. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Bridge or Stiffleg Box Culvert (3 sided) - _____ span x _____ rise: By the linear foot measured perpendicular to the span for the type and size specified, or per lump sum as designated in the Bid Schedule.

1. Bid Schedule Payment Reference: 704.4.1.A.1.
2. Bid Schedule Description: Bridge/Stiffleg Box Culvert (3 sided) - _____ span x _____ rise…linear foot (LF).

3. Bid Schedule Payment Reference: 704.4.1.A.3.
4. Bid Schedule Description: Bridge/Stiffleg Box Culvert (3 sided) - _____ span x _____ rise…lump sum (LS).

B. Box Culvert (4 sided): By the linear foot measured perpendicular to the span for the type and size specified, or per lump sum as designated in the Bid Schedule.

1. Bid Schedule Payment Reference: 704.4.1.B.1.
2. Bid Schedule Description: Box Culvert (4 sides) - _____ span x _____ rise…linear foot (LF).

3. Bid Schedule Payment Reference: 704.4.1.B.3.
4. Bid Schedule Description: Box Culvert (4 sides) - _____ span x _____ rise…lump sum (LS).

C. Vaults: Per each for the size specified.

1. Bid Schedule Payment Reference: ….704.4.1.C.1.
2. Bid Schedule Description: Vault, width _____, height _____ length _____…each (EA).

D. Miscellaneous Precast Structure: Tanks, Meter Boxes, Valve Boxes Head and Check Gates, and other miscellaneous precast structures: Per each for type and size of structure specified.

1. Bid Schedule Payment Reference: 704.4.1.D.1.
2. Bid Schedule Description: _____ Miscellaneous Precast Structure (Type)_____…each (EA).

END OF SECTION

SECTION 705

PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Constructing Portland cement concrete pavement on a prepared subgrade or base course.

1.2 RELATED SECTIONS

A. Section 701 – Concrete Formwork.

B. Section 702 – Concrete Reinforcement.

C. Section 703 – Cast-in-Place Concrete.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Parts I and II.

B. ITD Standard Specifications for Highway Construction.

C. AASHTO M 183/M 183M: Structural Steel.

D. AASHTO M 254: Corrosion Resistant Coated Dowel Bars.

E. ASTM D 3505: Joint Sealants, Hot-Applied, for Concrete and Asphalt Pavements.

F. ASTM D 3406: Joint Sealant, Hot-Applied Elastomeric-Type, for Portland Cement Concrete Pavements.

G. ASTM M 213: Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

H. Idaho Test Method T-133: Determination of the Rate of Evaporation of Surface Moisture from Concrete.

1.4 SUBMITTALS

A. Provide concrete mix design per Section 703 – Cast-In-Place Concrete.

B. Provide product data on dowels, tie-bars, reinforcing steel, control joint devices and joint fillers and sealers.

PART 2 MATERIALS

2.1 PORTLAND CEMENT CONCRETE

A. Furnish materials meeting Section 703 – Cast-In-Place Concrete requirements. Maximum slump – 4 inch, or 2 inch when using a slip form method. Use 3/4 inch coarse aggregate unless otherwise directed. Class of concrete to be as specified on the Contract Documents.

B. Handle measure, batch, mix, and deliver materials in accordance with SectIon 703 – Cast-In-Place Concrete.

2.2 REINFORCING STEEL

A. Use reinforcing steel and welded wire fabric meeting Section 702 – Concrete Reinforcement.

2.3 DOWELS FOR RIGID PAVEMENT CONTROL JOINTS OR DEVICES

A. Dowel Bars: AASHTO M 183/M 183M. Assure dowel bars are plain and free from burring or other deformations that prevents slippage in the concrete.

2.4 JOINT FILLERS AND SEALERS

A. Furnish a one piece joint filler sized the full depth and width of the joint. If a multiple-pieced joint filler is approved, fasten the abutting ends following the filler manufacturer's recommendations.

B. Pourable Joint Sealer: ASTM D 3405 or ASTM D 3406.

C. Preformed Joint Filler: AASHTO M 213. Furnish punched to receive the dowels shown on the Contract Documents.

D. Lubricant-Adhesive: As recommended by joint manufacturer.

2.5 CURING AND PROTECTIVE COATING MATERIALS

A. Furnish materials meeting the following requirements:

1. Membrane-forming curing compound, Type 2, Class A per ASTM C 309-94.

PART 3 WORKMANSHIP

3.1 EXAMINATION

A. Verify compacted granular base is acceptable and ready to support paving and imposed loads.

B. Prepare subgrade under the requirements of Division 200 - Earthwork.

C. Prepare base under the requirements of Division 800 – Aggregates and Asphalt.

D. Verify grades and elevations of base are correct.

3.2 EQUIPMENT

A. Obtain the Engineer's approval of equipment and tools used for handling materials and performing all parts of the work. Approval applies to design, capacity, and mechanical conditions. Assure the equipment is onsite ahead of the start of construction operations for the Engineer's examination.

1. Mixers and Hauling Equipment: Mixers, agitators and nonagitating hauling equipment to meet the requirements of ITD Standard Specifications for Highway Construction, Section 502.

2. Machine Paving with Forms: Any machine or combination of machines which will consolidate the concrete across the full width of the placement into a uniform and homogeneous mass, free of rock pockets, and without separation of mortar and aggregates. A test section of pavement may be required to demonstrate capability of equipment. Vibrating units may be of the internal, pan, beam or roller type.

3. Slip Form Paver: Paver to spread, consolidate, screed and float-finish freshly placed concrete in one complete pass with minimum of hand finish. Paver to have automatic screed control mechanisms based on a string line or trimmed surface. The paver shall have internal vibrators. Amplitude to be perceptible on the surface concrete more than 1 foot from the vibrator.

a. Vibration Rates*: Surface - 3500 cycles/min.
Internal – 5000 cycles/min.
*Tachometer required.

4. Concrete Sawing Equipment: Provide a minimum of three production saws, including one standby unit, of adequate power to perform the work. Unless otherwise provided or allowed, all saws to be multiple arbor, multiple blade gang saws. All saws operated on 3- to 4-hour-old pavement (nonrigid) to be work bridge mounted so weight is not on new concrete. Maintain all of this equipment in good working order. Keep equipment on the job before and continuously during concrete paving operations. Maintain an ample supply of saw blades at the site.

3.3 FORMS

A. Forms: May be of any material which result in a pavement of specified thickness, cross section, grade and alignment as shown on the Contract Documents.

B. Support to prevent deflection or movement. Top of forms to not deviate more than 1/8 inch in 10 feet and the alignment of forms to be within 1/4 inch in 10 feet. Forms to remain until concrete is sufficiently set to withstand removal.

3.4 WEATHER AND TEMPERATURE LIMITATIONS

A. Refer to Section 703 – Cast-in-Place Concrete.

3.5 PLACING CONCRETE

A. Place dowels and rebar as shown on the Contract Documents.

1. Rebar Tie Bars to be epoxy-coated deformed bars at size and spacing specified on the Contract Documents. Place securely on approved supports or place by approved mechanical means. Keep bars clean and free of any material that will impair concrete bonding.

2. Dowel bar load transfer devices to be an Engineer approved unit assembled into lane widths. Two assembly width units maximum will be allowed at tapers or ramps. Anchor assembly securely to ground or machine insert by method approved by the Engineer. Coat bars per AASHTO M 254, Type A or B. Type B Coatings to be coated with a thin Bond Breaker (such as Saran Wrap). Other insertion methods to be Engineer approved.

B. Moisten forms and surface of base immediately ahead of concrete placement. Do not add water to concrete surface until water cure of surface begins.

C. Place concrete in continuous operation between construction joints.

D. Deposit concrete as close as possible to final positions. Avoid rehandling.

E. Thoroughly consolidate concrete against forms. Avoid gravel pockets. Notify the Engineer immediately on discovery of gravel pockets.

F. Plan concrete placement to allow access to local traffic as required.

G. Placement sequence is strike-off and consolidation, floating, removal of laitance, straight edging, and final finish.

H. Hand Placement Methods.

1. Spread concrete evenly. Do not use vibrators to extensively shift concrete.

2. Consolidate with surface or internal vibrators. Do not cause concrete to segregate or lose entrained air.

3. After consolidation, strike concrete to final surface profile.

4. Smooth by floating. Maximum forward advance shall be 1/2 the float length. Floating will stay within 30 feet of compaction. Float until irregularities and free water on pavement are removed.

5. Scrape surface with 10 feet long (minimum) grout rod. Handle to reach to edge of pavement. Rod operator to not stand on fresh concrete. Operate rod to correct irregularities and remove water and laitance.

6. Place contraction joints.

7. Hand methods are allowed only where specified on the Contract Documents or as directed by the Engineer. A demonstration section may be required.

I. Machine Paving with Forms.

1. Spread concrete evenly. Do not use vibrators to extensively shift concrete.

2. Machine must be in motion when vibrators are operating.

3. Do not over vibrate, causing segregation, excess mortar at surface, or loss of entrained air.

4. Proper machine operation shall result in pavement finished to established grade and cross section, and a smooth surface with little hand finishing, and without excess fines at surface.

5. Remove water and laitance with 10 feet long (minimum) grout rod. Rod operator shall not stand on fresh concrete.

J. Slip Form Paver

1. Do not rest vibrators on new pavements or side forms.

2. Do not operate vibrators when machine is not moving.

K. Place joints per Subsection 3.6.

L. Concrete sawing: Provide adequate artificial lighting for night sawing.

M. Edging: Before final finish, edge pavement to a 1/8-inch radius. Concrete shall have attained partial set and be free of sitting water.

N. Final finish: Per Contract Documents or as directed by the Engineer.

1. Broom: Approved type broom finish applied perpendicular to centerline. Overlap strokes slightly.

2. Steel Comb: Tines 4 inch long at 1/2 inch on center on a self-propelled machine. Comb direction as directed in the Contract Documents or by the Engineer. Comb edges by hand if mechanical comb slumps edges. Correlate texture depth to a reference block as determined by Idaho T-97.

3. Burlap or Turf Texture: Approved type textured finish applied parallel to centerline. Overlap strokes must be a minimum of 2-feet.

3.6 JOINTS

A. Locate contraction or construction joints as shown on the Contract Documents. As an alternative, the Contractor may furnish a detailed joint layout plan, including construction phasing sequence for approval by the Engineer. The joint layout plan must be submitted at least 10 days prior to concrete placement. Locate longitudinal joints on lane lines where possible.

B. Transverse contraction joints may be formed or sawn.

1. Furnish a detailed joint layout plan, including construction phasing sequence, for approval by the Engineer prior to construction.

2. Warp joints as required at manholes, catch basins, valves, and monuments. Isolate these items per American Concrete Pavement Association Publication IS006P. Manhole collars per ISPWC do not apply in concrete paving sections.

3. Match curb, gutter, and sidewalk joints and score lines with concrete paving joints. Construct additional joints and score lines to meet minimum requirements as specified herein.

4. See American Concrete Pavement Association Publication IS006P – Intersection Joint Layout for additional details on adjusting joints for utility fixtures.

5. Transverse joints must be at 12-foot spacing unless noted otherwise (maximum spacing = 15.5 feet). Transverse joint spacing shall not exceed 150% of the longitudinal joint spacing.

6. Install dowel bars at all transverse joints and tiebars at longitudinal joints.

C. Formed transverse contraction joints.

1. Construct formed joints by imbedding approved preformed joint material. Material to be cut to length of joint (1/4 inch) of edge of panel.

2. Place formed joint before initial set.

3. Cut groove with a tool provided with stops to prevent cutting groove too deep. Cut groove at right angles to the surface.

4. Insert filler into groove. Top of filler to be between flush and 1/8 inch below surface.

5. Finish surface of pavement against filler strip with hand trowel.

6. Saw transverse contraction joints prior to longitudinal contraction joints being sawn.

D. Sawn Transverse Contraction Joints.

1. Relief saw cut as soon as concrete can be sawn without excessive raveling, but in no case longer than 24 hours after concrete placement. Saw to depth, locations and spacings shown on Contract Documents.

2. Saw without regard to time of day or weather. Provide artificial lighting as required. Sawing must keep pace with paving operations. Stop paving, if necessary.

3. Install sealant after 7 days curing time. Saw joints for sealant as detailed on the Contract Documents. Do not saw wider than specified. Jet waterblast clean the sealant reservoir sides and the adjacent pavement 1 inch each side of joint. Remove all residue from sawing and cleaning. Do not allow residue to blow away.

4. Sand blast and air blow the joint at 100 psi minimum within one hour of pouring sealant. Pavement temperature must be 50°F or higher, or as otherwise allowed by manufacturer. Pavement and weather to be dry. Install backer rod or bond breaker per manufacturer's instructions. Install sealant.

5. Repair all damage to pavement.

E. Transverse Construction Joints: Construct as shown on the Contract Documents when paving is discontinued for more than 30 minutes. Form a wedge shape key in the concrete when the construction joint coincides with a contraction joint. Other construction joint locations to be 5 feet away, minimum, from other joints, and require tire bars.

F. Longitudinal Contraction Joints: Install in true alignment per the Contract Documents. Use preformed joint material or saw as specified in Section D.

G. Longitudinal Construction Joints: Construct and locate as shown on Contract Documents or as approved by the Engineer.

3.7 SURFACE TEST

A. Tests will commence as soon as concrete curing allows.

B. Mark and grind down any area higher than 1/4 inch in 10 feet.

3.8 CURING

A. Apply Type 2, Class B curing compound per ASTM C 309-03 at the rate of 1 gal/150 ft^2 immediately after surface finishing is complete.

B. Apply water as soon as concrete is set enough to not be damaged.

C. Keep concrete surface moist for five days minimum. Cotton mats, rugs, burlap or other cover may be used as a reservoir medium. Plastic sheeting is permitted only with other reservoir mediums.

D. Other methods for curing to be approved by the Engineer.

E. Protect in place concrete from temperatures below 35°F with insulation material for 7 days after placing. Replace freeze damaged concrete with no additional cost to the Owner.

3.9 PROTECTION AND OPENING PAVEMENT TO TRAFFIC

A. Protect pavement against use by public or by construction traffic until sufficient curing has occurred. Contractor to be responsible for damage occurring by traffic or equipment operating prematurely on the pavement.

B. Protect critical area such as curbs and pavement edges adjoining unfinished work.

C. Permit full use of pavement when field cured concrete test specimens reach 3500 psi, unless directed otherwise by the Engineer. Permit cars and pickup trucks 72 hours after placement unless directed otherwise by the Engineer.

D. In lieu of test specimens to determine compressive strength, maturity testing may be used in accordance with ASTM C1074. Develop the maturity-strength relationship and provide maturity curves along with supporting data and field procedures for monitoring maturity for approval at least 10 days prior to use. The maturity-strength relationship shall represent field placed concrete and shall be validated on the first field placement and every 7 calendar days or 10,000 cubic yards thereafter, whichever is greater. Cylinders used for validation testing shall be cured using the same procedures as used in developing the initial maturity-strength relationship. Initial validation shall consist of validating a minimum of two points on the maturity curve, at least one of which shall be at a period of less than 7 days. Subsequent validation shall be a minimum of a single point occurring at less than 7 days. A maturity curve will be considered valid if the validation points are within 10 percent of the original maturity curve. Furnish all equipment, including thermo or maturity meters, thermocouples, wire and qualified personnel to monitor maturity and provide information to the Engineer.

3.10 FIELD QUALITY CONTROL

A. Per Section 703 – Cast-in-Place Concrete.

PART 4 MEASUREMENT AND PAYMENT

4.1 Measurement and Payment for portland cement concrete pavement includes forming, finishing, rebar, dowels, concrete, curing, joints, hauling and placing required for installation to the lines and grades shown on the Contract Documents. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Portland Cement Concrete Pavement: By the square yard installed for the class and thickness of pavement specified.

1. Bid Schedule Payment Reference: 705.4.1.A.1.
2. Bid Schedule Description: Portland Cement Concrete Pavement – Class _____ Thickness….. square yard (SY)

B. Portland Cement Concrete Pavement: By the ton for the class of pavement specified measured by truck tickets.

1. Bid Schedule Payment Reference: 705.4.1.B.1.
2. Bid Schedule Description: Portland Cement Concrete Pavement - Class _____ Thickness…… ton (TON).

END OF SECTION

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SECTION 706

OTHER CONCRETE CONSTRUCTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete sidewalks, stair steps, integral curbs, sign posts, valley gutters, gutters, parking areas, driveways on a prepared base.

B. Placing methods include cast-in-place in forms or extruded/slip form methods.

1.2 RELATED SECTIONS

A. Section 204 – Structural Excavation and Backfill.

B. Section 701 - Concrete Formwork.

C. Section 702 - Concrete Reinforcement.

D. Section 703 - Cast-in-Place Concrete.

E. Section 705 - Concrete Pavement.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Part I and II.

B. AASHTO M 213: Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.4 SUBMITTALS FOR REVIEW

A. Provide a concrete mix design as required in Section 703 – Cast-In-Place Concrete.

B. Product Data: Provide data on joint filler and preformed joint material.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Limitations of Mixing: Unless otherwise authorized in writing by the Engineer, discontinue operations when descending air temperature reaches 35°F, or lower. Furnish concrete that will have a temperature of at least 50 degrees F and not more than 85 degrees F at the time of placing.

PART 2 MATERIALS

2.1 FORM MATERIALS

A. For cast-in-place items, use forms that are straight, warp-free, and of sufficient strength to resist movement during placement of concrete. Conform to the requirements of Section 701 - Concrete Formwork.

2.2 SLIP FORM/EXTRUSION SYSTEM

A. Machinery to be in good working order, clean, and leave concrete surfaces smooth.

B. Machinery to follow a string line, or grade to be accepted by the Engineer.

C. The Engineer may require a demonstration section.

2.3 REINFORCEMENT

A. Conform to the requirements of Section 702 – Concrete Reinforcement.

B. Unless otherwise specified, all reinforcing steel to be ASTM A 615M, 60 ksi, yield grade, deformed billet.

2.4 PORTLAND CEMENT CONCRETE

A. Conform to the requirements of Section 703 – Cast-In-Place Concrete and Section 705 – Concrete Pavement, except use the following classes of concrete:

TABLE 1 – BASIC MIX DESIGN PARAMETERS

28-day Compressive Strength (PSI)	Max. Water/Cement Ratio (LB/LB)	Slump (IN)	Air Content (%)
3000	0.50	5 Max	6.5 +/- 1.5
1500	0.60	8 Max.	0-6

1. Fly ash, if used shall be Class F. Fly ash shall not be less than 20 percent or exceed 35 percent of the total cementitious material (Fly Ash + Cement).

2. Acceptance of concrete is based on conformance with all parameters specified for the given concrete class. Acceptance of strength will be determined from the results of 28-day compressive strength tests. Criteria for acceptance shall be in accordance with Section 703 Part 3.8.A&B and the Table 3 pay reduction.

3. At the Contractor's option, a set stabilizer meeting ASTM C 494 may be used. When a set stabilizer is used, discharge time may be extended to 3 hours and total revolutions shall not exceed 500.

4. Unless otherwise specified, all concrete shall be 3,000 psi.

2.5 ACCESSORIES

A. Curing Compound: as specified in Section 705 – Concrete Pavement.

2.6 STANDARD DETAILS

A. Comply with Standard Drawings SD-701 – SD-714 A for miscellaneous new concrete construction unless otherwise detailed in the Contract Documents.

PART 3 WORKMANSHIP

3.1 EXAMINATION

A. Verify compacted granular base is acceptable and ready to support paving and imposed loads.

B. Prepare subgrade under the requirements of Division 200 – Earthwork.

C. Prepare base under the requirements of Division 800 – Aggregates and Asphalt.

D. Verify grade and elevations of base are correct.

3.2 FORMING

A. Meet the requirements of Section 701 – Concrete Formwork.

B. Place and secure forms to correct location, dimension, profile, and grade.

C. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

D. Place joint filler vertical in positions, in straight lines. Secure to formwork during concrete placement.

3.3 REINFORCEMENT

A. Place reinforcement under the requirements of Section 702 – Concrete Reinforcement.

B. Place reinforcement as indicated on the Contract Documents.

3.4 ACCESSORIES

A. Place any precast concrete, embedded assemblies, or inserts specified on the Contract Documents.

3.5 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of catch basin frames with oil to prevent bond with concrete pavement.

C. Notify the Engineer a minimum of 24 hours prior to commencement of concreting operations.

3.6 PLACING CONCRETE

A. Hand Techniques: Place concrete as close as possible to final location. Avoid moving with vibrators. Vibrate or tamp to consolidate and avoid rock pockets. Do not allow placing or consolidation techniques to segregate concrete or to lose entrained air. Meet the requirements of Section 703 – Cast-In-Place Concrete.

B. Slip Form Techniques: Slip form system shall extrude, consolidate, and smooth concrete. Do not allow machine to vibrate concrete when machine is not moving.

C. Ensure reinforcement, inserts, embedded parts, formed joints and are not disturbed during concrete placement.

D. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur without approval of the Engineer.

E. Place concrete to pattern indicated on the Contract Documents.

3.7 JOINTS

A. Place or construct joints of the type and in the locations shown on the Contract Documents.

B. Place sawn joints at optimum time after finishing.

C. Expansion joint material specified to comply with AASHTO M 213, and shall be installed vertically extending to the full depth and width of the concrete work. Expansion joint material shall be installed perpendicular to straight sections and radially on a curve. Expansion joint filler material shall completely fill the joint area to within ¼ inch of any surface of the concrete. Excess filler material shall be trimmed off to the specified dimensions of the concrete work in a neat and workmanlike manner. During the placing and tamping of the concrete, the filler strip shall be held rigidly and securely in its proper position. Expansion joint material shall be placed around all surface installation, between the sidewalk and existing buildings, at locations where sidewalks, approaches, alley pads, etc. intersect one another at an angle, at joints of newly constructed concrete abutting existing concrete and around utility poles, light poles, and fire hydrants.

3.8 FINISHING

A. Driveways Vehicle Approaches, and Sidewalk: Light broom.

B. Paving: Wood float, slightly rough.

C. Curbs and Gutters: Light broom parallel to long dimension.

D. Inclined Vehicular Ramps: Broomed perpendicular to slope.

E. Place curing compound on exposed concrete surfaces immediately after finishing. Cure in accordance with Section 705 – Concrete Pavement (except cover in plastic sheeting in lieu of water cure).

3.9 BACKFILL

A. Backfill up to 4 inches from top of concrete with native material. Compact to prevent settlement.

B. Areas with Lawns.

1. Backfill top 4 inches with black loam or rock-free top soil.

2. Seed and protect as directed on the Contract Documents.

3. Place sod as directed on the Contract Documents. (Adjust topsoil depth to accommodate thickness of sod.)

4. Seed type or sod as specified on the Contract Documents.

5. Cultivate and water as specified on the Contract Documents.

3.10 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 feet.

B. Maximum Variation from True Position: 1/2 inch.

C. For valley gutter, curb turn fillets or other drainage structures using water test: Maximum water depth – 1/4 inch, maximum pond length 10 feet.

D. No ponding is allowed on sidewalks, steps, pedestrian ramps or designated pathways.

3.11 FIELD QUALITY CONTROL

A. Test concrete and take samples as specified in Section 703 – Cast-In-Place Concrete. The minimum test requirements will be at least one test of slump and air content per project and per class of concrete for this section.

3.12 PROTECTION

A. Protect concrete as specified in Section 705 – Concrete Pavement.

3.13 STANDARD DETAILS

A. Comply with Standard Drawings SD-701 – SD-714 A for other concrete construction unless otherwise detailed in the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit prices as designated on the Bid Schedule. Prices include forming, furnishing and installing or constructing joint devices and fillers, furnishing and installing reinforcing steel (unless otherwise specified) miscellaneous embedded items, furnishing, placing, finishing, and curing concrete. If required and not listed in the Bid Schedule, excavation, base materials, backfill and compaction are to be considered incidental to the following Bid Items:

A. Concrete Curb and Gutter: By the linear foot for the particular type used, horizontal distance along face of curb. Include furnishing and placing backfill and topsoil behind curb. Include transition and curb terminus section distance at the same bid cost as for typical curb items for pay distance. Does not include distance through drop inlets or catch basins for pay distance.

1. Bid Schedule Payment Reference: 706.4.1.A.1.
2. Bid Schedule Description: Standard 3 inch Rolled Curb and Gutter…linear foot (LF).

3. Bid Schedule Payment Reference: 706.4.1.A.3.
4. Bid Schedule Description: _____ Vertical Curb (No Gutter) Type _____…linear foot (LF).

5. Bid Schedule Payment Reference: 706.4.1.A.5.
6. Bid Schedule Description: Standard 6 inch Vertical Curb and Gutter…linear foot (LF).

7. Bid Schedule Payment Reference: 706.4.1.A.7.
8. Bid Schedule Description: Curb and Gutter, Type _____…linear foot (LF).

9. Bid Schedule Payment Reference: 706.4.1.A.9.
10. Bid Schedule Description: Mountable Roundabout Curb (no Gutter) ..linear foot (LF).

11. Bid Schedule Payment Reference: 706.4.1.A.11.
12. Bid Schedule Description: Mountable Roundabout Curb and Gutter…linear foot (LF).

B. Concrete Valley Gutter: By the linear foot or square foot.

1. Bid Schedule Payment Reference: 706.4.1.B.1.
2. Bid Schedule Description: Concrete Valley Gutters…linear foot (LF).

3. Bid Schedule Payment Reference: 706.4.1.B.3.
4. Bid Schedule Description: Concrete Valley Gutters…square foot (SF).

C. Curb Turn Fillets: By the each or square foot or, if unspecified, shall be incidental to valley gutter or curb and gutter.

1. Bid Schedule Payment Reference: 706.4.1.C.1.
2. Bid Schedule Description: Curb Turn Fillets and Backfill…each (EA).

3. Bid Schedule Payment Reference: 706.4.1.C.3.
4. Bid Schedule Description: Curb Turn Fillets and Backfill…square foot (SF).

D. Concrete Steps: By the square foot of total riser plus tread, including 3 foot landing at base and 3 foot landing at top of steps. Include all special forming, reinforcement, hand rails, special tread nosings, special grip finishes, and other items as detailed on the Contract Documents in bid price.

1. Bid Schedule Payment Reference: 706.4.1.D.1.
2. Bid Schedule Description: Concrete Steps…square foot (SF).

E. Concrete Sidewalk: By the square yard, to include required base material. Pay for Pedestrian Ramps is under this item.

1. Bid Schedule Payment Reference: 706.4.1.E.1.
2. Bid Schedule Description: Concrete Sidewalks, thickness _____…square yard (SY).

F. Concrete Driveway Approaches: By the square yard.

1. Bid Schedule Payment Reference: 706.4.1.F.1.
2. Bid Schedule Description: Concrete Driveway Approach…square yard (SY).

G. Concrete Repair: Perform repair as specified in the Contract Documents. Paid by the square yard as measured in the field.

1. Bid Schedule Payment Reference: 706.4.1.G.1.
2. Bid Schedule Description: Concrete Repair…square yard (SY).

H. Pedestrian Ramp w/Detectable Warning Domes, Type _____ Per each as measured in the field.

1. Bid Schedule Payment Reference: 706.4.1.H.1.
2. Bid Schedule Description: Pedestrian Ramp w/Detectable Warning Domes, Type _____……each (EA).

END OF SECTION

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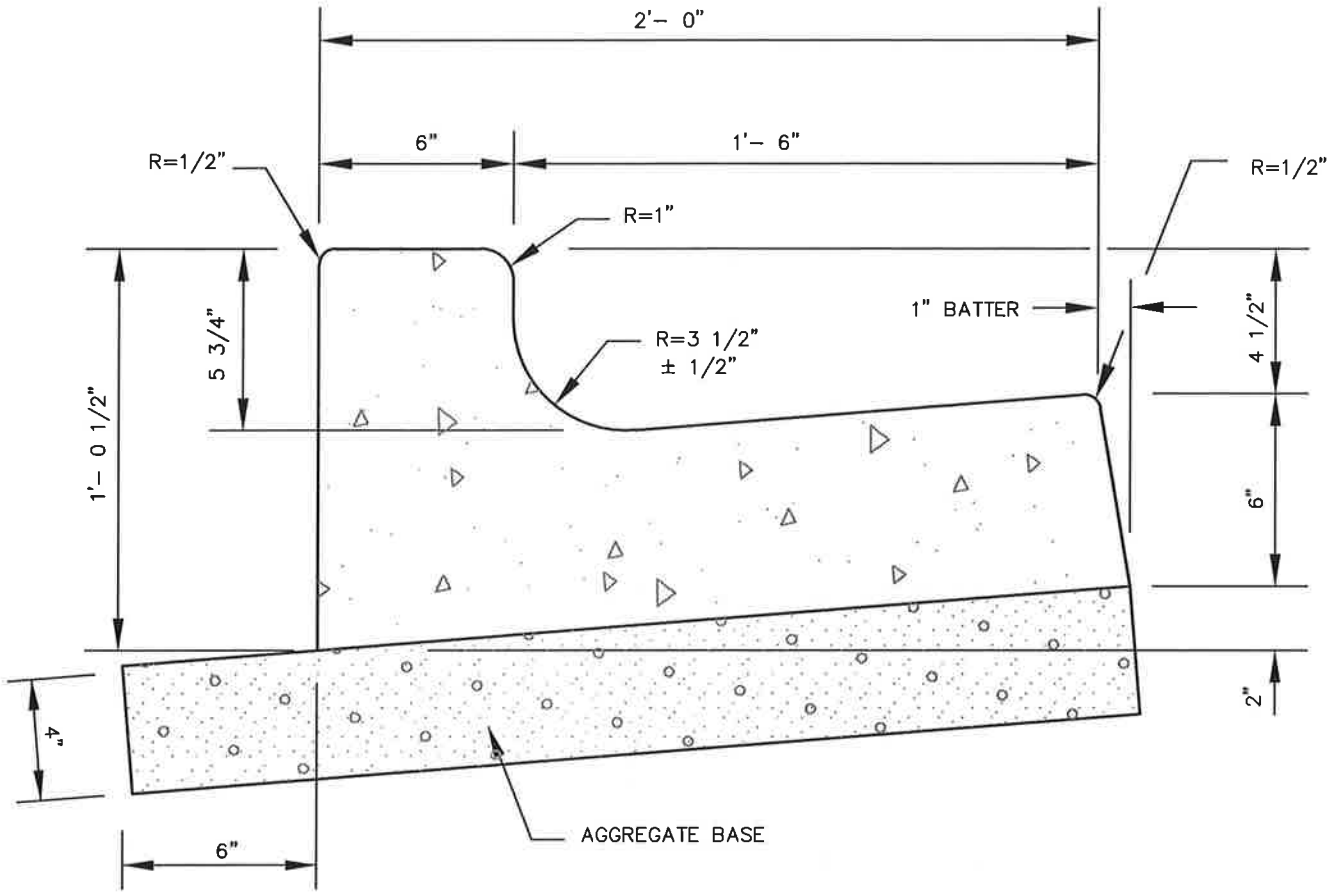
ISPWC - DIVISION 700

Concrete

Standard Drawings

SD-701 – 6” Vertical Curb and Gutter
SD-701A – 6” Vertical Curb (no gutter)
SD 701B – Mountable Roundabout Curbs
SD-702 – 3” Rolled Curb and Gutter
SD-703 – Curb and Gutter, Type I
SD-704 – Curb and Gutter, Type II
SD-705 – Curb and Gutter, Type III
SD-706 – Curb Cut Detail for Curb, Type III
SD-707 – Curb Terminus
SD-708 – Valley Gutter
SD-709 – Concrete Sidewalk
SD-709A – Curbside Mail Box Stand
SD-710 – Concrete Driveway Approach
SD-710A – Concrete Driveway with Sidewalk Around Approach
SD-710B – Concrete Driveway with Ramped Sidewalk
SD-710C – Concrete Driveway with Detached Sidewalk
SD-711 – Driveway Grade Standard
SD-711A – Rural Driveway Grade Standard
SD-712 – Detectable Warning for Pedestrian Access
SD-712A – Pedestrian Ramp Type “A” for New Development
SD-712C – Pedestrian Ramp Type “C” for New Development
SD-712D – Pedestrian Ramps Within Radius for Modifying Existing Corners
SD-712E – Pedestrian Ramps Outside Radius for Modifying Existing Corners
SD-712F – Pedestrian Ramp Type “F” for Existing Corners
SD-712G – Pedestrian Ramp with No Landing
SD-713 – Concrete Steps
SD-714 – Concrete Pavement Jointing Criteria
SD-714A – Concrete Pavement Jointing Details
SD-714B – Concrete Pavement Sawed Joints
SD-715 – Curb Drain



NOTES:

(A) GRADE AND ALIGNMENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY HAVING JURISDICTION.

(B) BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACE AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR.

(C) 1/2-INCH PREFORMED EXPANSION JOINT MATERIAL (AASHTO M 213) AT TERMINAL POINTS OF RADII.

(D) CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS AT 10-FEET MAXIMUM SPACING (OR CONSISTENT WITH 2X SIDEWALK WIDTH FOR SCORE SPACING).

(E) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.

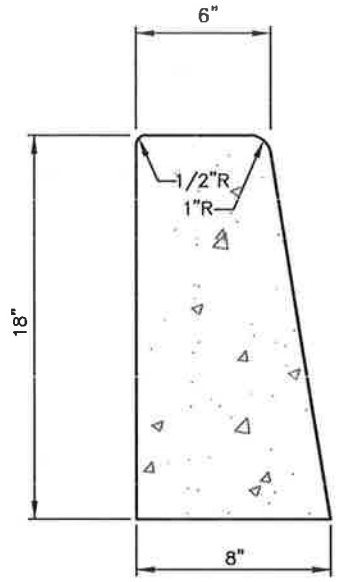
(F) BACKFILL AS PER SECTION-706.

(G) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.

(H) STANDARD CURB TO BE USED ON:
1. COLLECTOR AND ARTERIAL STREETS, UNLESS OTHERWISE INDICATED.
2. ALL RADII PLUS 5-FEET EACH END WITH 2-FEET TRANSITION TO ROLL CURB.
3. TO MATCH EXISTING CURBS.
4. SEE SD-709 FOR CURB CONSTRUCTION WHEN SIDEWALK IS INCLUDED.

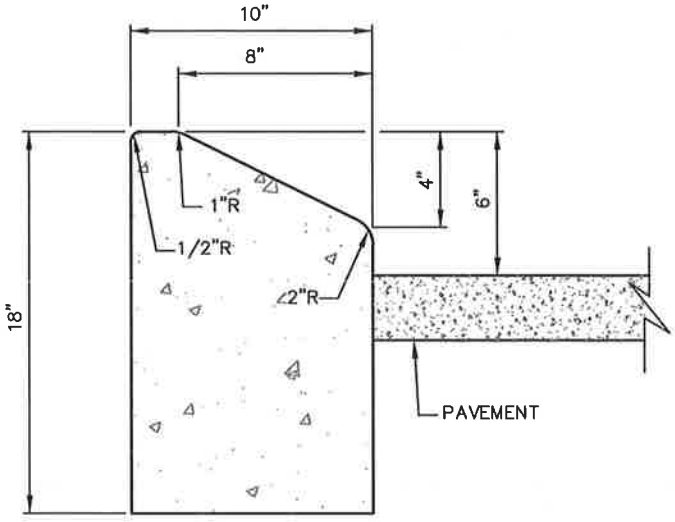
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	6" VERTICAL CURB AND GUTTER	STANDARD DRAWING NO. SD-701



6" VERTICAL CURB (NO GUTTER)

N.T.S.



MOUNTABLE VERTICAL CURB

N.T.S.

NOTES:

(A) GRADE AND ALIGNMENT TO BE ESTABLISHED BY THE ENGINEER AND THE PUBLIC AGENCY HAVING JURISDICTION.

(B) CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS MINIMUM EIGHT FEET.

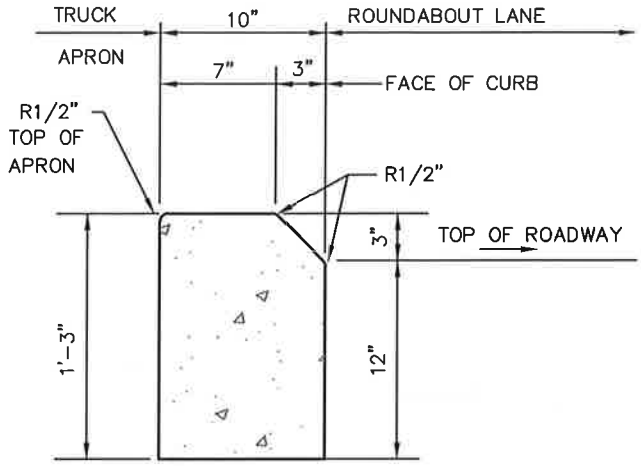
(C) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.

(D) BACKFILLS AS PER ISPWC SECTION 706.

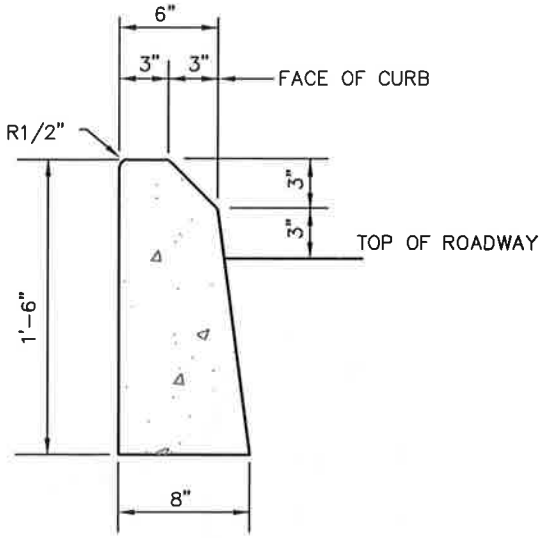
(E) SECURE RIGHT-OF-WAY PERMIT BEFORE CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.

2015

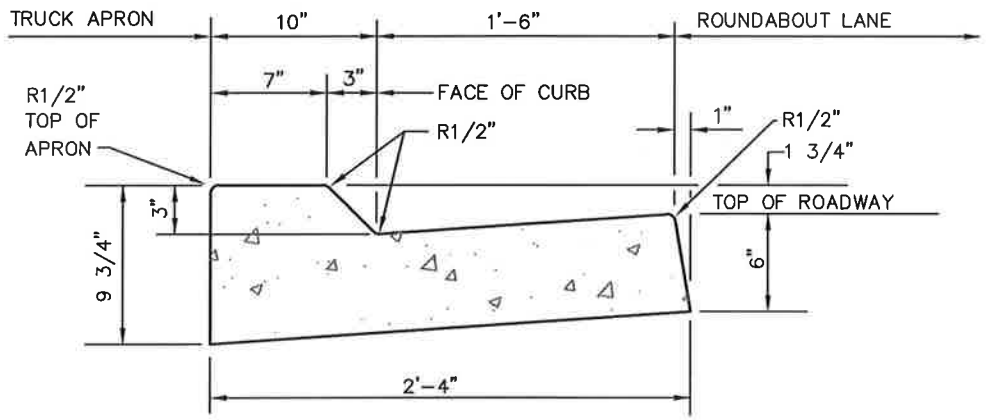
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	6" VERTICAL CURB (NO GUTTER)	STANDARD DRAWING NO. SD-701A



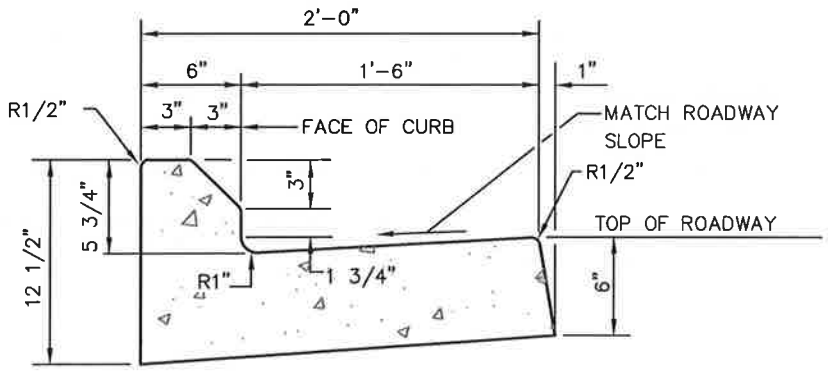
3" MOUNTABLE TRUCK APRON CURB
(NO GUTTER)



6" ROUNDABOUT CURB
(NO GUTTER)



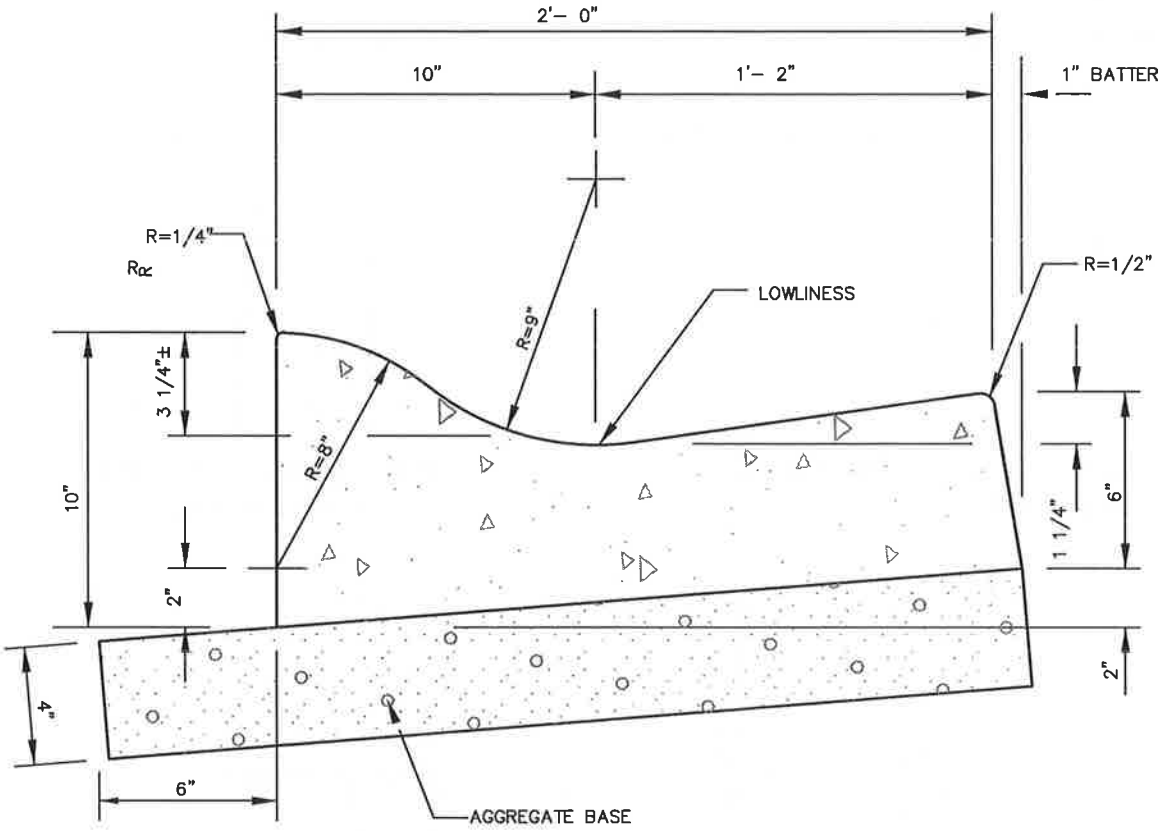
6" MOUNTABLE TRUCK APRON CURB AND GUTTER



6" ROUNDABOUT CURB AND GUTTER

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	MOUNTABLE ROUNDABOUT CURBS	STANDARD DRAWING NO. SD-701B



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(B) BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACED AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR.

(C) 1/2-INCH PREFORMED EXPANSION JOINT MATERIAL (AASHTO M 213) AT TERMINAL POINTS OF RADII.

(D) CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS AT 10-FEET MAXIMUM SPACING (OR CONSISTENT WITH 2x SIDEWALK WIDTH FOR SCORE SPACING.)

(E) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.

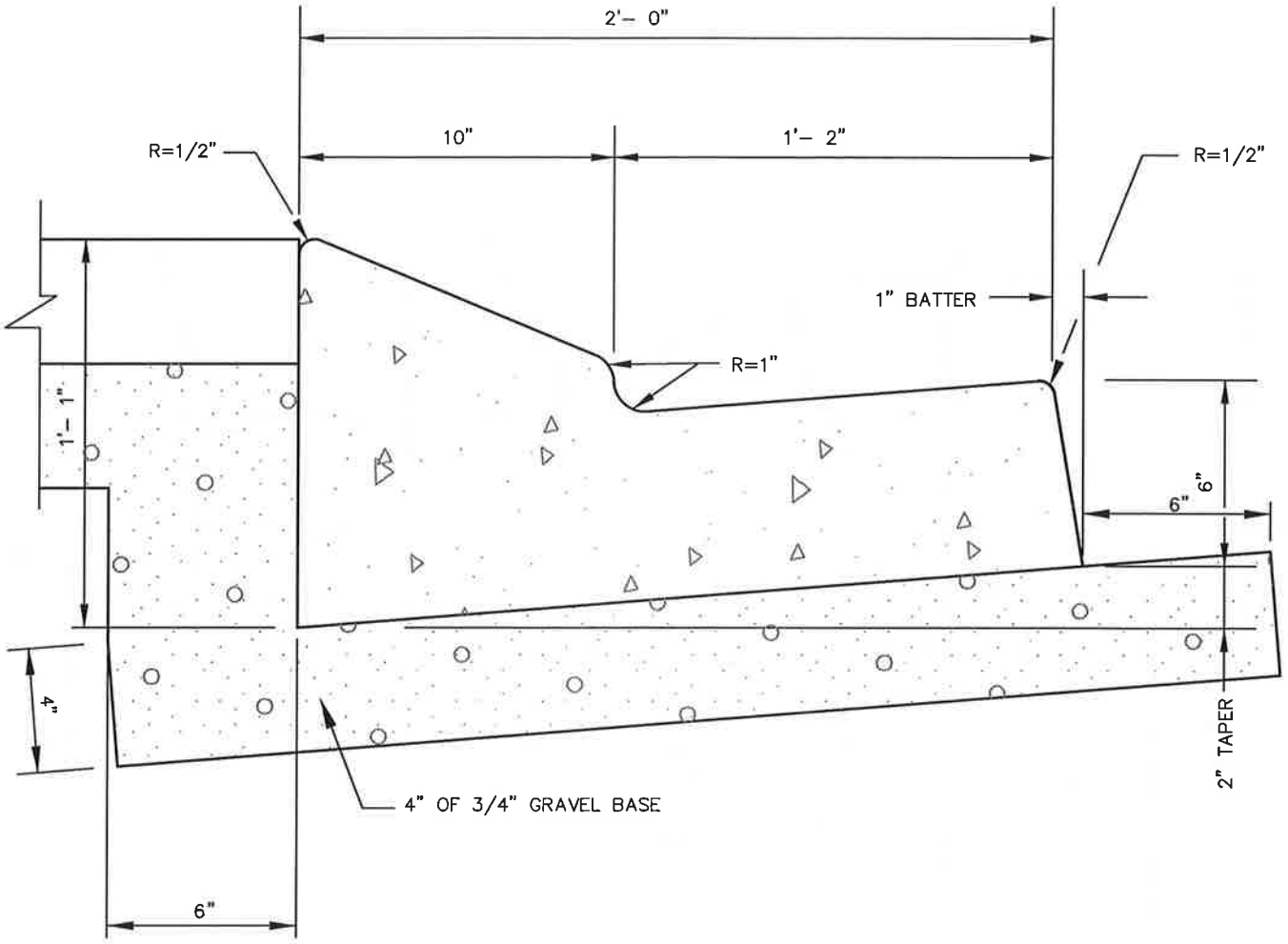
(F) BACKFILL AS PER ISPWC SECTION-706.

(G) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.

(H) USE ROLLED CURB IN RESIDENTIAL AREAS. WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTIONS VERTICAL CURB LENGTH TO BE FULL RADIUS PLUS 5 FEET AT EACH END. TRANSITION LENGTH FROM ROLLED CURB TO VERTICAL CURB 2 FEET.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	3" ROLLED CURB AND GUTTER	STANDARD DRAWING NO. SD-702



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(C) 1/2-INCH PREFORMED EXPANSION JOINT MATERIAL (AASHTO M 213) AT TERMINAL POINTS OF RADII.

(D) CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS 10-FEET MAXIMUM SPACING OR CONSISTENT 2X SIDEWALK WIDTH FOR SCORE SPACING).

(E) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.

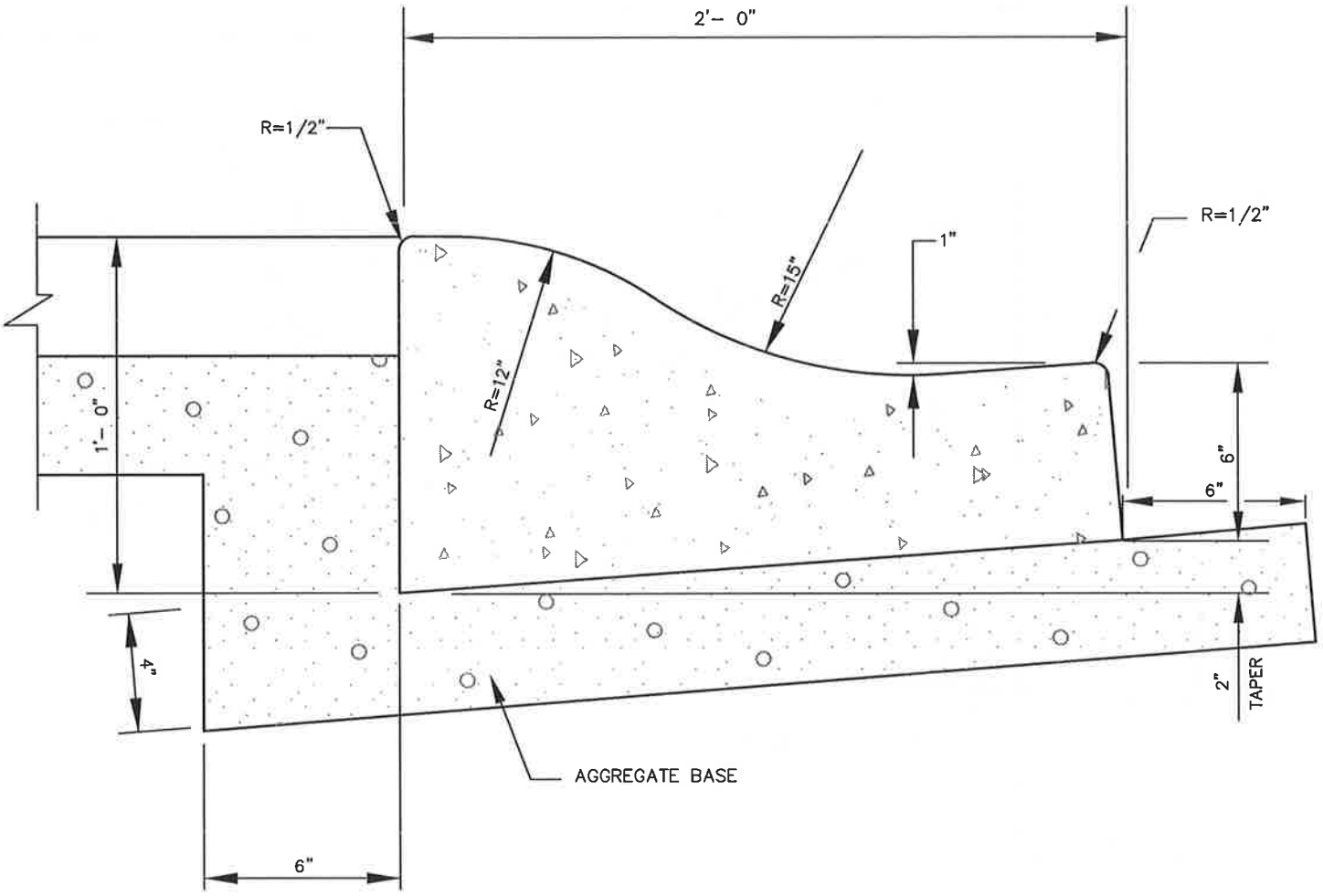
(F) BACKFILL AS PER ISPWC SECTION-706.

(G) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.

(H) WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTIONS, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5 FEET TANGENT AT EACH END. TRANSITION LENGTH FROM TYPE I CURB TO VERTICAL CURB 2 FEET.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CURB AND GUTTER TYPE I	STANDARD DRAWING NO. SD-703



NOTES:

(A) GRADE AND ALIGNMENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY HAVING JURISDICTION.

(B) BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACED AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR; A MINIMUM WIDTH OF 3-FEET TO GRADE, PRIOR TO SETTING CURB FORMS.

(C) 1/2-INCH PREFORMED EXPANSION JOINT MATERIAL (AASHTO M 213) AT TERMINAL POINTS OF RADII.

(D) CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS 10-FEET MAXIMUM SPACING OR CONSISTENT WITH 2x SIDEWALK WIDTH FOR SCORE SPACING).

(E) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.

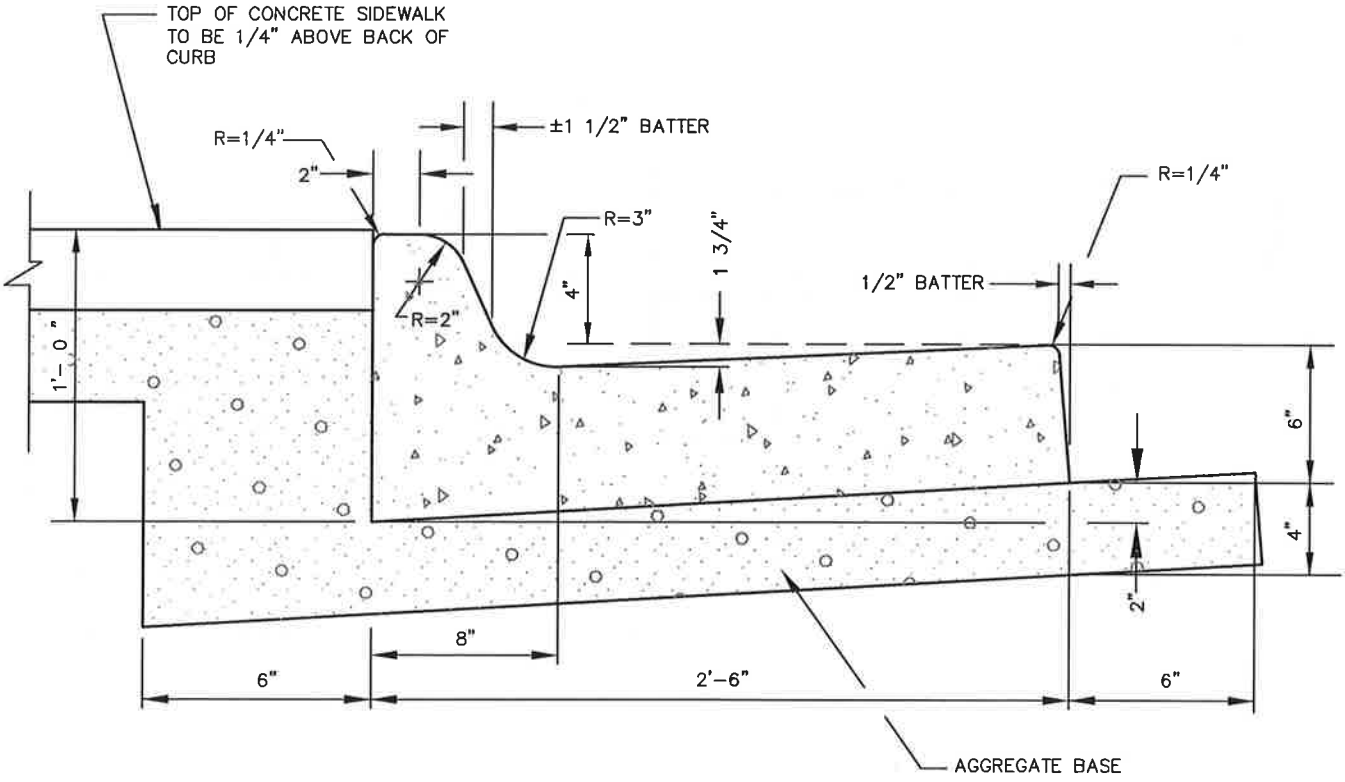
(F) BACKFILL AS PER ISPWC SECTION-706.

(G) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.

(H) WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTION, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5 FEET TANGENT AT EACH END. TRANSITION LENGTH FROM TYPE II CURB TO VERTICAL CURB 2 FEET.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CURB AND GUTTER TYPE II	STANDARD DRAWING NO. SD-704



NOTES:

(A) GRADE AND ALIGNMENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY HAVING JURISDICTION.

(B) BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACE AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR; A MINIMUM WIDTH OF 3-FEET 6-INCHES TO GRADE, PRIOR TO SETTING CURB FORMS.

(C) 1/2-INCH PREFORMED EXPANSION JOINT MATERIAL (AASHTO M 213) AT TERMINAL POINTS OF RADII.

(D) CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS 8-FEET MAXIMUM SPACING.

(E) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.

(F) BACKFILL AS PER ISPWC SECTION-706.

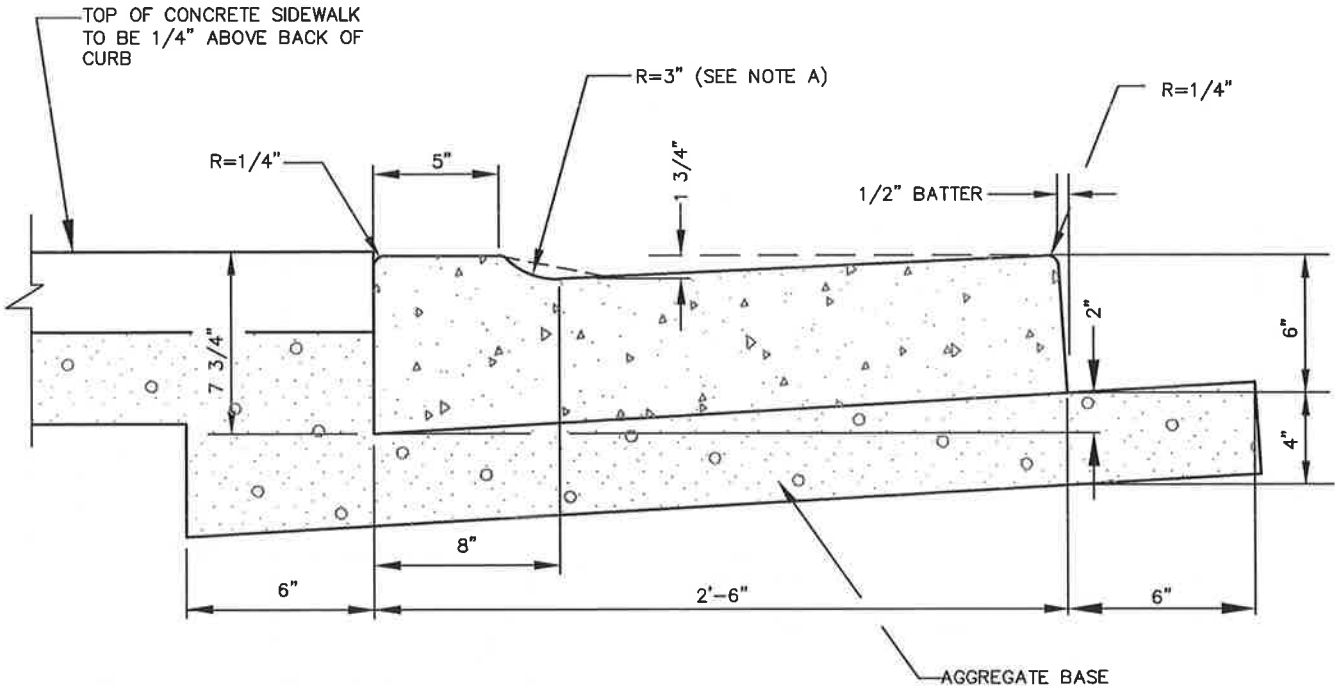
(G) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.

(H) WHEN LOCAL JURISDICTION REQUIRES VERTICAL CURB AT INTERSECTIONS, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5 FEET TANGENT AT EACH END. TRANSITION LENGTH FROM TYPE III CURB TO VERTICAL CURB 2 FEET.

(I) SEE SD-706 FOR TYPE III CURB CUT.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CURB AND GUTTER TYPE III	STANDARD DRAWING NO. SD-705



NOTES:

(A) GRADE AND ALIGNMENT TO BE ESTABLISHED OR APPROVED BY THE ENGINEER AND THE PUBLIC AGENCY HAVING JURISDICTION IN THIS AREA.

(B) BASE: 4-INCH COMPACTED DEPTH OF 3/4-INCH MINUS CRUSHED AGGREGATE BASE MATERIAL, PLACE AS SPECIFIED AND PAID UNDER SECTION-802 ISPWC; COMPACTED TO EXCEED 95% OF STANDARD PROCTOR; A MINIMUM WIDTH OF 3-FEET 6-INCHES TO GRADE, PRIOR TO SETTING CURB FORMS.

(C) 1/2-INCH PREFORMED EXPANSION JOINT MATERIAL (AASHTO M 213) AT TERMINAL POINTS OF RADII.

(D) CONTINUOUS PLACEMENT PREFERRED, SCORE INTERVALS 8-FEET MAXIMUM SPACING.

(E) MATERIALS AND CONSTRUCTION IN COMPLIANCE WITH ISPWC SPECIFICATIONS.

(F) BACKFILL AS PER ISPWC SECTION-706.

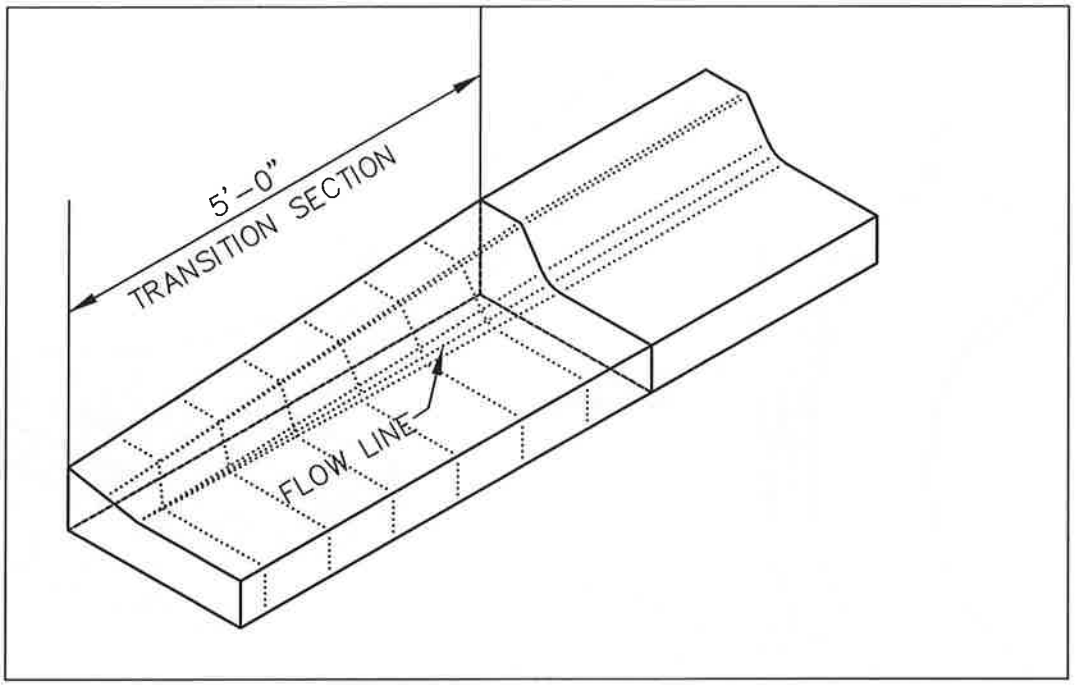
(G) SECURE RIGHT-OF-WAY PERMIT BEFORE BEGINNING CONSTRUCTION IN PUBLIC RIGHT-OF-WAY.

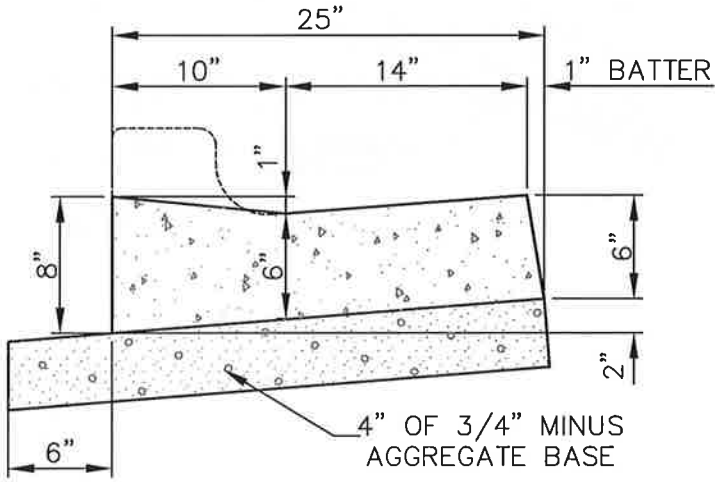
(H) WHEN LOCAL JURISDICTION REQUIRES CURB AT INTERSECTIONS, VERTICAL CURB LENGTH TO BE FULL CURVE CIRCUMFERENCE PLUS 5-FEET TANGENT AT EACH END. TRANSITION FROM TYPE III CURB TO VERTICAL CURB 2 FEET.

(I) FOR PEDESTRIAN RAMPS, CONSTRUCT TRANSITION PER A.D.A. REQUIREMENTS IN LIEU OF 3" RADIUS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CURB CUT DETAIL FOR CURB TYPE III	STANDARD DRAWING NO. SD-706





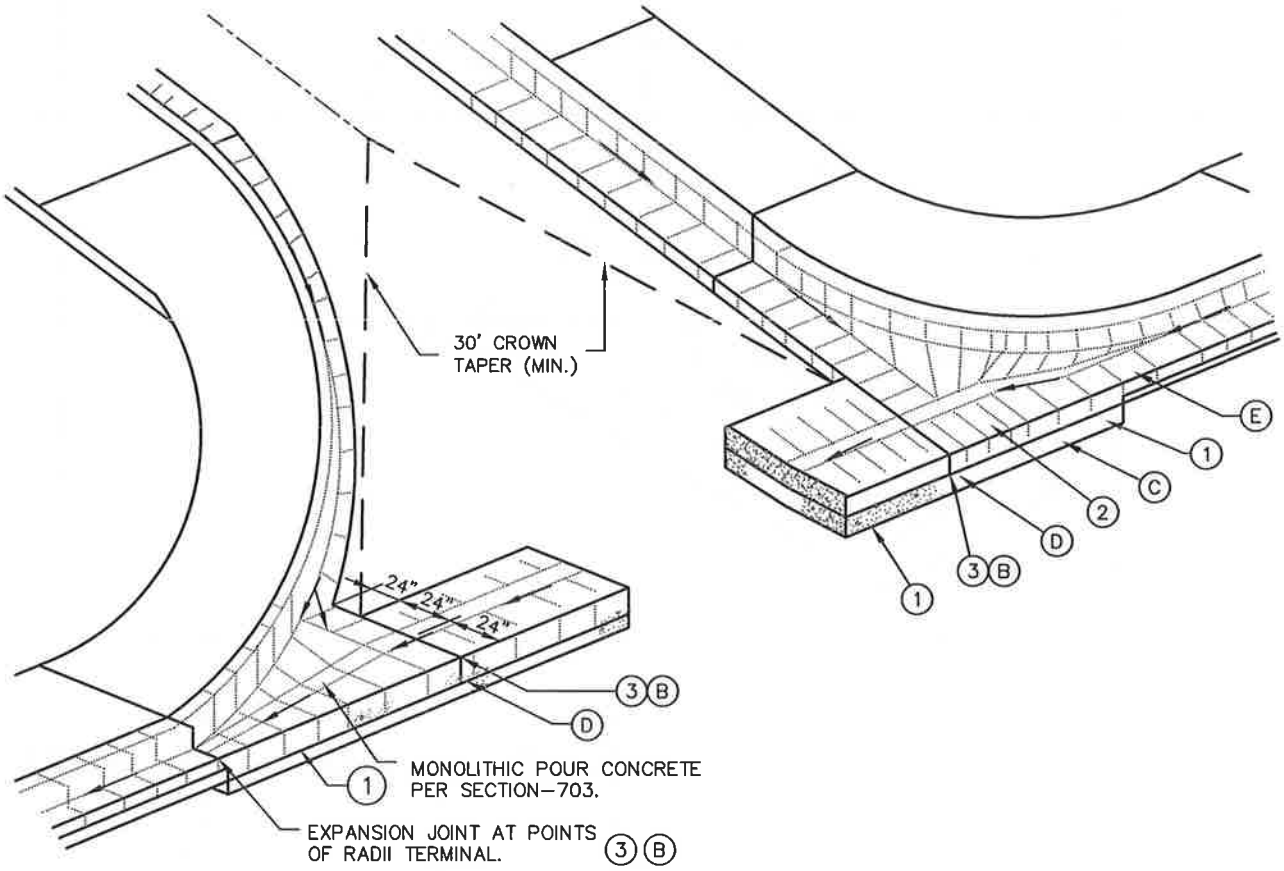
DETAIL AT END OF TRANSITION

NOTE:

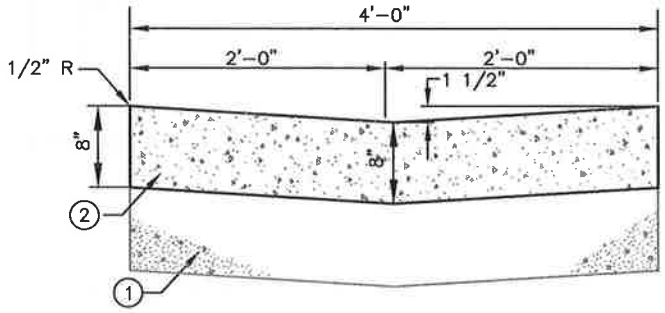
(A) USE WITH STANDARD 6" CURB AND GUTTER TO AVOID ABRUPT BEGINNING AND END OF CURB.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CURB TERMINUS	STANDARD DRAWING NO. SD-707



PERSPECTIVE



LEGEND:

1. 6" OF 3/4" MINUS CRUSHED AGGREGATE BASE MINIMUM.
2. CONCRETE.
3. 1/2" EXPANSION JOINT.

TYPICAL SECTION

NOTES:

A. GRADE OF GUTTER MINIMUM 0.4%.

B. EXPANSION JOINT 1/2–INCH PREFORMED JOINT MATERIAL (AASHTO M 213).

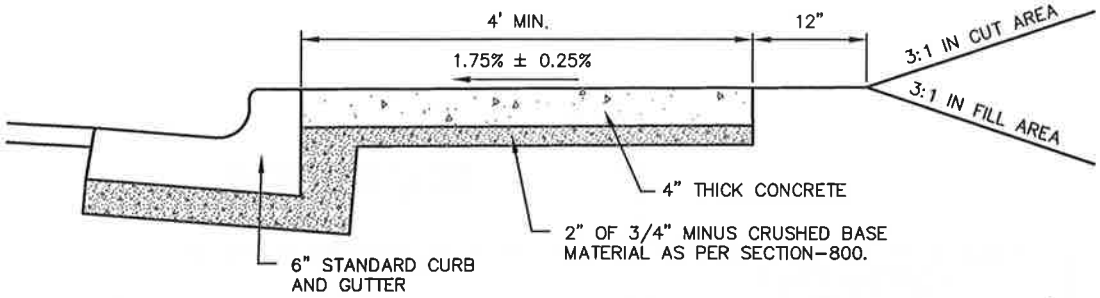
C. FILLET AND BASE SECTION THICKNESS SHALL MATCH THE VALLEY GUTTER, TYPICAL.

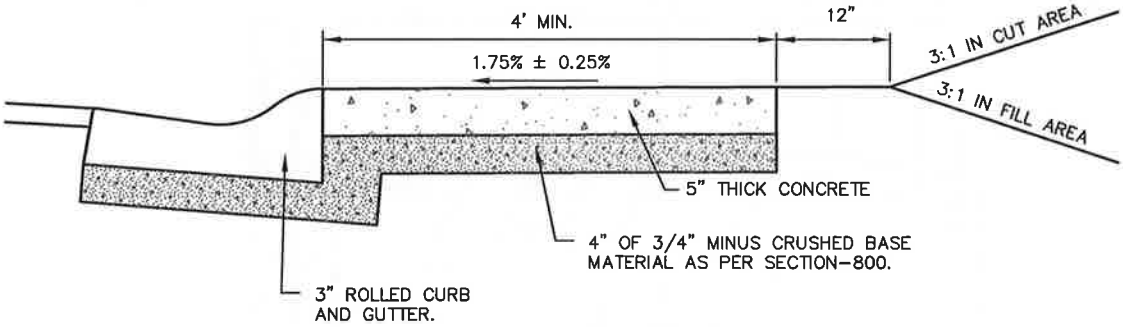
D. PAY LIMITS FOR VALLEY GUTTER.

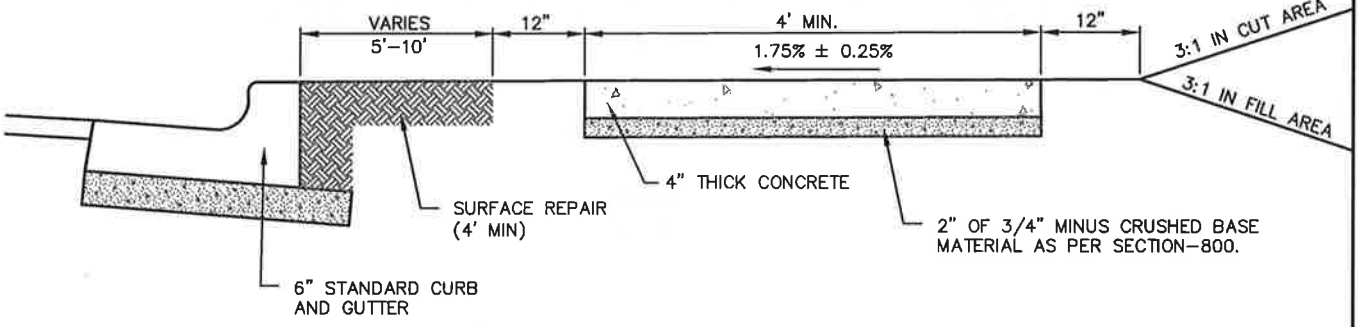
E. FILLET DETAIL FOR CORNER RADIUS 15 FEET OR LESS.

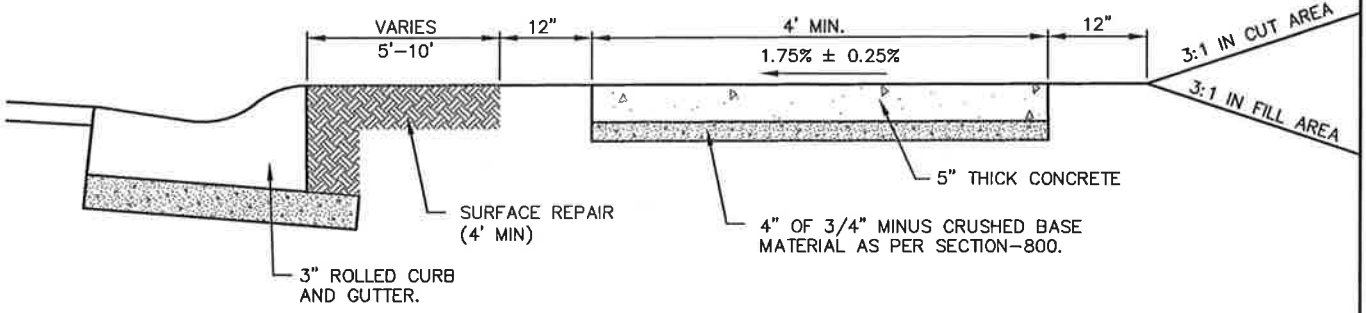
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	VALLEY GUTTER	STANDARD DRAWING NO. SD–708









NOTES:

(A) LOCATION GRADE AND WIDTH TO BE ESTABLISHED OR APPROVED BY THE OWNER.

(B) BASE TO BE COMPACTED TO EXCEED 95% OF STANDARD DENSITY.

(C) SLOPE SIDEWALK TOWARD THE STREET NOT TO EXCEED 1.75% ± 0.25% UNLESS OTHERWISE SPECIFIED BY THE OWNER.

(D) SCORE AT INTERVALS TO MATCH WIDTH OF WALK NOT TO EXCEED 5 FEET SPACING. IN BOTH THE LONGITUDINAL AND TRANSVERSE DIRECTION FOR SIDEWALK GREATER THAN 5 FEET IN WIDTH.

(E) 1/2" TRANSVERSE PREFORMED BITUMINOUS JOINTS AT THE TERMINUS POINTS FOR CURVE AND WHERE SIDEWALK IS PLACED BETWEEN TWO PERMANENT FOUNDATIONS OR ADJACENT TO A STRUCTURE, PLACE 1/2" EXPANSION JOINT MATERIAL ALONG THE BACK OF WALK THE FULL LENGTH.

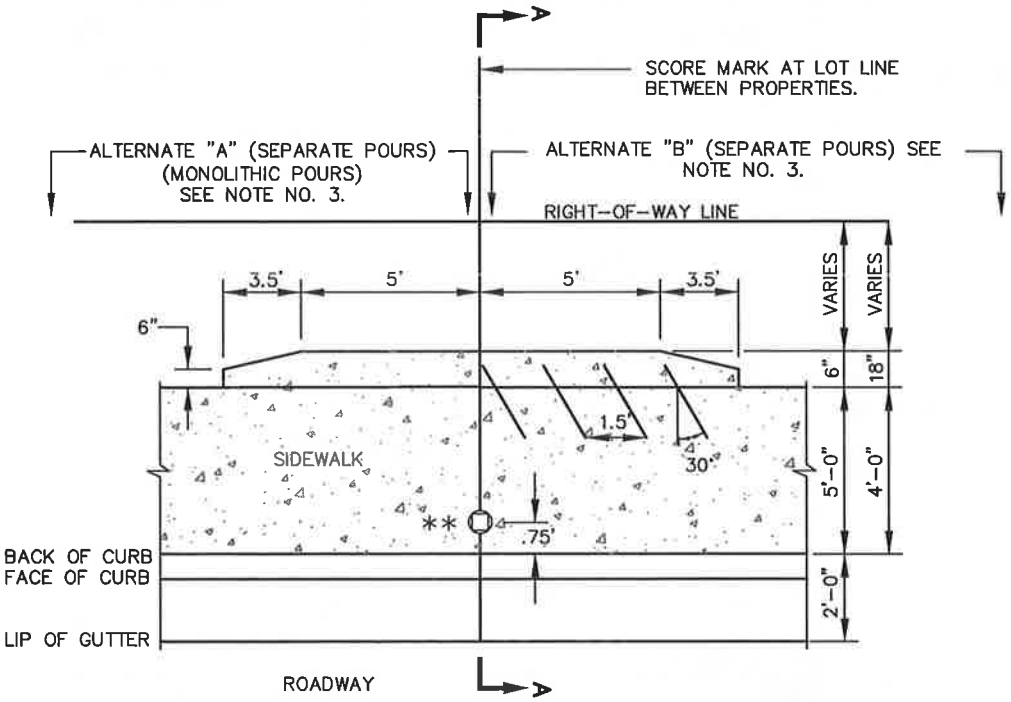
(F) DRIVEWAY APPROACH ACROSS PLANTER STRIP TO BE 5" MINIMUM CONCRETE OVER 4" OF 3/4" MINUS CRUSHED BASE.

(G) SIDEWALK CONSTRUCTION JOINTS SHALL BE CONSTRUCTED APPROXIMATELY $\frac{1}{8}$" WIDE, $\frac{3}{4}$" IN DEPTH AND FINISHED AND EDGED SMOOTH. A PREFORMED EXPANSION JOINT FILLER SHALL BE PLACED EVERY 40' FOR NEW SIDEWALK CONSTRUCTION.

(H) ALL CONCRETE SHALL BE CLASS 3000 PER SECTION-703 UNLESS NOTED OTHERWISE.

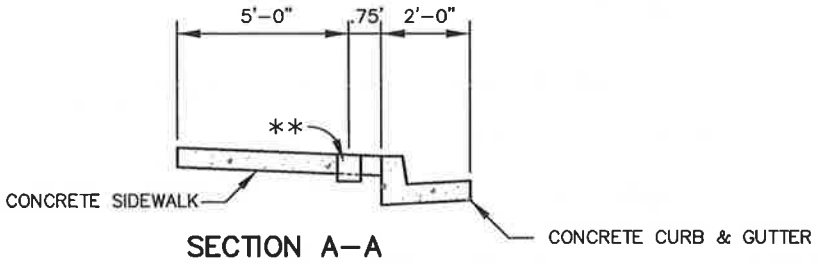
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE SIDEWALK	STANDARD DRAWING NO. SD-709



PLAN

N.T.S



SECTION A-A

N.T.S

** 8 'x 6" PVC PIPE TO BE USED AND BACKFILLED OR COVERED, OR USE AT A LATER TIME.

NOTES:

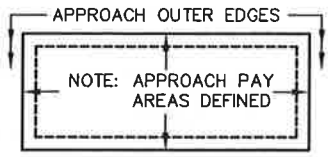
(A) LOCATIONS SHOWN ON CONSTRUCTION PLANS.

(B) SEE STANDARD SPECIFICATIONS SECTION 700 FOR DETAILS NOT SHOWN.

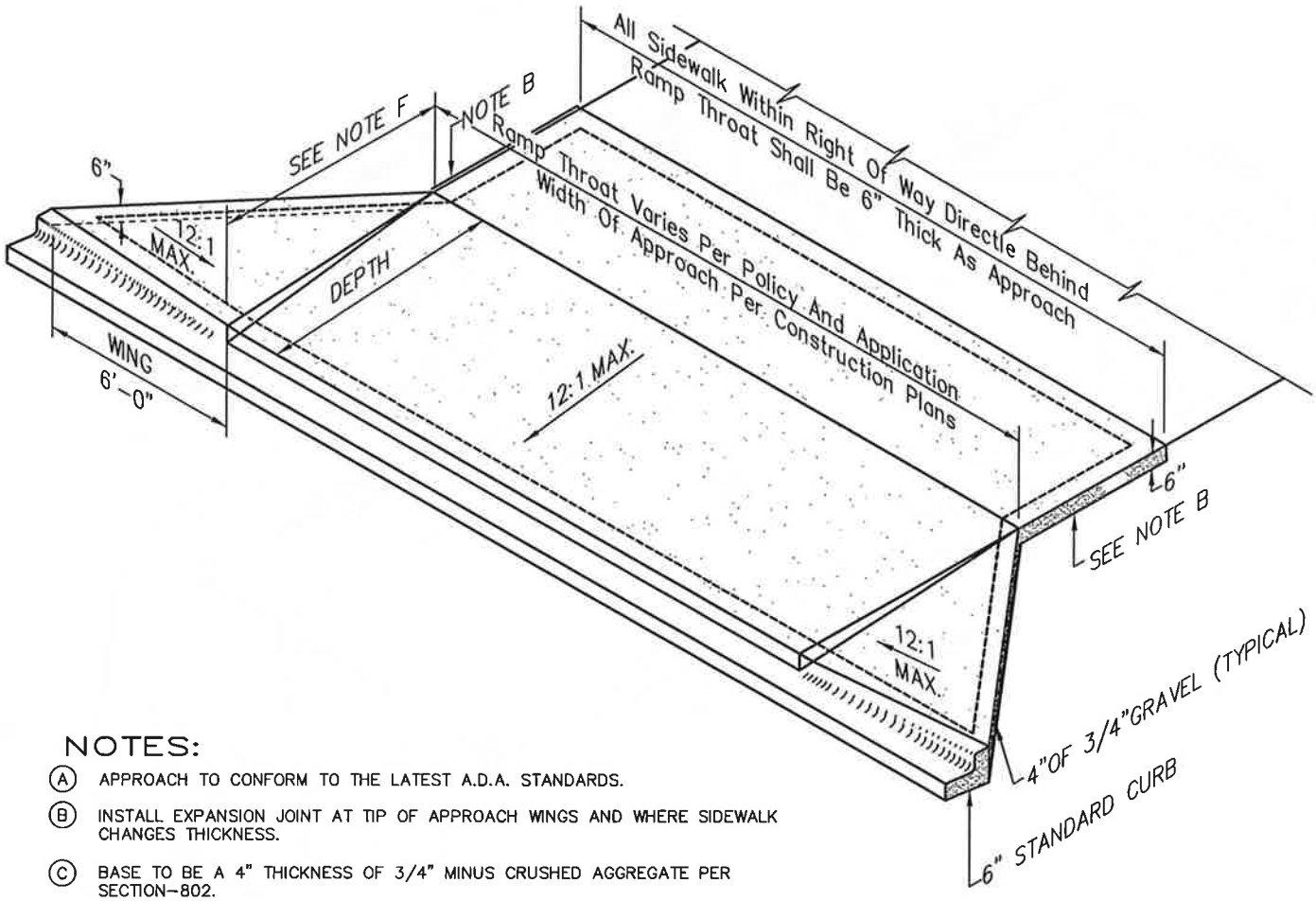
(C) ALL SIDEWALK CONSTRUCTION OF MAILBOX LOCATIONS SHALL BE EITHER BY ALTERNATE "A" OR ALTERNATE "B" CONSTRUCTION. ALTERNATE "B" SHALL INCLUDE PLACEMENT OF 2' x 1/2" (NO. 4) STEEL REINFORCING BARS PLACED 1.5' O.C. DIRECTED TOWARD THE LOT LINE BETWEEN PROPERTIES ON BOTH SIDES OF LOT LINE AT BACK OF WALK AREA. (SEE PLAN VIEW).

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CURBSIDE MAIL BOX STAND	STANDARD DRAWING NO. SD-709A



PAY QUANTITY DETAIL
(SEE NOTE NO. G)



NOTES:

(A) APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.

(B) INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.

(C) BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION-802.

(D) APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT. WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.

(E) ALL CONCRETE SHALL BE CLASS 3000 PER SECTION-703.

(F) APPROACH DIMENSIONS ARE BASED ON THE HEIGHT OF THE CURB. SEE TABLE BELOW.

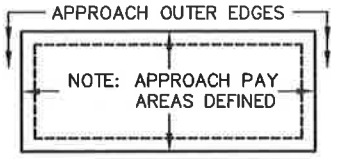
(G) PAY QUANTITIES FOR URBAN APPROACHES SHALL INCLUDE THE APPROACH RAMP/DRIVEWAY AREA, AND THE APPROACH FLARES/WINGS.

APPROACH DIMENSION TABLE

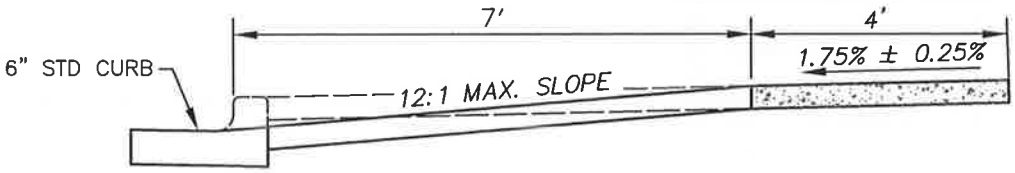
Curb	3"	4"	5"	6"	7"	8"
Depth	4'	5'	6'	7'	8'	9'
Wing	3'	4'	5'	6'	7'	8'
Throat Per Policy And Application Unless Otherwise Approved by Owner						

2015

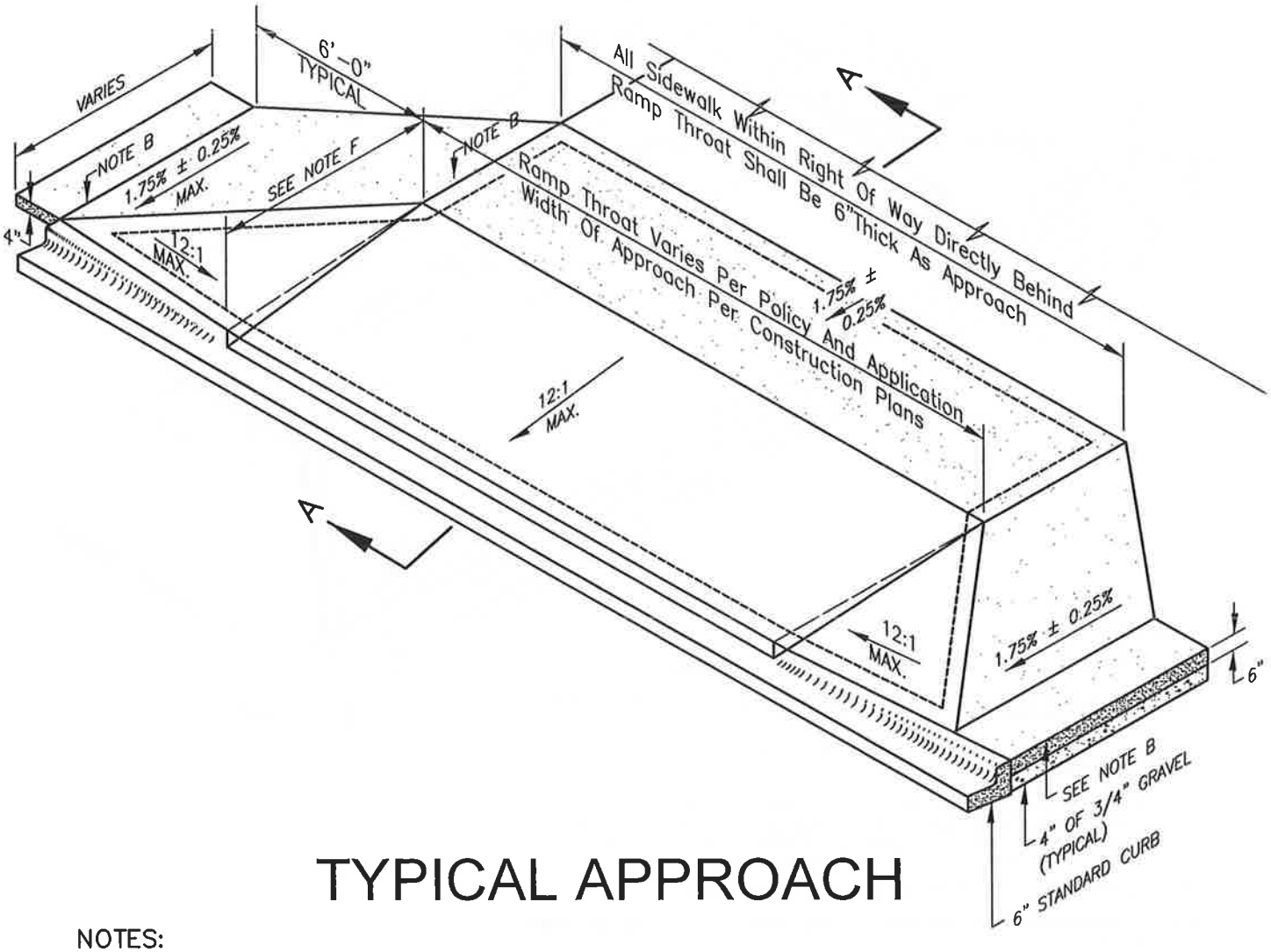
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE SIDEWALK APPROACH	STANDARD DRAWING NO. SD-710



PAY QUANTITY DETAIL
(SEE NOTE NO. G)



SECTION A–A
N.T.S.



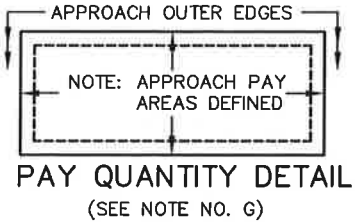
TYPICAL APPROACH

NOTES:

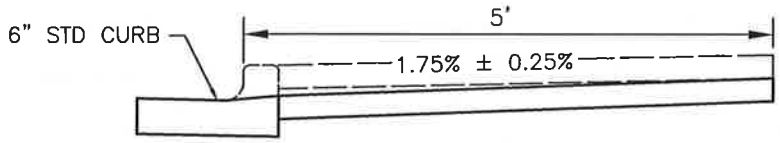
- (A) APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.
- (B) INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.
- (C) BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION – 802.
- (D) APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT. WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- (E) ALL CONCRETE SHALL BE CLASS 3000 PER SECTION – 703.
- (F) SIDEWALK WIDTH MAY VARY.
- (G) PAY QUANTITIES FOR URBAN APPROACHES SHALL INCLUDE THE APPROACH RAMP/DRIVEWAY AREA, AND THE APPROACH FLARES/WINGS.

2015

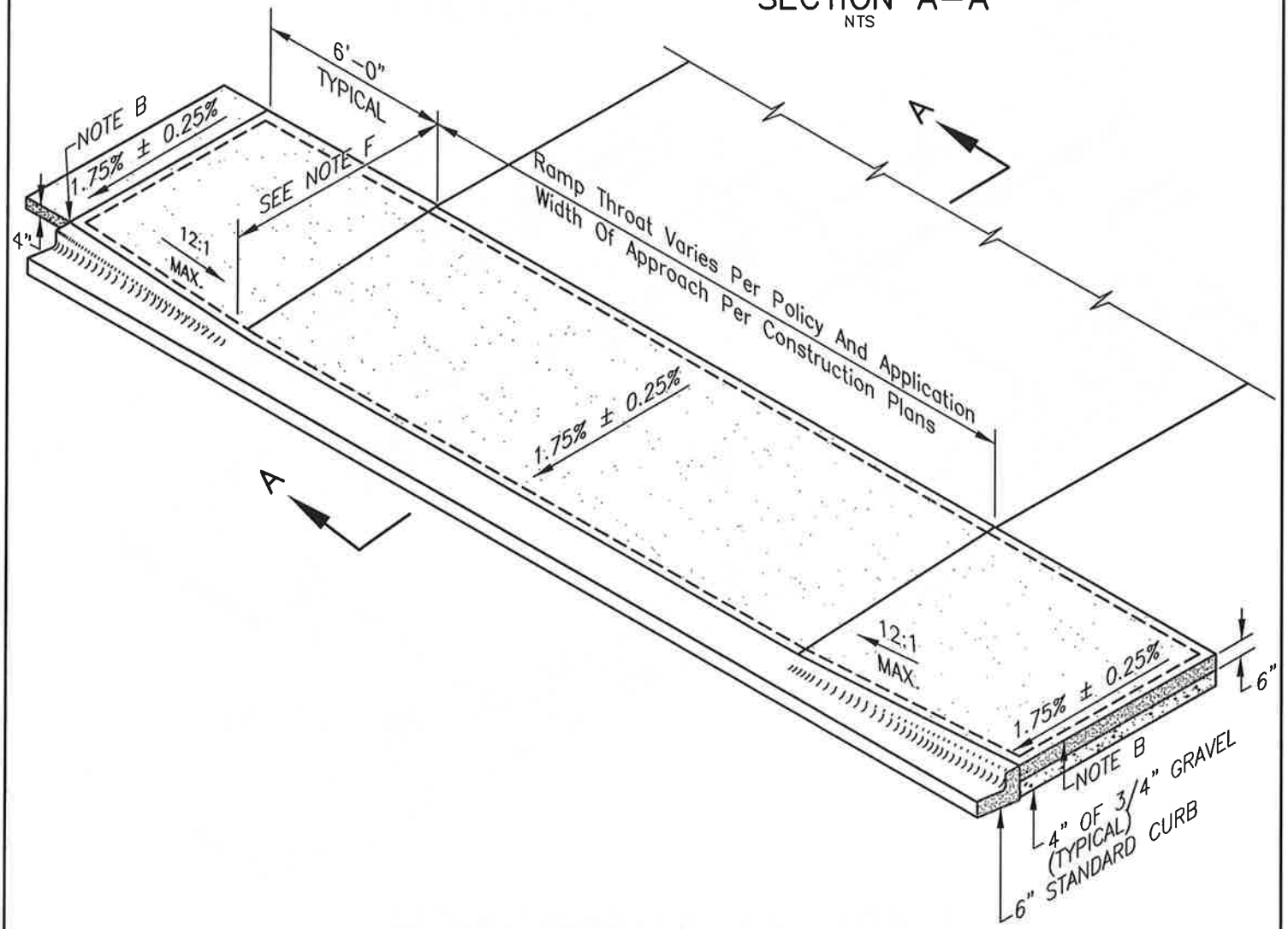
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE DRIVEWAY WITH SIDEWALK AROUND APPROACH	STANDARD DRAWING NO. SD–710A



PAY QUANTITY DETAIL
(SEE NOTE NO. G)



SECTION A–A
NTS



TYPICAL APPROACH

N O T E S:

Ⓐ APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.

Ⓑ INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.

Ⓒ BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION – 802.

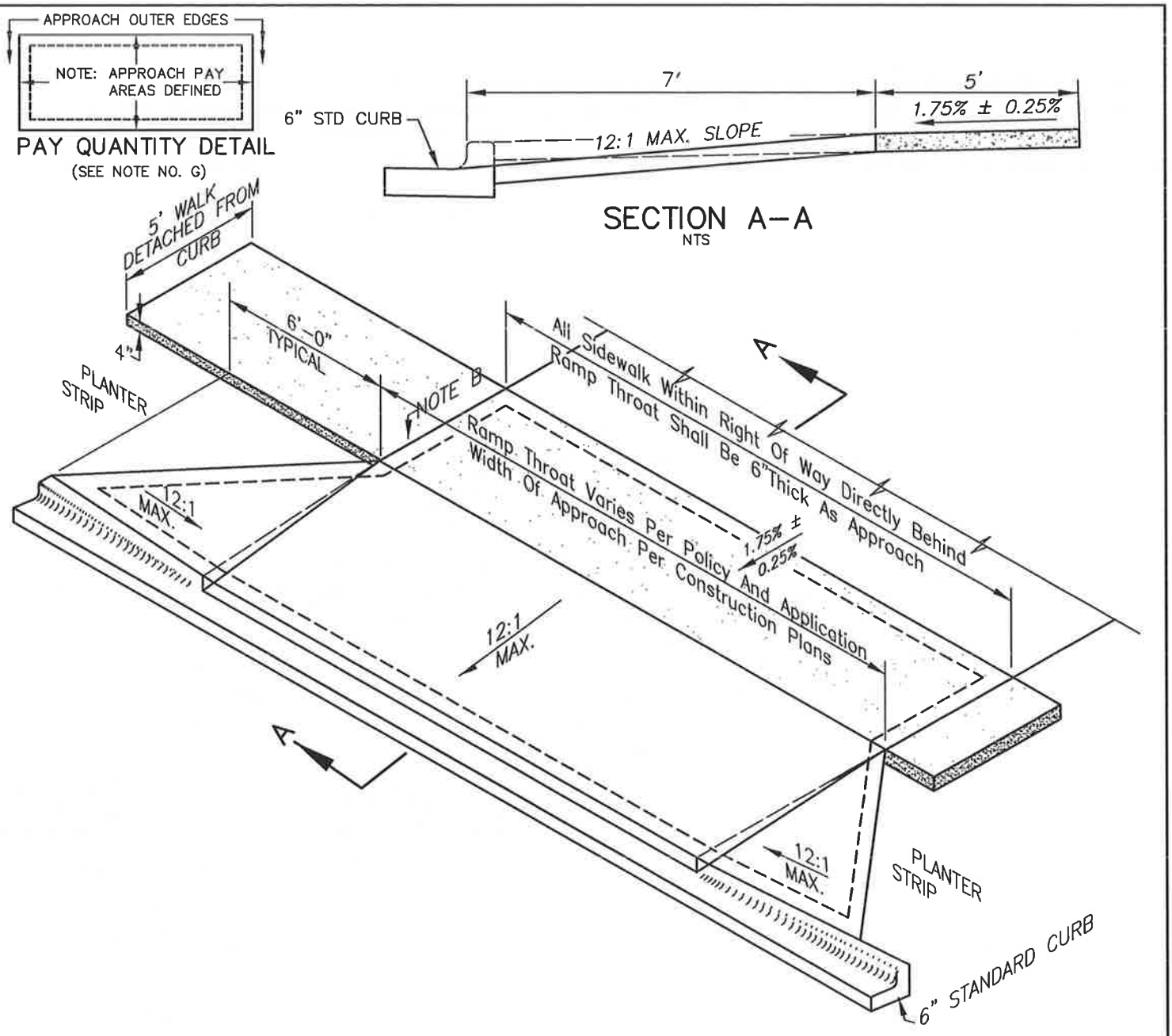
Ⓓ APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT. WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.

Ⓔ ALL CONCRETE SHALL BE CLASS 3000 PER SECTION – 703.

Ⓕ SIDEWALK WIDTH MAY VARY.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE DRIVEWAY WITH RAMPED SIDEWALK	STANDARD DRAWING NO. SD–710B



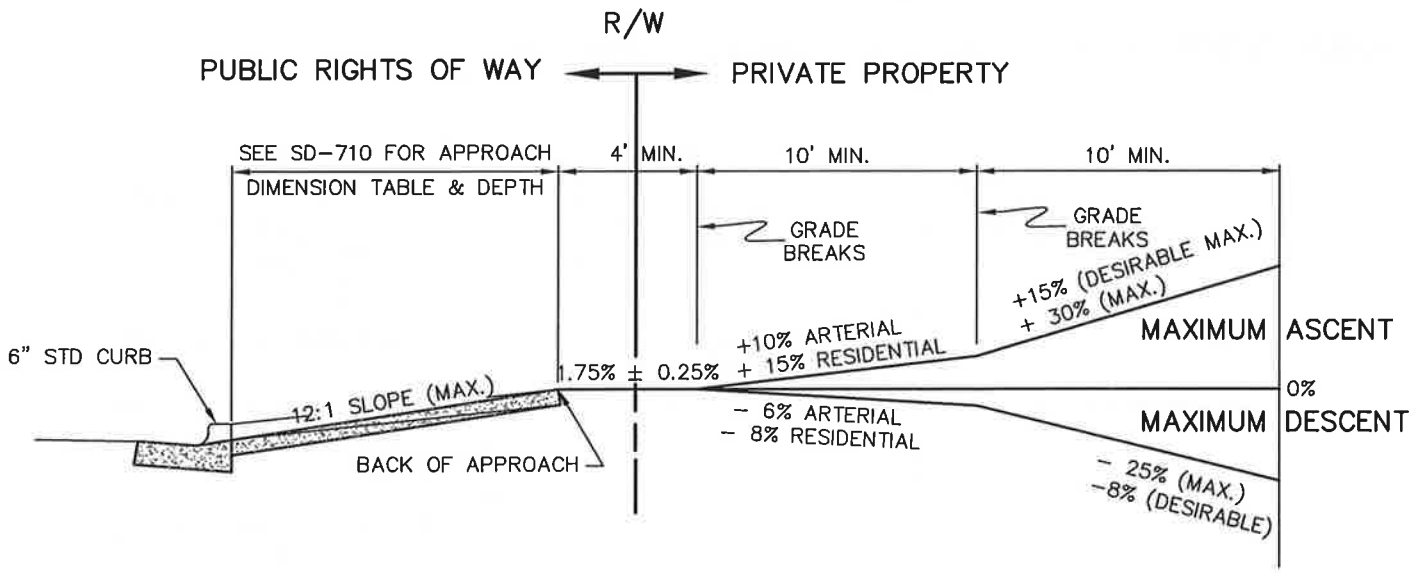
TYPICAL APPROACH

NOTES:

- (A) APPROACH TO CONFORM TO THE LATEST A.D.A. STANDARDS.
- (B) INSTALL EXPANSION JOINT AT TIP OF APPROACH WINGS AND WHERE SIDEWALK CHANGES THICKNESS.
- (C) BASE TO BE A 4" THICKNESS OF 3/4" MINUS CRUSHED AGGREGATE PER SECTION – 802.
- (D) APPROACH THROAT WIDTHS SET BY POLICY AND APPLICATION. ALL CONCRETE TO BE 6" THICK FROM TIP OF WING TO TIP OF WING UP TO THE EXPANSION JOINT. WHEN SIDEWALK IS SEPARATE FROM CURB THE SIDEWALK IMMEDIATELY BEHIND THE APPROACH THROAT SHALL BE 6" THICK ALSO.
- (E) ALL CONCRETE SHALL BE CLASS 3000 PER SECTION – 703.
- (F) SIDEWALK WIDTH MAY VARY.
- (G) PAY QUANTITIES FOR URBAN APPROACHES SHALL INCLUDE THE APPROACH RAMP/DRIVEWAY AREA, AND THE APPROACH FLARES/WINGS.
- (H) ROUTING OF SIDEWALK AROUND APPROACH IS NOT NECESSARY WHEN THE PLANTING STRIP EQUALS OR EXCEEDS 6 FEET.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE DRIVEWAY WITH DETACHED SIDEWALK	STANDARD DRAWING NO. SD–710C



NOTES:

(A) SAME PRINCIPLES APPLY FOR ALL CURB TYPES.

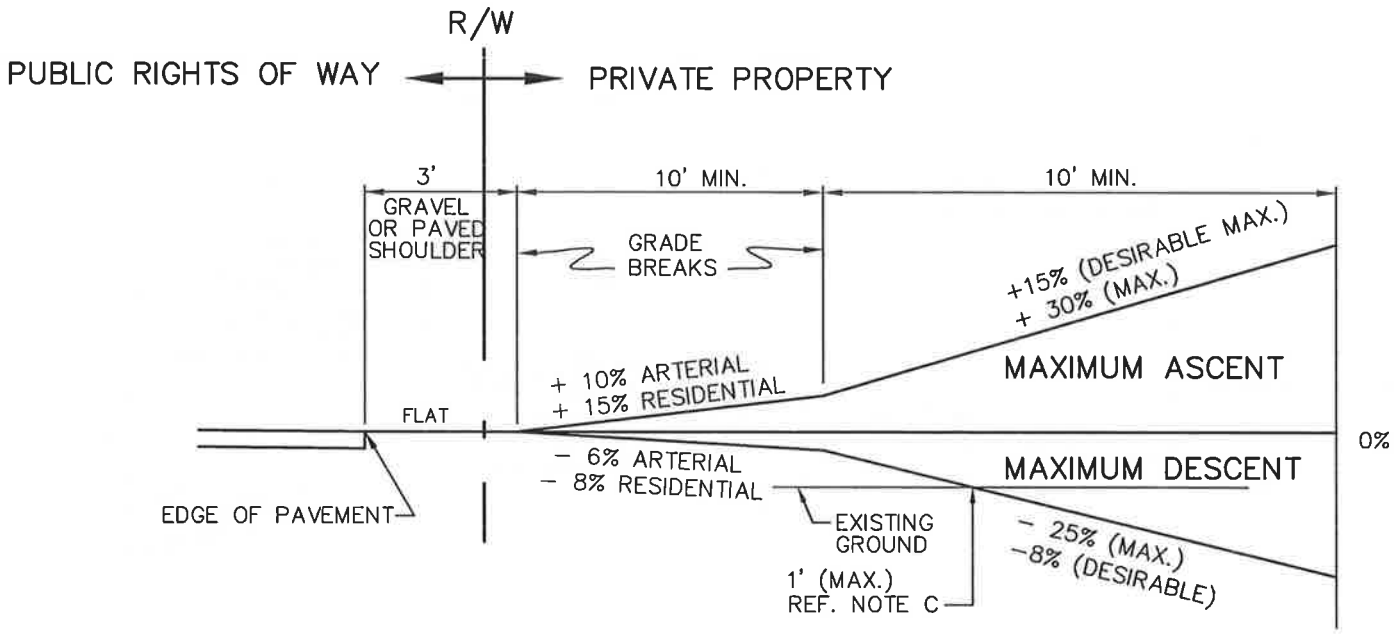
(B) MINIMUM AND MAXIMUM GRADES SHOWN FOR ACENDING AND DESCENDING DRIVES

(C) DESIGNED TO MINIMIZE BUMPER DRAGGING OF VEHICLES.

(D) WHEN DIFFERENCE IN GRADE IS GREATER THAN 1' USE THE SLOPES ABOVE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	DRIVEWAY GRADE STANDARD	STANDARD DRAWING NO. SD-711



NOTES:

(A) MINIMUM AND MAXIMUM GRADES SHOWN FOR ACENDING AND DESCENDING DRIVES

(B) DESIGNED TO MINIMIZE BUMPER DRAGGING OF VEHICLES.

(C) WHEN DIFFERENCE IN GRADE IS GREATER THAN 1' USE THE SLOPES ABOVE.

2015

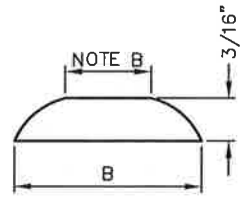
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	RURAL DRIVEWAY GRADE STANDARD	STANDARD DRAWING NO. SD-711A

NOTES:

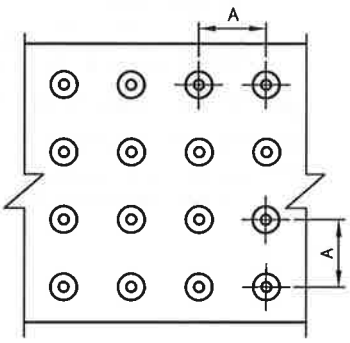
(A) DETECTABLE WARNINGS SHALL BE 24" IN THE DIRECTION OF TRAVEL AND EXTEND THE FULL WIDTH OF THE CURB RAMP, LANDING OR BLEND TRANSITION.

(B) DETECTABLE WARNINGS SHALL HAVE A DIAMETER OF 50% TO 65% OF THE BASE DIAMETER OF DOME.

(C) DETECTABLE WARNING DOMES SHALL BE PRE-MANUFACTURED UNITS INTEGRALLY CAST INTO CONCRETE RAMP TO ACHIEVE THE TRUNCATED DOME DIMENSIONS AND SPACING SHOWN. INSTALLATION TO BE PER MANUFACTURER'S SPECIFICATIONS. SURFACES SHALL CONTRAST VISUALLY WITH ADJACENT WALKING SURFACES EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT. METHODS OF CONSTRUCTION AND COLORATION MUST BE APPROVED BY THE OWNER PRIOR TO INSTALLATION.

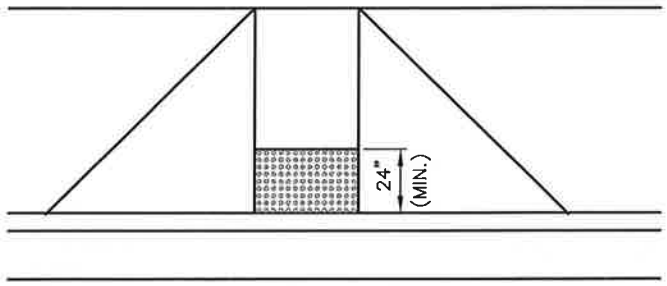


DOME SECTION

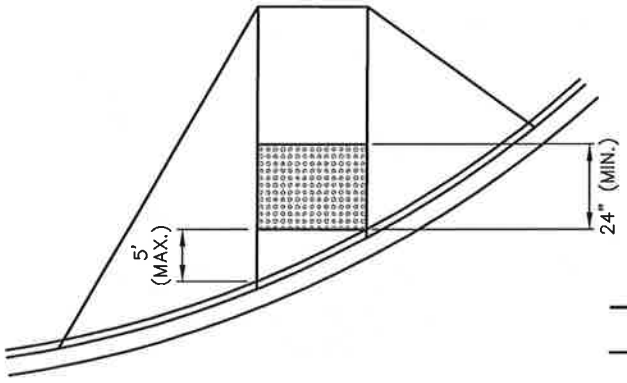


DOME SPACING

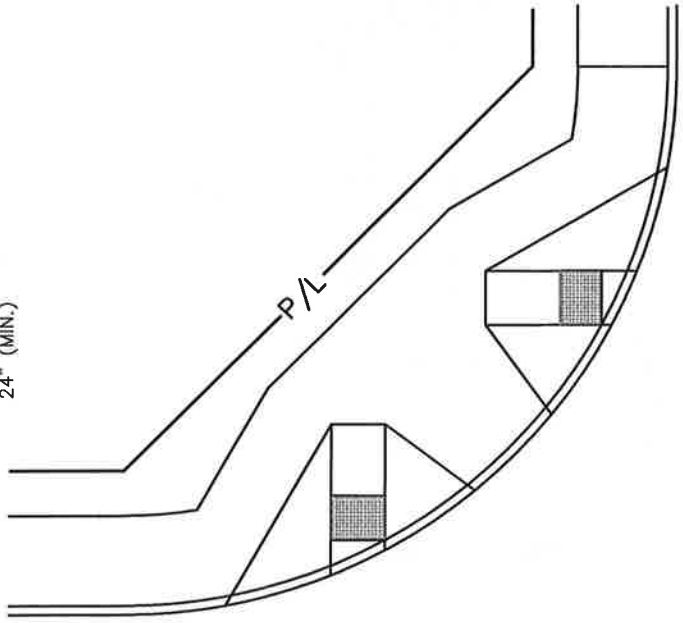
	MIN.	MAX.
A	1 5/8"	2 3/8"
B	7/8"	1 7/16"



PERPENDICULAR RAMP



SKEWED RAMP



2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	DETECTABLE WARNING FOR PEDESTRIAN ACCESS	STANDARD DRAWING NO. SD-712

NOTES:

(A) THIS TYPE OF RAMP TO BE USED FOR ALL CORNERS EXCEPT WHERE LOCAL STREETS MEET.

(B) CURB ON THE RADIUS TO BE 6" STANDARD CURB FOR SHOWN DIMENSIONS.

(C) ALL RAMP SURFACES TO BE 12 TO 1 SLOPE TO CONFORM TO ADA REQUIREMENTS.

(D) THIS TYPE OF CORNER TO HAVE TWO RAMPS CENTERED IN RADIUS WITH 6' BETWEEN RAMP WING TIPS.

(E) CORNER RADIUS IS 30' AS A MINIMUM WHEN ADJOINING ANY COLLECTOR OR ARTERIAL STREET. THE ENGINEER MAY REQUIRE LARGER RADIUS SIZES WHERE LARGER VEHICLE TURNING IS EXPECTED.

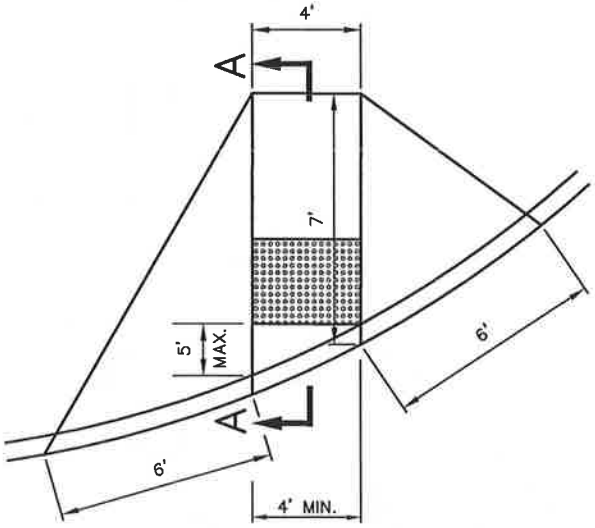
(F) PROPERTY TRIANGLE SIZE TO BE EQUAL TO THE RADIUS SIZE AS A MINIMUM. THE ENGINEER MAY REQUIRE LARGER TRIANGLES TO ACCOMMODATE VARIOUS TRAFFIC EQUIPMENT AND UTILITIES.

(G) THE RAMP THROAT WIDTH TO BE 4 FEET MEASURED PERPENDICULAR TO THE 7 FOOT THROAT SIDE. THE RAMP THROAT DEPTH TO BE 7 FEET MEASURED FROM THE FACE OF THE CURB TO THE BACK OF THE APPROACH. THE 7 FOOT SIDE OF THE RAMP THROAT TO BE PARALLEL WITH THE EXPECTED PATH OF THE PEDESTRIAN AND NOT PERPENDICULAR TO THE CURB. FOR EXAMPLE: PARALLEL WITH THE CROSS WALK STRIPES OR STOP BAR.

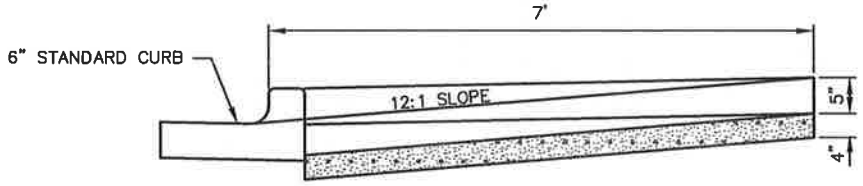
(H) THE RAMP WINGS TO BE 6 FEET MEASURED AT THE CURB FACE FOR 6" STANDARD CURB.

(I) ALL RAMPS TO HAVE A 4 FOOT WIDE CONTINUOUS PATH BEHIND THEM FOR PEDESTRIANS.

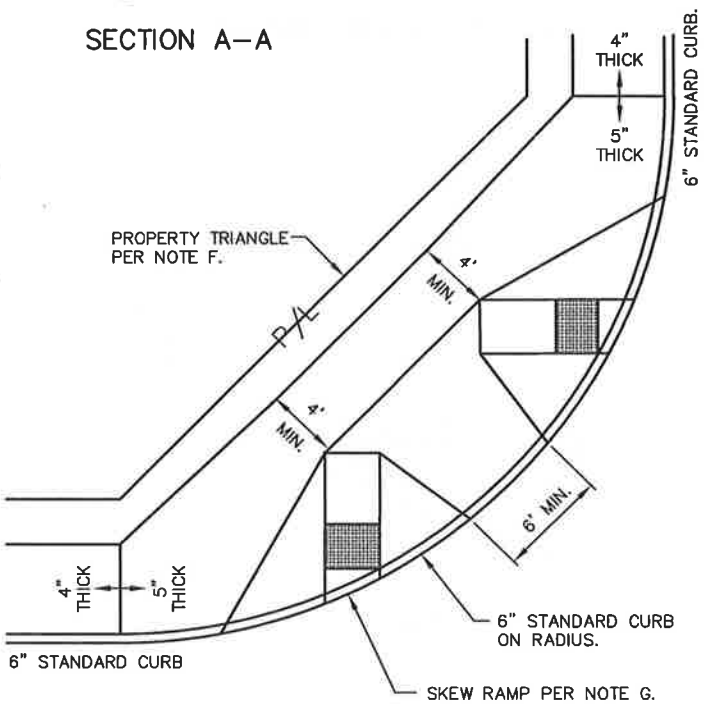
(J) ALL CONCRETE ADJOINING THE RADIUS WITHIN AND AROUND THE RAMPS TO BE 5 INCHES THICK WITH 4 INCHES OF 3/4 INCH AGGREGATE BASE.



RAMP DETAIL



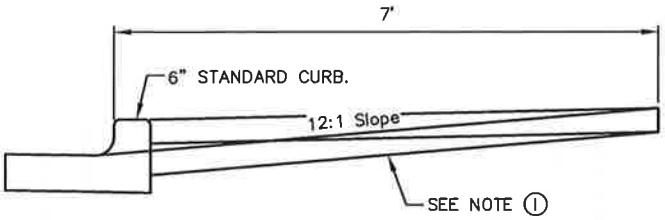
SECTION A–A



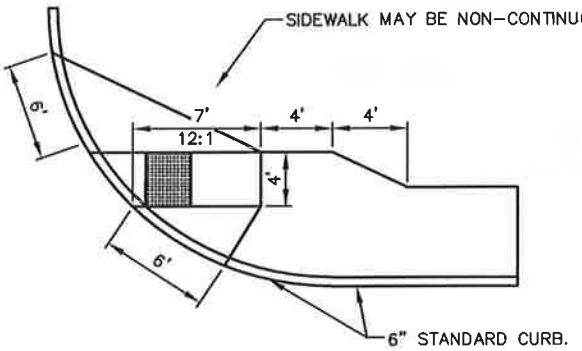
TYPICAL CORNER
30' RADIUS MINIMUM

2015

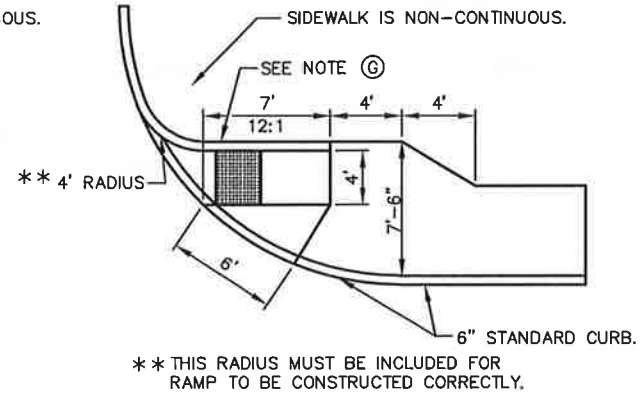
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PEDESTRIAN RAMP TYPE "A" FOR NEW DEVELOPMENT	STANDARD DRAWING NO. SD–712A



RAMP SECTION



TYPE "C3"
15' RADIUS MINIMUM



** THIS RADIUS MUST BE INCLUDED FOR RAMP TO BE CONSTRUCTED CORRECTLY.

TYPE "C4"
15' RADIUS MINIMUM

NOTES:

Ⓐ THIS TYPE OF RAMP MAY BE USED FOR LARGE COMMERCIAL APPROACHES WHERE THE STANDARD CONCRETE APPROACH IS NOT REQUIRED. THESE ALSO MAY BE USED FOR ALLEY AND PRIVATE STREET APPROACHES WHERE:
- A. THE SIDE WALK IS NOT REQUIRED TO CONTINUE AROUND THE RADIUS
- B. A SECOND RAMP IS NOT REQUIRED TO MOVE PEDESTRIANS ACROSS THE PRIMARY STREET.

Ⓑ CURB ON THE RADIUS MUST BE 6" STANDARD CURB FOR SHOWN DIMENSIONS.

Ⓒ ALL RAMP SURFACES MUST CONFORM TO ADA REQUIREMENTS.

Ⓓ THIS TYPE OF CORNER MUST HAVE A SINGLE RAMP TURNED PARALLEL TO THE PRIMARY STREET.

Ⓔ CORNER RADIUS IS 15' AS A MINIMUM.
THE DISTRICT MAY REQUIRED LARGER RADIUS SIZES WHERE LARGER VEHICLE TURNING IS EXPECTED.

Ⓕ THE RAMP THROAT WIDTH MUST BE 4 FEET MEASURED PERPENDICULAR TO THE 7 FOOT THROAT SIDE.
THE RAMP THROAT DEPTH MUST BE 7 FEET MEASURED FROM THE FACE OF THE CURB TO THE BACK OF THE APPROACH.
THE 7 FOOT SIDE OF THE RAMP THROAT MUST BE PARALLEL WITH THE EXPECTED PATH OF THE PEDESTRIAN AND NOT PERPENDICULAR TO THE CURB FOR EXAMPLE: PARALLEL WITH THE CROSS WALK STRIPES, THE STOP BAR, OR THE PRIMARY STREET CURB.

Ⓖ THE RAMP WING MUST BE 6 FEET MEASURED AT THE CURB FACE FOR 6" STANDARD CURB.
THE WING AWAY FROM THE ROAD IS ELIMINATED AND REPLACED WITH A WING SUBSTITUTE THAT IS 6 INCHES HIGH AT THE FACE OF THE STANDARD CURB AND 0 INCHES HIGH AT THE BACK OF THE RAMP AND POURED MONOLITHICALLY WITH THE RAMP.

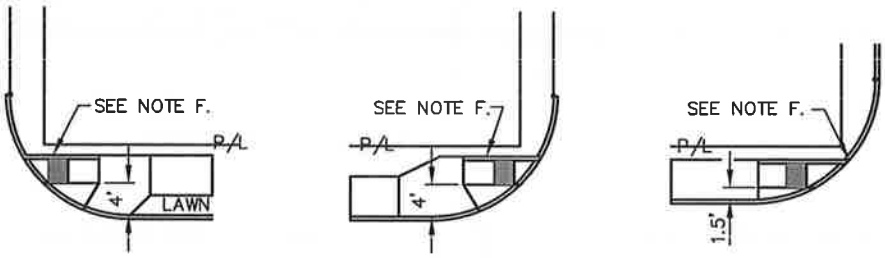
Ⓗ ALL RAMPS MUST HAVE A MINIMUM 4 FOOT X 4 FOOT LANDING BEHIND THEM FOR PEDESTRIANS.

Ⓘ ALL CONCRETE ADJOINING THE RADIUS WITHIN AND AROUND THE RAMPS SHALL BE 5 INCHES THICK WITH 4 INCHES OF 3/4 INCH AGGREGATE BASE.

Ⓙ RAMP CROSS SLOPE TO BE 1.75% ± 0.25%.

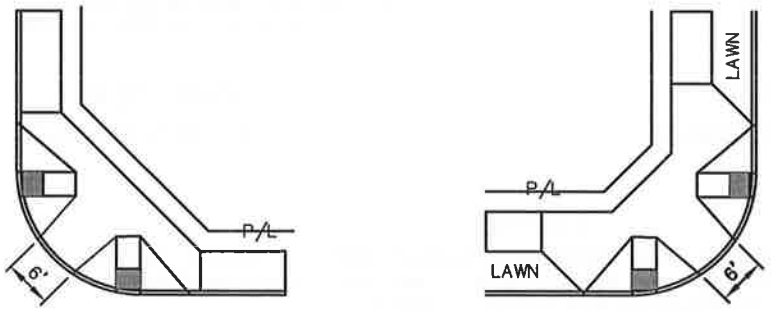
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PEDESTRIAN RAMP TYPE "C" FOR NEW DEVELOPMENT	STANDARD DRAWING NO. SD-712C



TYPE "C1" TYPE "C2" TYPE "C3"

ONE WING / ONE CURB
FOR NON CONTINUOUS SIDEWALK
10' RADIUS (MIN.)



TYPE "A1" TYPE "A2"

TWO WINGS
10' RADIUS (MIN.)

NOTES:

(A) THESE STYLES OF RAMPS MAY BE USED WHERE EXISTING STREET CORNERS NEED NEW CURBS AND RAMPS AND THE RADIUS IS 10 FOOT MIN. OR LARGER.

(B) CURB ON THE RADIUS SHOULD MATCH THE HEIGHT AND STYLE OF THE ADJOINING EXISTING CURB ANY VARIANCE FROM THIS MUST BE APPROVED BY THE OWNER.

(C) RAMP DIMENSIONS ARE BASED ON THE HEIGHT OF THE CURB. SEE TABLE BELOW.

RAMP DIMENSION TABLE

CURB	3"	4"	5"	6"	7"	8"
DEPTH	4'	5'	6'	7'	8'	9'
WING	3'	4'	5'	6'	7'	8'
THROAT	4'	4'	4'	4'	4'	4'

(D) ALL RAMPS TO HAVE A 4 FOOT WIDE CONTINUOUS PATH BEHIND THEM FOR PEDESTRIANS.

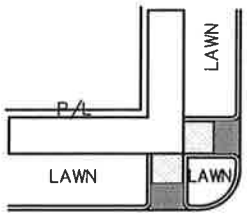
(E) ALL RAMP SURFACES MUST BE 12 TO 1 SLOPE TO CONFORM TO A.D.A. REQUIREMENTS.

(F) RAMP WINGS MAY BE REPLACED BY A 6 INCH WIDE CURB IF RAMP SIDE ABUTS A LAWN OR PLANTER. THE CURB IS 0 INCHES TALL AT BACK OF APPROACH AND MATCHES CURB HEIGHT AT THE STREET.

(G) ALL CONCRETE ADJOINING THE RADIUS WITHIN AND AROUND THE RAMPS TO BE 5 INCHES THICK WITH 4 INCHES OF 3/4 INCH AGGREGATE BASE.

2015

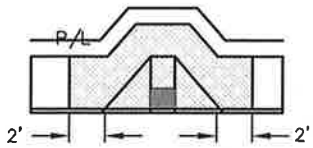
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PEDESTRIAN RAMPS WITHIN RADIUS FOR MODIFYING EXISTING CORNERS	STANDARD DRAWING NO. SD-712D



TYPE "F1"

TWO CURBS

2' TO 8' RADIUS ONLY



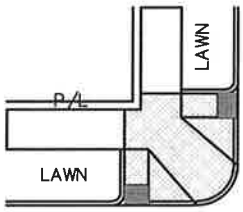
TYPE "G1"

MID BLOCK

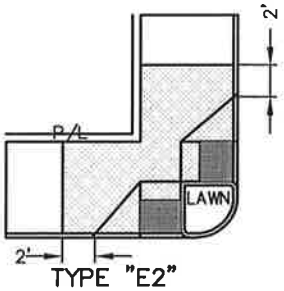
CONCRETE

5" THICK

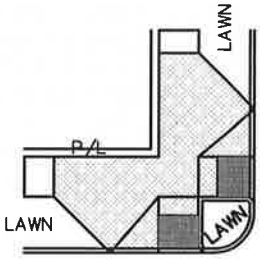
4" THICK



TYPE "E1"



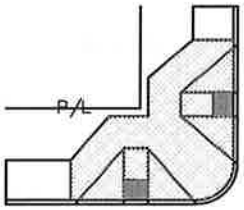
TYPE "E2"



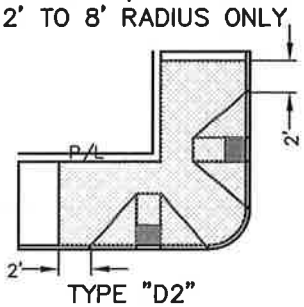
TYPE "E3"

ONE WING / ONE CURB

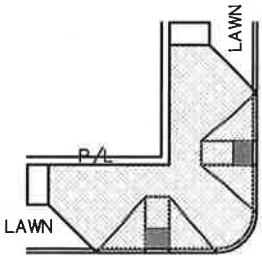
2' TO 8' RADIUS ONLY



TYPE "D1"



TYPE "D2"



TYPE "D3"

TWO WINGS

2' TO 8' RADIUS ONLY

NOTES:

(A) RAMPS OUTSIDE OF THE RADIUS MAY BE USED WHERE EXISTING STREET CORNERS NEED NEW CURBS AND RAMPS AND THE RADIUS IS BETWEEN 2 AND 8 FEET.

(B) CURB ON THE RADIUS SHOULD MATCH THE HEIGHT AND STYLE OF THE ADJOINING EXISTING CURBS. ANY VARIANCE FROM THIS MUST BE APPROVED BY THE ENGINEER.

(C) ALL RAMP SURFACES TO BE 12 TO 1 SLOPE TO CONFORM TO A.D.A. REQUIREMENTS.

(D) RAMP DIMENSIONS ARE BASED ON THE HEIGHT OF THE CURB. SEE TABLE BELOW.

RAMP DIMENSION TABLE

CURB	3"	4"	5"	6"	7"	8"
DEPTH	4'	5'	6'	7'	8'	9'
WING	3'	4'	5'	6'	7'	8'
THROAT	4'	4'	4'	4'	4'	4'

(E) RAMP WINGS MAY BE REPLACED BY A 6 INCH WIDE CURB IF RAMP SIDE ABUTS A LAWN OR PLANTER. THE CURB IS 0 INCHES TALL AT BACK OF APPROACH AND MATCHES CURB HEIGHT AT THE STREET.

(F) ALL RAMPS MUST HAVE A 4 FOOT WIDE CONTINUOUS PATH BEHIND THEM FOR PEDESTRIANS.

(G) ALL CONCRETE ADJOINING THE RADIUS WITHIN AND AROUND THE RAMPS TO BE 5 INCHES THICK WITH 4 INCHES OF 3/4 INCH AGGREGATE BASE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PEDESTRIAN RAMPS OUTSIDE RADIUS FOR MODIFYING EXISTING CORNERS	STANDARD DRAWING NO. SD-712E

NOTES:

(A) CORNER RADIUS AND SIDEWALK ARRANGEMENT WILL VARY.

(B) A.D.A. REQUIRES TRAVELED WAY TO BE 1:12 WITH 4' MIN. WIDTH.

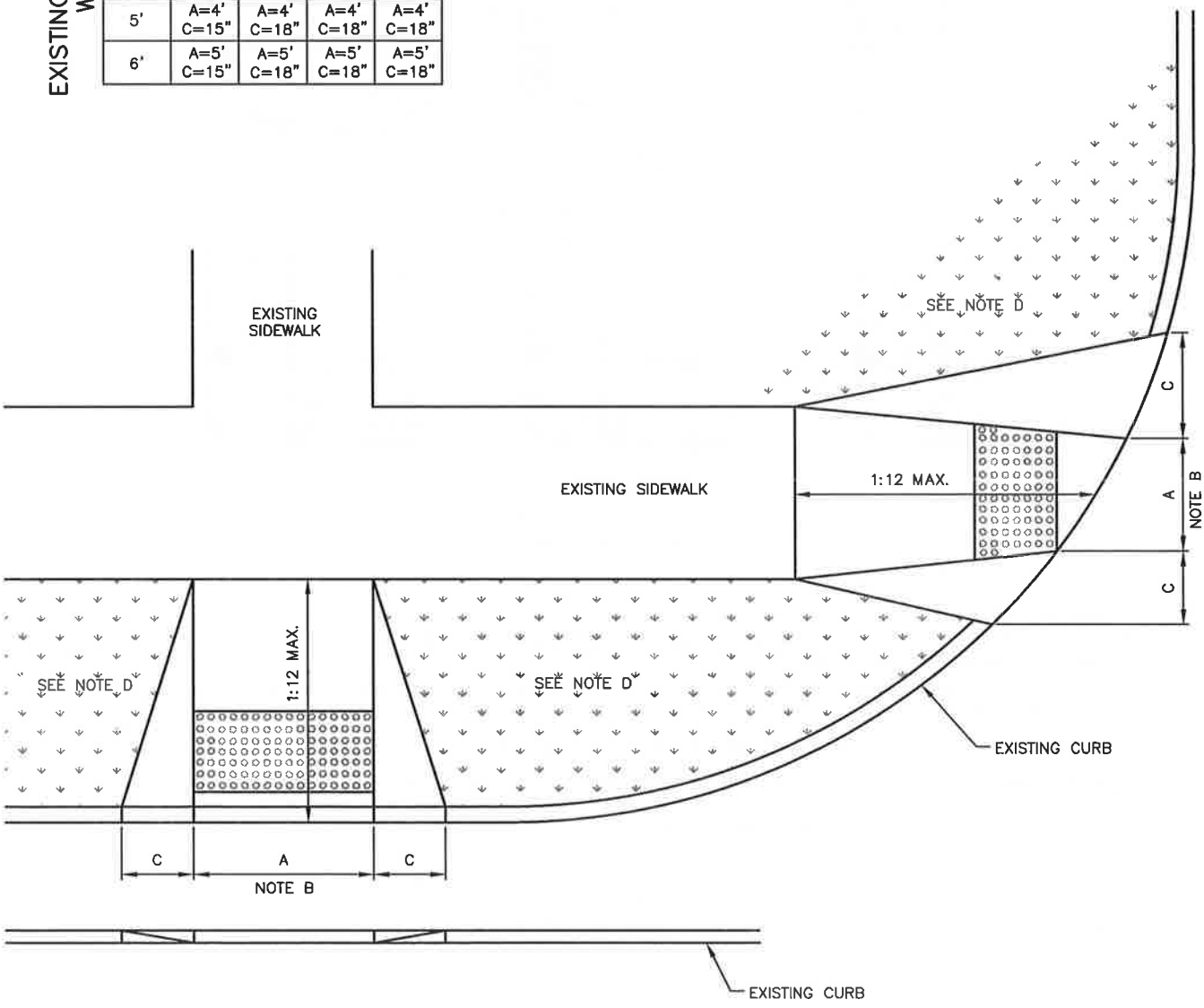
(C) WING CROSS SLOPE VARIES WITH EXISTING CURB HEIGHT REFERENCE CHART BELOW FOR APPROPRIATE DIMENSIONS.

(D) NO SIDEWALK OR CONCRETE LANDING ALLOWED UNLESS WING CROSS SLOPE IS 1:10 MIN.

(E) THIS RAMP IS SUITABLE FOR MID-BLOCK CROSSINGS.

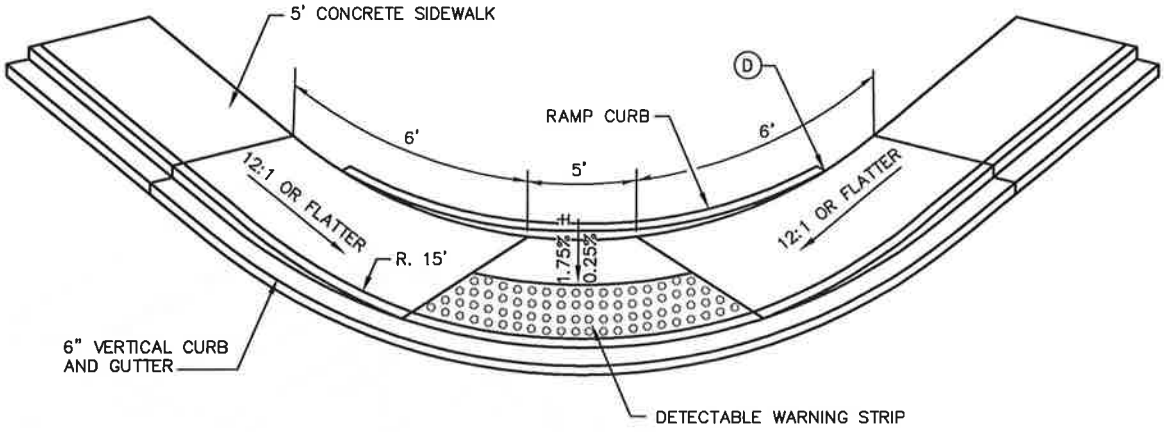
EXISTING CURB HEIGHT

EXISTING SIDEWALK WIDTH	3"	6"	9"	12"
3'	A=4' C=9"	A=4' C=12"	A=4' C=15"	A=4' C=18"
4'	A=4' C=9"	A=4' C=12"	A=4' C=15"	A=4' C=18"
5'	A=4' C=15"	A=4' C=18"	A=4' C=18"	A=4' C=18"
6'	A=5' C=15"	A=5' C=18"	A=5' C=18"	A=5' C=18"

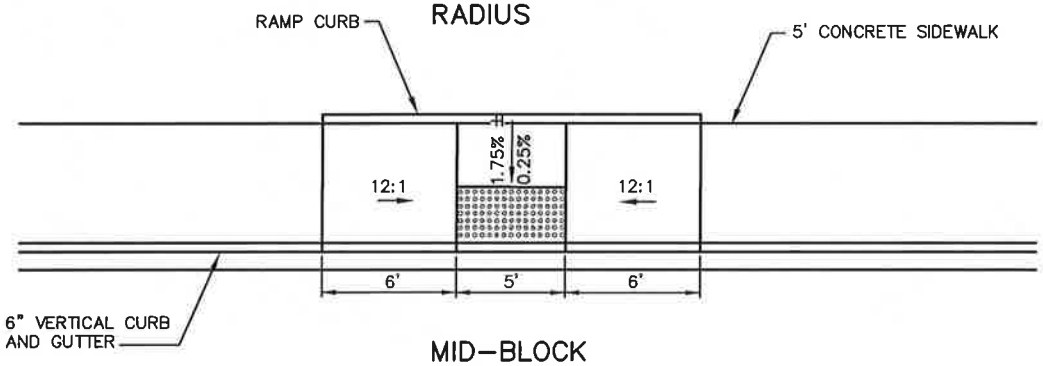


2015

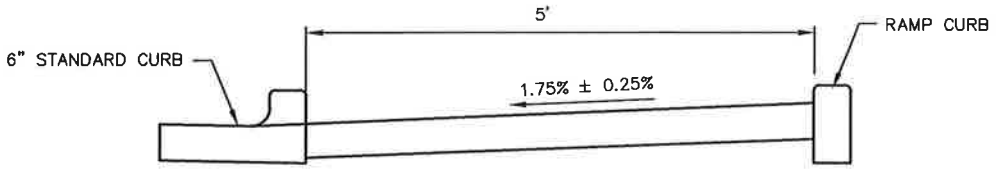
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PEDESTRIAN RAMP TYPE "F" FOR EXISTING CORNERS	STANDARD DRAWING NO. SD-712F



RADIUS



MID–BLOCK



SECTION

NOTES:

(A) THIS TYPE OF RAMP MAY BE USED FOR SIDEWALKS IN AREAS THAT DO NOT HAVE ADEQUATW SPACE FOR LANDINGS REQUIRED TO MEET ADA.

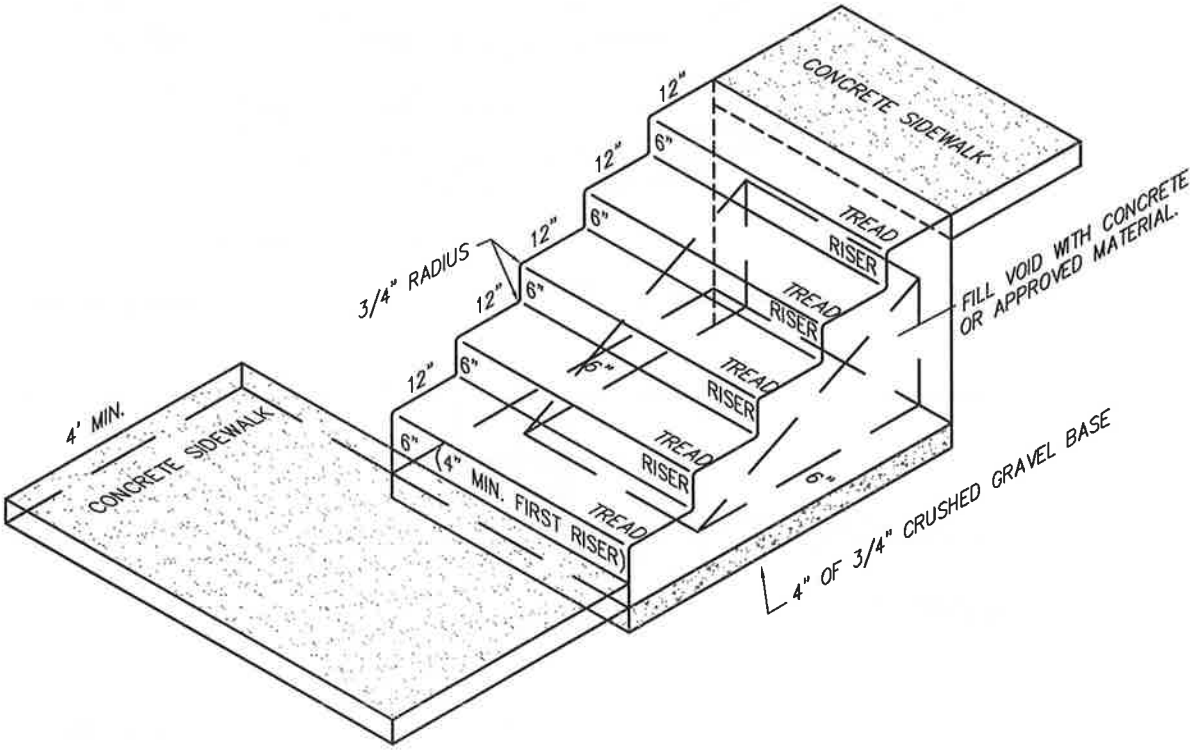
(B) THROAT OF RAMP WILL BE 1.75% ± 0.25% PER ADA REQUIREMENTS.

(C) ALL SIDEWALK SURFACES SLOPING TO PEDESTRIAN RAMP MUST BE 12:1 SLOPE TO CONFORM TO ADA REQUIREMENTS.

(D) CONCRETE CURB WILL BE PLACED AT THE BACK OF THE RAMP AND ADJOINING SLOPING SIDEWALK. HEIGHT OF CURB WILL BE DETERMINED BY THE ADJACENT PROPERTY BEING TIED INTO. CURB WILL BE 0 INCHES HIGH AT THE TOP OF THE SLOPING SIDEWALK.

(E) ALL CONCRETE ADJOING THE RADIUS WITHIN AND AROUND THE RAMPS SHALL BE 5 INCHES THICK WITH 4 INCHES OF 3/4.

(F) SLOPES SHOWN ARE MAXIMUMS. THE CONTRACTOR SHOULD ACCOUNT FOR CONSTRUCTION TOLERANCES TO PREVENT EXCEEDING THE MAXIMUM SLOPES.



NOTES:

(A) TREADS AND RISERS TO BE UNIFORM IN SIZE.

(B) ALL WALLS TO BE 6" THICK AS SHOWN.

(C) ALL EXPOSED CORNERS TO HAVE 3/4" RADIUS.

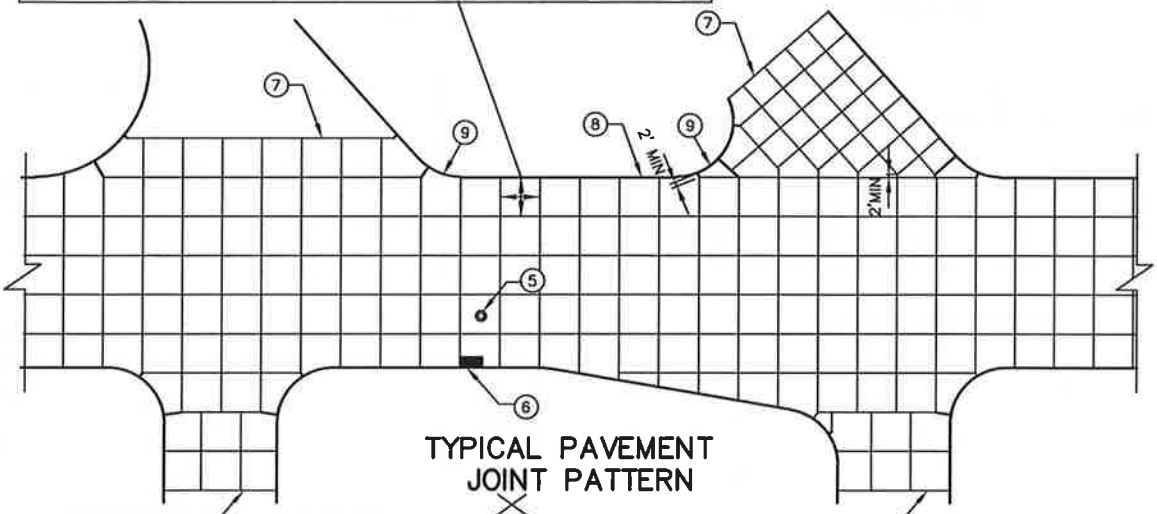
(D) LANDINGS TO BE 4 FEET WIDE AS A MINIMUM.

(E) IF SPACE PERMITS, FIRST TREAD TO BE AT GRADE WITH SIDEWALK.

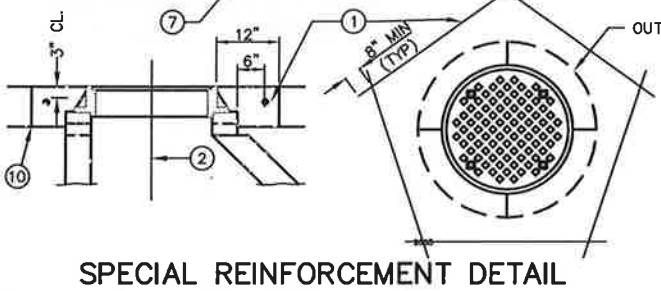
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE STEPS	STANDARD DRAWING NO. SD-713

MAXIMUM AND NORMAL TRAVERSE JOINT SPACING IS 15'. THE MINIMUM TRANSVERSE JOINT SPACING IS 9'. ALL TRANSVERSE JOINTS MUST CONNECT ACROSS THE PAVEMENT. NORMAL LONGITUDINAL JOINT SPACING IS 12' AND THE MAXIMUM IS 15'. THE LONGITUDINAL JOINTS SHALL BE COINCIDENTAL WITH THE LANE LINES. THE MAXIMUM TIED WIDTH IS 38'. ALL CONSTRUCTION JOINTS SHOULD BE TIED. UNTIED CONSTRUCTION JOINTS SHALL HAVE A KEYWAY CONSTRUCTION WHEN THE PAVEMENT IS 9" OR THICKER.



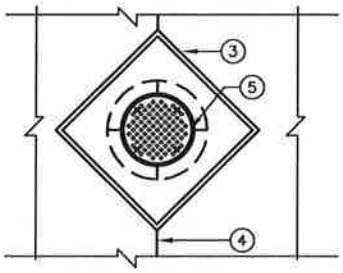
TYPICAL PAVEMENT JOINT PATTERN



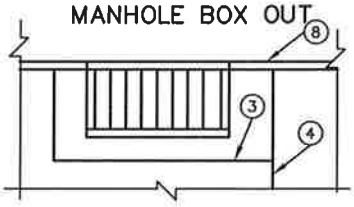
SPECIAL REINFORCEMENT DETAIL

LEGEND

1. REINFORCING BAR (NO. 4).
2. C MANHOLE RING AND COVER.
3. KEYED CONSTRUCTION JOINT – TYPE C.
4. TRANSVERSE JOINT.
5. MANHOLE.
6. CATCH BASIN.
7. END CONCRETE PAVEMENT.
8. CURB.
9. 2' MIN. RADIUS ON RETURNS.
10. ISOLATION JOINT–ROOFING FELT OR FULL DEPTH FIBER.



MANHOLE BOX OUT



CATCH BASIN BOX OUT

BOX OUT DETAILS

NOTES

(A) THE TYPICAL PAVEMENT JOINT PATTERN SHOWN IS FOR ILLUSTRATION PURPOSE ONLY. USE AS A GUIDE IN DEVELOPING THE JOINT PATTERN FOR THE PROJECT. PREPARE A PAVEMENT JOINT PATTERN FOR THE PROJECT FOR APPROVAL BY THE ENGINEER.

(B) WHEN POSSIBLE, PLACE MANHOLES AWAY FROM JOINTS. JOINT SPACING MAY BE ADJUSTED NEAR MANHOLES, WITHIN THE STANDARD LIMITS. PLACE MANHOLES AT LEAST TWO FEET FROM A JOINT. IF THIS IS NOT FEASIBLE, CENTER MANHOLE ON JOINT. WHEN A MANHOLE IS LOCATED TWO TO FOUR FEET FROM A JOINT, SPECIAL REINFORCEMENT AROUND THE MANHOLE IS REQUIRED, AS SHOWN.

(C) WHEN MANHOLE OR CATCH BASIN FRAMES ARE BOXED OUT AND THE PAVEMENT PLACED AROUND THE FRAME AS A SEPARATE OPERATION, PLACE ISOLATION JOINTS AS SHOWN IN BOX OUT DETAIL.

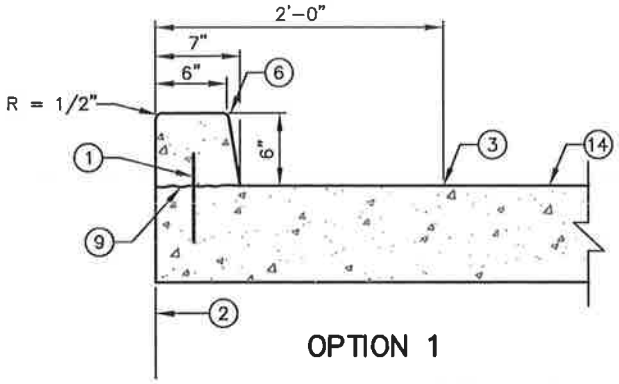
(D) JOINTS IN THE CURBS TO COINCIDE WITH TRANSVERSE JOINTS IN THE PAVEMENT.

(E) SEE STANDARD DRAWINGS SD–701 TO SD–709 FOR ADDITIONAL NOTES ON REQUIREMENTS FOR CURB AND GUTTER CONSTRUCTION.

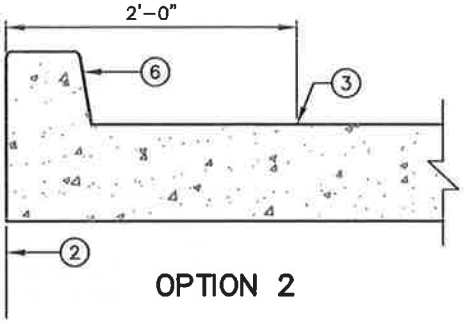
(F) CONSTRUCT SAWED JOINTS 3/16"–5/8" WIDE AND FILL WITH 1/4" SWADDLE WITH HOT POURED ELASTOMERIC JOINT FILLER MEETING REQUIREMENTS OF ASTM D–3405 OR D–3406.

2015

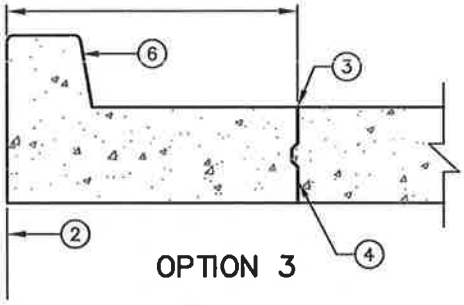
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE PAVEMENT JOINTING CRITERIA	STANDARD DRAWING NO. SD–714



OPTION 1



OPTION 2



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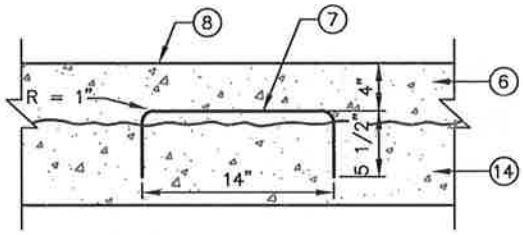
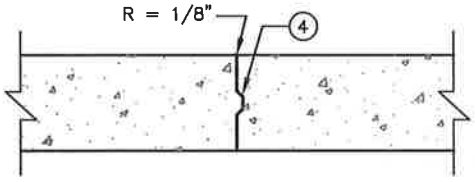
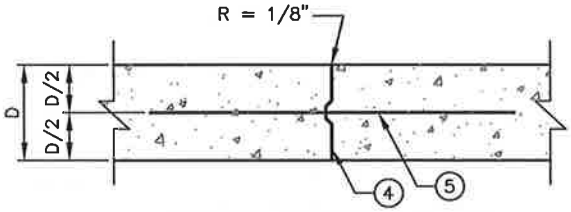


CURB TIE DETAIL



KEYED CONSTRUCTION
JOINT – TYPE C



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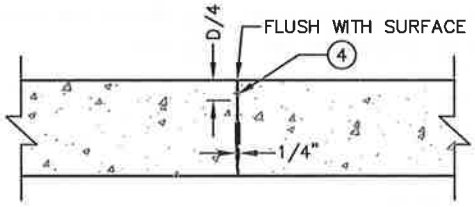
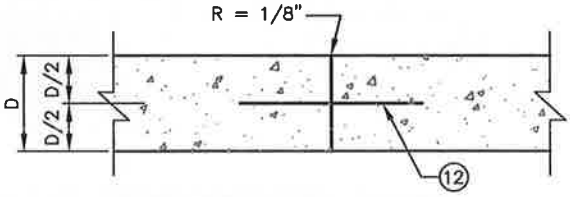
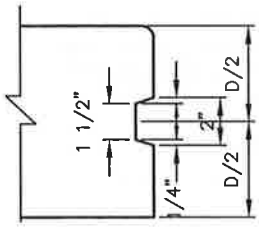


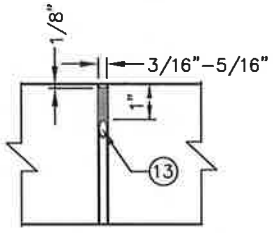
KEYED CONSTRUCTION SAWED
OR PREMOLDED STRIP
CONSTRUCTION JOINT – TYPE B



TIED TRANSVERSE CONSTRUCTION
JOINT ALTERNATIVE – TYPE D



KEYWAY DETAIL
(ON 10" THICK PAVEMENT OR GREATER)



HOT POURED JOINT
FILLER DETAIL

LEGEND

1. NO. 3 CURB TIE.
2. CONCRETE PAVEMENT LIMIT.
3. PROFILE GRADE.
4. KEYWAY FORMED BY FASTENING KEY TO FORM.
5. NO. 4 DEFORMED TIE BARS 30" LONG AT 30" O.C.
6. CURB.
7. NO. 3 CURB TIE PLACE AT 27" O.C.
8. TOP OF CURB.
9. COLD JOINT ROUGH SURFACE.
10. CONSTRUCTION JOINT TYPE C.
11. PREMOLDED STRIP.
12. NO. 8 DEFORMED TIE BARS 15" LONG AT 12" O.C.
13. HEAT RESISTANT BACKER ROD OF TYPE RECOMMENDED BY JOINT FILLER MANUFACTURER.
14. CONCRETE PAVEMENT.

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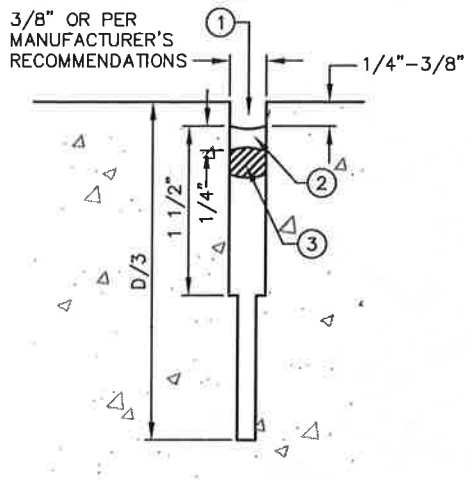
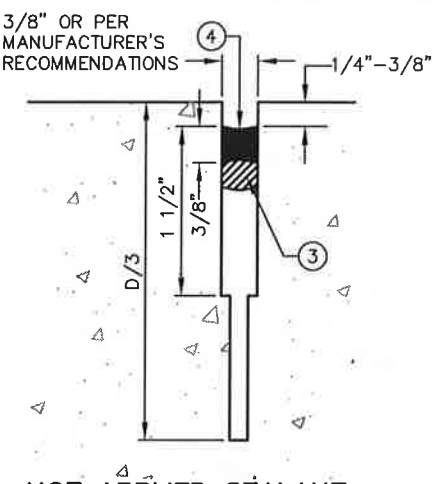
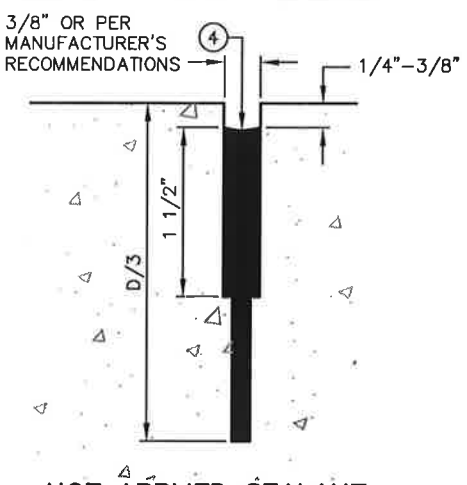
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE PAVEMENT JOINTING DETAILS	STANDARD DRAWING NO. SD–714A



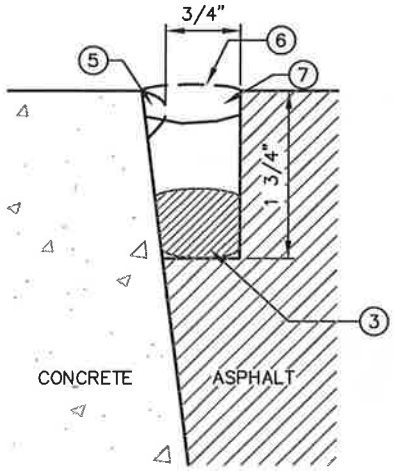
SILCONE SEALANT



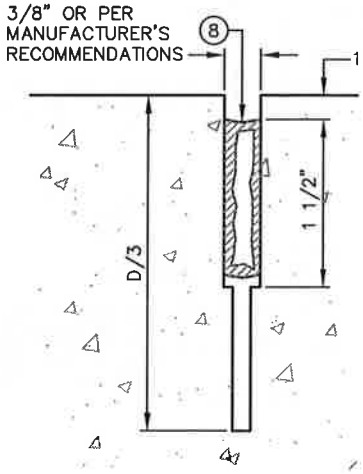
HOT APPLIED SEALANT W/BACKER ROD



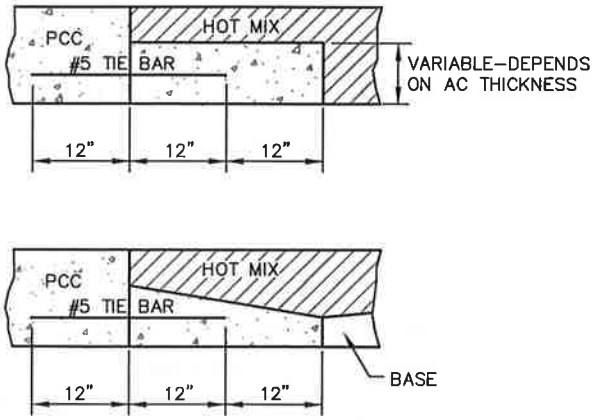
HOT APPLIED SEALANT W/NO BACKER ROD



CONCRETE TO ASPHALT



COMPRESSION SEAL



CONCRETE TO ASPHALT TRANSITIONS

LEGEND

1. TOOLED SURFACE REQUIRED EXCEPT FOR SELF LEVELING TYPE SEALANT.
2. APPROVED SILICONE SEALANT.
3. THE BACKER ROD MUST BE COMPATIBLE WITH THE SEALANT AND SLIGHTLY OVERSIZED TO RESIST MOVEMENT DURING SEALING OPERATION.
4. HOT APPLIED SEALANT – ASTM D 3405.
5. ANY PAVEMENT ADHERING TO THE CONCRETE FACE AFTER SAWING SHALL BE REMOVED.
6. HOT POURED SEALANT – ASTM D 3405 FLUSH WITH SURFACE.
7. APPROVED SILICONE SEALANT 1/4" – 3/8" BELOW SURFACE.
8. PREFORMED COMPRESSION SEAL– ASTM D 2628.

NOTES

A. THE PAVEMENT EDGE IS TO BE PLACE APPROXIMATELY VERTICAL.

B. A CONSTRUCTION JOINT SHALL BE AT LEAST 2' FROM A SAWED JOINT.

C. TRAVERSE AND LONGITUDINAL JOINT SHALL BE SAWED JOINTS.

D. SEALANTS AND PREFORMED SEALS SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURES REQUIREMENTS.

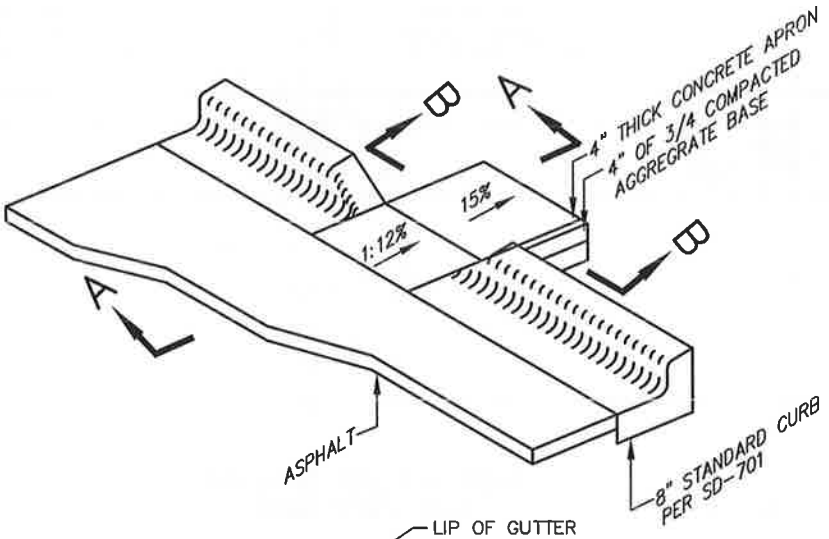
E. MAKE A VERTICAL SAW CUT IN THE ASPHALT TO SERVE AS A FORM FOR THE END OF THE CONCRETE PAVEMENT.

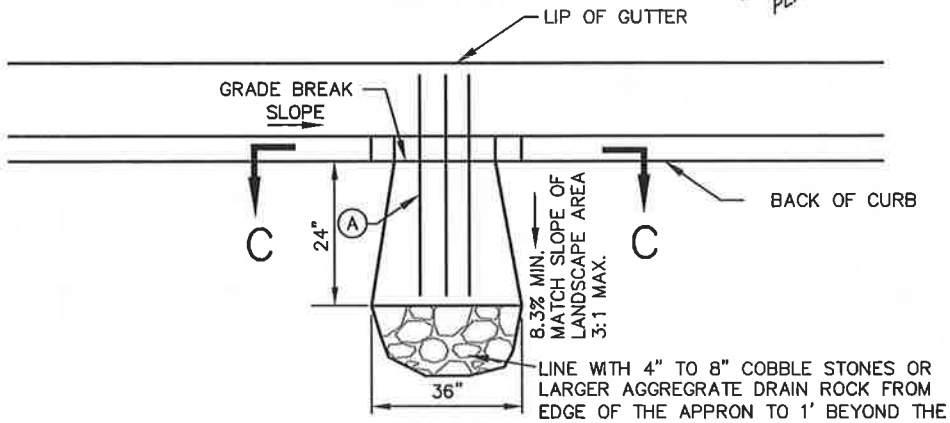
F. PREFERRED PRACTICE IS TO PLACE THE CONSTRUCTION JOINT AT THE LOCATION OF A PLANNED CONTRACTION JOINT AND USE DOWEL BARS PER STANDARD TRANSVERSE JOINT DETAILS.

G. DIMENSIONING REFERS TO SEALANT RESERVOIR ONLY. SAW CUT TO CONTROL SLAB CRACKING SHALL BE D/3 DEEP. "D" EQUALS DESIGN DEPTH OF CONCRETE PAVEMENT.

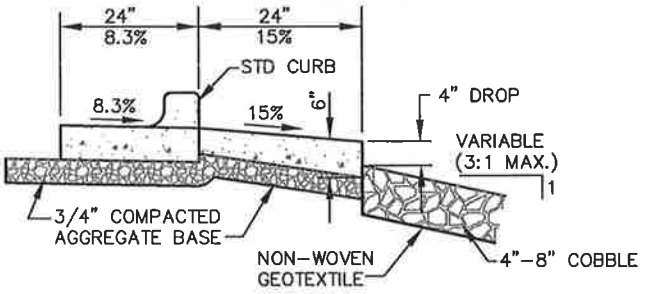
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONCRETE PAVEMENT SAWED JOINTS	STANDARD DRAWING NO. SD–714B

2015

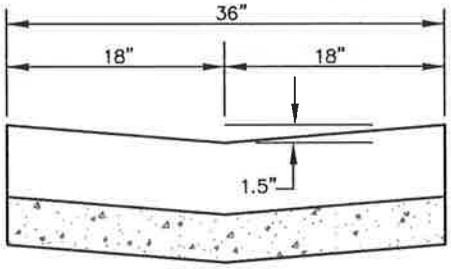




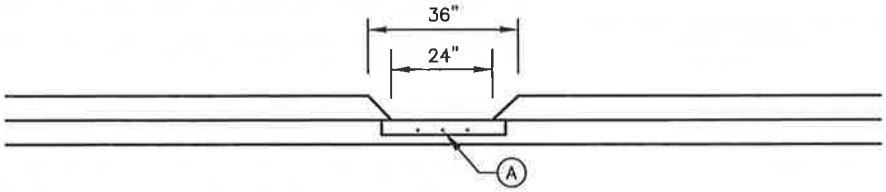
PLAN
N.T.S.



SECTION A–A
N.T.S.



SECTION B–B (PARTIAL)
N.T.S.



SECTION C–C
N.T.S.

NOTES:

(A) 3 # 4 BARS AT MID DEPTH OF CONCRETE SPACE EQUALLY ACROSS CURB OPENING.

(B) REQUIRED WITH INFLITRATION SWALE DESIGN.

(C) CONCRETE APRON SHALL REMAIN FREE OF ALL OBSTRUCTIONS INCLUDING GRASS AND OTHER VEGETATION THAT MAY BE USED IN CONJUNCTION WITH LANDSCAPING OF SWALE OR RETENTION BASIN.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CURB DRAIN	STANDARD DRAWING NO. SD–715

ISPWC – DIVISION 800

Aggregates and Asphalt

Section 801 – Uncrushed Aggregates
Section 802 – Crushed Aggregates
Section 803 – Plant Mix Aggregates
Section 804 – Sand Choker
Section 805 – Asphalt
Section 806 – Asphalt Tack Coat
Section 807 – Asphalt Prime Coat
Section 808 – Seal Coat
Section 809 – Surface Treatment
Section 810 – Plant Mix Pavement
Section 811 – Road Mix Pavement
Section 812 – Scrub Coat
Section 813 – Fog Coat

SECTION 801

UNCRUSHED AGGREGATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Uncrushed aggregate materials, testing and production and construction requirements.

1.2 RELATED SECTIONS

A. Section 202 – Excavation and Embankment.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

1.4 SUBMITTALS

A. Test results – gradation, sand equivalent, Los Angeles abrasion loss, liquid limit, plasticity index.

B. Materials from an approved Idaho Transportation Department materials source will not require project specific submittals for source quality unless otherwise specified in the Contract Documents.

1.5 PROJECT RECORD DOCUMENTS

A. Gradation charts and graphs.

B. Sand equivalent test results.

C. Los Angeles Abrasion test results.

1.6 DELIVERY, STORAGE AND HANDLING

A. Stockpile screened material in an approved location.

B. Stockpile, load, haul and place material in a manner which minimizes segregation and degradation.

PART 2 MATERIALS

2.1 DESCRIPTION

A. Uncrushed, hard, durable gravel or fragments of stone from approved source.

B. May include sand, stonedust or similar filler material.

C. Screen out or crush down oversize material to meet gradation requirements.

D. Percent of wear not more than 50, at 500 revolutions on material retained on No. 4 sieve.

1. AASHTO T 96: Los Angeles Abrasion Test.

2.2 UNCRUSHED AGGREGATE GRADATION

A. Gradations are listed in the following chart:

1. AASHTO T 2: Sampling of Aggregates.

2. AASHTO T 11: Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.

3. AASHTO T 27: Sieve analysis of Fine and Coarse Aggregates.

4. AASHTO T 248: Reducing Field Samples of Aggregate to Testing Size.

5. AASHTO T 255: Total Moisture Content of Aggregate by Drying.

Table 1
UNCRUSHED AGGREGATE GRADATIONS

PERCENTAGES BY WEIGHT PASSING SQUARE MESH SIEVES							
SIEVE SIZE	NOMINAL MAXIMUM SIZE						
	8 inches	6 inches	3 inches	Drain Rock 3 inches	1 inch	Sand	Filter Sand
8 in.	100						
6 in.		100					
3 in.			100	100			
1 in.				25-60	100		
3/8 in.				0-4		100	100
No. 4	15-65	15-60	25-60		25-60	85-100	95-100
No. 16							45-80
No. 50							10-30
No. 100							2-10
No. 200	0-12	0-12	0-12	0-2	0-12	2-10	0-4

Footnote: Drain Rock shall have a minimum of 35% Air Voids as determined by AASHTO T 19 Bulk Density (“Unit Weight”) and Voids in Aggregate, Jigging Procedure.

B. Allowable percent passing No. 4 sieve may be adjusted within the range shown in the table with additional compensation to the Contractor.

C. Portion of fine aggregate passing the No. 200 sieve to be less than 60% of that portion passing the No. 40 sieve.

D. Liquid limit of fine aggregate passing the No. 40 sieve $\leq$ 25. Plasticity Index $\leq$ 6.

1. AASHTO T 2: Sampling of Aggregates.

2. AASHTO T 89: Determining the Liquid Limits of Soils.

3. AASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils.

E. Sand Equivalent $\geq$ 25. Sand equivalent not required if less than 5% passing the No. 200 sieve.

F. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test. Preferred method to be Alternate #1, others as specified by the Engineer.

G. Imported Trench Backfill is considered 8 inch minus.

H. Obtain one sample of uncrushed aggregate for each 3000 tons or one sample per project, whichever frequency is greater. Test each sample for gradation and sand equivalent.

PART 3 WORKMANSHIP

3.1 PREPARATION FOR PLACEMENT

A. Prior to placing base course.

1. Blade smooth and shape underlying surface (subgrade) to specified cross section and grade.

2. Subgrade must be approved.

B. Binder (when required).

1. When added at screening plant:

a. Mix uniformly without contamination to uncrushed aggregates.

2. When added on roadway:

a. Mix uniformly without contamination to uncrushed aggregates.

b. Protect subgrade from disturbance.

C. Haul over subgrade or previously placed lifts.

1. Not permitted when detrimental to subgrade or surface.

2. When allowed, construction equipment to operate in “split track” pattern.

3.2 PLACEMENT

A. Placing material which can be tested by AASHTO T 310: In Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) in Maximum 8-inch thick lifts.

B. For material too granular to test, refer to Section 202.3.8.

3.3 MIXING

A. Stationary Plant Mixer.

1. Aggregate and water mixed in approved mixer or by approved method.

2. Add sufficient water during mixing to facilitate compaction.

3. Place on roadway with approved aggregate spreader.

B. Travel Plant Method.

1. Place aggregate with approved aggregate spreader or windrow device.

2. Uniformly mix base aggregate with a traveling mixing plant.

3. Add sufficient water during mixing to facilitate compaction.

C. Road Mix Method.

1. Place on roadway with approved aggregate spreader.

2. Uniformly mix with motor graders or other approved equipment.

3. Add sufficient water during mixing to facilitate compaction.

D. Premixed Method.

1. Uniformly mix aggregate and water in an approved manner.

2. Add sufficient water during mixing to facilitate compaction.

3. Place on roadway with approved aggregate spreader.

3.4 COMPACTION

A. Compaction methods.

1. Compact each lift full width.

2. When lift is on a superelevation, start roller pattern at bottom of superelevation and work towards top.

3. In areas too small for rollers, use hand compactors.

4. Perform one in-place density test per lift for each 300 linear feet of roadway or 10,000 square feet of general fill and embankment area. Refer to section 202.3.8 for material moisture control and density acceptance requirements. If the specified density is not attained, the area shall be reworked and/or re-compacted until the density specifications are achieved and documented by additional testing or retesting at the designated frequencies.

3.5 SURFACE SMOOTHNESS

A. Finished grade at top of uncrushed aggregate course within 0.05 foot of specified elevation.

B. Ten-foot straight edge deviation not greater than 0.04 foot.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following bid item as designated in the Bid Schedule. To include compacting subgrade, furnishing, loading, hauling placing, blending, spreading, shaping, watering, and compacting the uncrushed aggregate and all tools, labor, equipment and incidentals necessary for the proper completion of this item. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Uncrushed Aggregate Base: By the cubic yard measured on a compacted in place basis.

1. Bid Schedule Payment Reference: 801.4.1.A.1.
2. Bid Schedule Description: _____ Minus Uncrushed Aggregate Base …cubic yard (CY).

B. Uncrushed Aggregate Base: By the ton measured by truck tickets.

1. Bid Schedule Payment Reference: 801.4.1.B.1.
2. Bid Schedule Description: _____ Minus Uncrushed Aggregate Base …ton (TON).

END OF SECTION

SECTION 802

CRUSHED AGGREGATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Crushed aggregate materials, testing and production, and construction requirements.

1.2 RELATED SECTIONS

A. Section 202 – Excavation and Embankment.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

B. WAQTC – Western Alliance for Quality Transportation Construction.

1.4 SUBMITTALS

A. When required in the Contract Documents, submit uncrushed aggregates source with archaeological clearance and reclamation plan.

B. Test results – gradation, sand equivalent, percent wear, liquid limit, plasticity index, and fractured faces.

C. Materials from approved Idaho Transportation Department materials source will not require project specific submittals for source quality unless otherwise specified in the Contract Documents.

1.5 PROJECT RECORD DOCUMENTS

A. Gradation charts and graphs.

B. Sand equivalent work sheets.

C. Percent wear test results.

1.6 DELIVERY, STORAGE AND HANDLING

A. Stockpile crushed aggregate in an approved location.

B. Stockpile, load, haul and place material in a manner which minimizes segregation and degradation.

PART 2 MATERIALS

2.1 DESCRIPTION

A. Fine and coarse fragments of crushed stone or crushed gravel.

B. May include sand, finely crushed stone, crusher screenings, or similar filler material.

C. Crushed material consisting of hard, durable particles or fragments of stone free of flat, elongated or soft pieces, dirt, or other objectionable material.

D. Percent of wear not more than 35, at 500 revolutions.

1. AASHTO T 96: Los Angeles Abrasion Test.

E. Production requirements.

1. Percentage of fractured particles occurring in the finished product to be uniform and constant.

2. The percentage of aggregate retained on the No. 4 sieve having at least one fractured face as determined by AASHTO T35 to be 60 percent for untreated base and 75 percent for treated base and road mix.

3. Material may require screening and/or washing prior to crushing to eliminate excessive fines. No additional payment will be made for pre-screening or washing.

F. Test coarse and fine aggregates for soundness.

1. AASHTO T 104: Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

a. Five (5) cycles using sodium sulfate.

b. Maximum loss $\leq$ 12%.

G. Incorporate all material passing the No. 4 sieve into the final product unless it is necessary to reduce the amount of this material to meet gradation specifications.

2.2 CRUSHED AGGREGATE FOR BASE GRADATION

A. Gradations are listed in the chart below.

1. AASHTO T 2: Sampling of Aggregates.

2. AASHTO T 11: Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.

3. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates.

Table 1 CRUSHED AGGREGATE FOR BASE GRADATIONS		
PERCENTAGES BY WEIGHT PASSING SQUARE MESH SIEVES		
SIEVE SIZE	NOMINAL MAXIMUM SIZE	
	2 in. (Type II)	¾ in. (Type I)
	PERCENT PASSING	
2-1/2 in.	100	
2 in.	90-100	
1-1/2 in.		
1 in.	55-83	100
¾ in.		90-100
3/8 in.		
No. 4	30-60	40-65
No. 8		30-50
No. 30	10-25	
No. 200	0-8	3-9

B. Allowable percent passing No. 4 sieve may be adjusted within the range shown in the table with additional compensation to the Contractor.

C. Portion of fine aggregate passing the No. 200 sieve to be less than 60% of that portion passing the No. 40 sieve.

D. Liquid limit of fine aggregate passing the No. 40 sieve $\leq$ 25. Plasticity Index $\leq$ 6.

1. AASHTO T 2: Sampling of Aggregates.

2. AASHTO T 89: Determining the Liquid Limits of Soils.

3. AASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils.

E. Sand Equivalent $\geq$ 30. Sand Equivalent not required if less than 5% passing the No. 200 sieve.

F. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.

G. Sand Equivalent not required if less than 5% passing the No. 200 sieve, or aggregate to be used for cement or lime treated base.

2.3 AGGREGATE CONTROL

A. Consistency checks on percent passing No. 4 and No. 200 sieves for samples taken from belt loading hauling equipment or from roadway.

B. Variation from as crushed stockpile average on No. 4 sieve not to be greater than ± 6%.

C. Variation from as crushed stockpile average on No. 200 sieve not to be greater than ± 3%.

2.4 AGGREGATE ACCEPTANCE

A. Crushed aggregate for base acceptance tests will be performed at a frequency of 1 test per each 1000 tons. Test samples will be obtained in accordance with AASHTO T 2 from the materials delivered to the job site. Acceptance tests will include gradation, sand equivalency, and fractured faces. Acceptance criteria are defined in subsections 2.1 and 2.2 of this section.

2.5 TEST METHODS

A. Idaho IT 74: Compaction Standard for Coarse Granular Materials by Use of the Vibratory Spring-Load Compactor.

B. AASHTO T 99: Testing Standards for Moisture Density Relations of Soils Using a 5.5 lb. Rammer and 12-inch Drop.

C. AASHTO T 310: In-place Density and Moisture Content of Soil and Soil-Aggregate Using the Nuclear Method.

PART 3 WORKMANSHIP

3.1 PREPARATION FOR PLACEMENT

A. Prior to placing crushed aggregate base course.

1. Blade smooth and shape underlying surface to specified cross section and grade.

2. Underlying surface must be approved.

B. Binder (when required).

1. When added at crushing plant.

a. Mix uniformly without contamination to crushed aggregate base.

2. When added on roadway.

a. Mix uniformly without contamination to crushed aggregate base.

b. Protect underlying material from disturbance.

C. Haul over subgrade or previously placed lifts.

1. Not permitted when detrimental to subgrade or surface.

2. When allowed, construction equipment to operate in “split track” pattern.

3.2 PLACEMENT

A. Required compacted depth less than 0.5 foot.

1. Place in one lift.

B. Required compacted depth greater than 0.5 foot.

1. Maximum compacted thickness of any one layer not to exceed 0.5 foot.

C. When vibrating or other special type of compaction equipment is used, maximum compacted depth of a single lift may be 0.8 foot when approved.

3.3 MIXING

A. Stationary Plant Mixer.

1. Aggregate and water mixed in approved mixer or approved method.

2. Add sufficient water during mixing to facilitate compaction.

3. Place on roadway with approved aggregate spreader.

B. Travel Plant Method.

1. Place aggregate with approved aggregate spreader or windrow device.

2. Uniformly mix base aggregate with a traveling mixing plant.

3. Add sufficient water during mixing to facilitate compaction.

C. Road mix method.

1. Place on roadway with approved aggregate spreader.

2. Uniformly mix with motor graders or other approved equipment.

3. Add sufficient water during mixing to facilitate compaction.

D. Premixed method.

1. Uniformly mix aggregate and water in an approved manner.

2. Add sufficient water during mixing to facilitate compaction.

3. Place on roadway with approved aggregate spreader.

3.4 COMPACTION

A. Spread material in an approved manner.

B. Compaction equipment to be chosen by Contractor.

C. Maintain a uniform surface texture on each layer during compaction operations.

D. Aggregate to be firmly keyed.

E. Uniformly apply water over the base material in sufficient quantities to facilitate compaction.

F. Perform one in-place density test per lift per 300 linear feet of roadway or 10,000 square feet of general fill and embankment area.

G. The minimum field compaction shall be 95 percent of the maximum laboratory density as determined by AASHTO T-99. For aggregates too coarse to test using the AASHTO T-99 method, the minimum field compaction shall be 95 percent of the maximum laboratory density as determined by Compaction Standard for Coarse Granular Materials by Use of the Vibratory Spring Loaded Compactor per Idaho IT-74.

H. If the specified density is not attained, the area shall be reworked and/or re-compacted until the density specifications are achieved and documented by additional testing or retesting at the designated frequencies.

3.5 SURFACE SMOOTHNESS

A. Where surface of aggregate is not to be paved.

1. Finished grade at top of crushed aggregate base course to be within ± 0.05 foot of staked elevation.

2. Algebraic sum of the deviation of two points not more than 30 feet apart not to exceed 0.15 foot.

3. Maximum surface deviation over a ten-foot straight edge placed parallel to centerline to be 0.04 foot.

B. Where asphalt concrete is placed on top of aggregate base course.

1. Finished grade at top of crushed aggregate base course to be within ± 0.03 foot of staked elevation.

2. Algebraic sum of the deviation of two points not more than 30 feet apart not to exceed 0.03 foot.

3. Maximum surface deviation over a ten-foot straight edge placed parallel to centerline to be 0.04 foot.

3.6 AGGREGATE BASE MATERIAL IN STOCKPILE

A. Furnish aggregate base material meeting all specifications in stockpiles at designated locations.

B. Prepare stockpile site by clearing and smoothing.

C. Construct stockpiles in neat, regular form occupying as small an area as possible.

D. Begin by spreading material over entire stockpile base.

E. Build upward in successive layers not exceeding 3 feet in depth.

F. Do not end dump, shove, or conveyor stack over the sides of the pile.

3.7 AGGREGATE BASE MATERIAL, LOAD, HAUL AND PLACE

A. Load aggregate base from existing stockpile, haul and place on roadbed.

B. Spreading, processing and compacting to meet requirements expressed in Sections 3.1 through 3.4 of this subsection.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the unit prices listed below as indicated in the Bid Schedule. Including all labor, materials and equipment required to provide, place and compact crushed aggregate. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Crushed Aggregate for Base: By the cubic yard compacted and measured in place, includes load, haul and place.

1. Bid Schedule Payment Reference: 802.4.1.A.1.
2. Bid Schedule Description: Crushed Aggregate for Base Type _____…cubic yard (CY).

B. Crushed Aggregate for Base: By the ton measured by truck tickets and includes load, haul and place. Moisture in the aggregate greater than 7% will be deducted from payment.

1. Bid Schedule Payment Reference: 802.4.1.B.1.
2. Bid Schedule Description: Crushed Aggregate for Base Type _____…ton (TON).

C. Crushed Aggregate in Stockpile: By the cubic yard measured compacted and in place, includes load, haul and place.

1. Bid Schedule Payment Reference: 802.4.1.C.1.
2. Bid Schedule Description: Crushed Aggregate in Stockpile, Type _____…cubic yard (CY).

D. Crushed Aggregate in Stockpile: By the ton measured by truck tickets, includes load, haul and place. Moisture in the aggregate greater than 7% will be deducted from payment.

1. Bid Schedule Payment Reference: 802.4.1.D.1.
2. Bid Schedule Description: Crushed Aggregate in Stockpile, Type _____…ton (TON).

END OF SECTION

SECTION 803

PLANT MIX AGGREGATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Plant mix aggregates, testing and production, and construction requirements.

1.2 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

B. WAQTC – Western Alliance for Quality Transportation Construction.

1.3 SUBMITTALS

A. Plant mix aggregate source with archaeological clearance and reclamation plan.

B. Proposed gradation.

C. Test results – gradation, sand equivalent, L.A. Abrasion, fractured faces, sulfate soundness, etc.

D. Asphalt mix design.

1.4 PROJECT RECORD DOCUMENTS

A. Gradation charts and graphs.

B. Sand equivalent work sheets.

C. Percent wear test results.

1.5 DELIVERY, STORAGE AND HANDLING

A. Stockpile plant mix aggregate in an approved location.

B. Stockpile, load, haul and place material in a manner which minimizes segregation and degradation.

PART 2 MATERIALS

2.1 DESCRIPTION

A. Fine and coarse fragments of crushed stone or crushed gravel.

B. May include sand, finely crushed stone, crusher screenings, or similar filler material.

C. Crushed material consisting of hard, durable particles or fragments of stone, free of flat, elongated or soft pieces, dirt, or other objectionable material.

D. Percent of wear not more than 35.

1. AASHTO T 96: Los Angeles Abrasion Test.

E. Production requirements.

1. Percentage of fractured particles occurring in the finished product to be uniform and consistent.

2. At least 90% of material retained on No. 4 sieve to have at least one fractured face and 60% to have two fractured faces per AASHTO T-335 Method 1, Percentage of Fracture in Coarse Aggregate.

3. Thin or elongated aggregate particles (length greater than 5 times width) not to exceed 15% by weight per ASTM D479 Flat and Elongated Particles in Coarse Aggregate.

4. Material may require screening and/or washing prior to crushing to eliminate excessive fines. No additional payment will be made for pre-screening or washing.

F. Test coarse and fine aggregates for soundness.

1. AASHTO T 104: Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

a. Five (5) cycles using sodium sulfate.

b. Maximum loss $\leq$ 12%.

2.2 PLANT MIX AGGREGATE GRADATION

A. Gradations for aggregate blends are listed in Table 1.

1. AASHTO T 2: Sampling of Aggregates.

2. AASHTO T 11: Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.

3. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates.

Table 1 BLENDED AGGREGATE GRADATIONS FOR PLANT MIX			
PERCENTAGES BY WEIGHT PASSING SQUARE MESH SIEVES			
SIEVE SIZE	NOMINAL MAXIMUM SIZE		
	3/4 in.	1/2 in.	3/8 in.
	PERCENT PASSING		
1 in.	100		
3/4 in.	90-100	100	
1/2 in.	90 max	90-100	100
3/8 in.	52-80	90 max	90-100
No. 4			90 Max
No. 8	23-49	28-58	32-67
No. 30			
No. 50			
No. 200	2.0-8.0	2.0-10.0	2.0-10.0

B. Sand Equivalent of blended aggregate $\geq$ 35. Sand equivalent not required if less than 5 percent passing the No. 200 sieve.

C. Index of retained strength to be $\geq$ 85% when tested in accordance with AASHTO T 165: Effect of Water on Cohesion of Compacted Bituminous Mixtures. If aggregate does not meet these requirements, add an anti-strip agent

2.3 AGGREGATE CONTROL

A. Perform consistency checks on percent passing No. 4 and No. 200 sieves for samples taken from cold feed belt.

B. Variation from as crushed stockpile average on No. 8 sieve shall not be greater than $\pm$ 5.0%.

C. Variation from as crushed stockpile average on No. 200 sieve not to be greater than $\pm$ 2.0%.

D. Obtain samples of cold feed at the frequency outlined in Section 810 for Hot Mix Asphalt and the frequency outlined in Section 811 for Cold Mix Asphalt and test for gradation, sand equivalent, and fractured faces.

PART 3 WORKMANSHIP

3.1 PRODUCTION

A. Equipment.

1. Pre-break.

   a. All suitable material larger than can be handled by crushing equipment to be broken down to a crushable size.

2. Crusher.

   a. Capable of breaking rock passing a 10-inch screen.

   b. Capable of removing excess and undesirable fines.

3. Screening Plants to be capable of removing oversize, excess or undesirable fines.

   a. Trommel screen.

   b. Shaker screen.

   c. Vibrating screen.

   d. Combination of the above or other approved device.

4. Scales.

   a. Beam or springless dial scales.

      1) Use of springs to carry part or all of load is not allowed.

      2) Commercial certification, within last year, of all weighing equipment required.

      3) Clearances required to prevent displacement of scale parts.

      4) All parts to be protected from material falling on or against them.

      5) Tractor unit to be out of gear and all brakes released while unit or units are being weighed.

   b. Combination vehicles may be weighed as separate units as long as approaches to and from scale platform on same level as platform scale for a distance great enough to assure all units of combination vehicle are on same elevation.

c. Conveyor weighing equipment.

1) Meet requirements of State of Idaho, Department of Agriculture, Division of Agricultural Markets, Bureau of Weights and Measures.

2) Check regularly for calibration using methods specified by the manufacturer.

d. Automatic Weighing Equipment.

1) Requires written approval.

B. All weighing equipment to be accurate to within 1%.

3.2 CRUSHING

A. Clearing and stripping incidental to aggregate production, no separate payment.

B. Handling of unsuitable material incidental to aggregate production, no separate payment.

C. Entire volume of oversize material encountered to be broken down for production of aggregate.

D. Excess or undesirable material to be removed with no separate payment.

E. Material to be stockpiled, loaded, hauled and/or placed in mixing plant in a manner that minimizes segregation.

3.3 STOCKPILES

A. Prepare site by clearing and smoothing in approved area.

B. Stockpiles to be neat and regular in form and to occupy as little space as possible.

C. Distribute material over entire base and build up in layers no greater than 3 feet in depth.

D. End dumping, shoving or conveying material over side of stockpile not permitted.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated in the Bid Schedule. To include all labor, material, and equipment necessary for installation of plant mix aggregates. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Plant Mix Aggregate: By the ton based on truck tickets. Moisture in the aggregate above 7% will be deducted from the pay quantity.

1. Bid Schedule Payment Reference: 803.4.1.A.1.
2. Bid Schedule Description: Plant Mix Aggregate _____…ton (TON).

B. Plant Mix Aggregate: By the cubic yard compacted and in place.

1. Bid Schedule Payment Reference: 803.4.1.B.1.
2. Bid Schedule Description: Plant Mix Aggregate _____…cubic yard (CY).

END OF SECTION

SECTION 804

SAND CHOKER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Choke Sand and Blotter testing and production requirements.

1.2 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

1.3 SUBMITTALS

A. Material source with archaeological clearance and reclamation plan.

B. Test results – gradation, sand equivalent, liquid limit and plasticity index.

1.4 PROJECT RECORD DOCUMENTS

A. Gradation charts and graphs.

B. Sand equivalent test results.

C. Liquid limit and plasticity index results.

1.5 DELIVERY, STORAGE AND HANDLING

A. Stockpile aggregates in an approved location.

B. Stockpile, load, haul and place material in a manner which minimizes segregation and degradation.

PART 2 MATERIALS

2.1 DESCRIPTION

A. Aggregate meeting the required gradation and test results.

2.2 CHOKE SAND AND BLOTTER GRADATION

A. Aggregate gradation requirements for choke sand and blotter are listed in Table 1.

1. AASHTO T 2: Sampling of Aggregates.

2. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates.

3. AASHTO T 11: Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.

Table 1
CHOKE SAND AND BLOTTER

Sieve Size	Choke Sand percent passing	Blotter percent passing
3/8 inch	100	100
No. 4		40 to100
No. 200	0 to 5.0	0 to 16.0

B. Blend of aggregate Sand Equivalent $\geq$ 25.

1. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.

C. Liquid limit of fine aggregate passing the No. 40 sieve $\leq$ 25. Plasticity Index not to exceed 0.

1. AASHTO T 89: Determining the Liquid Limits of Soils.

2. AASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils.

PART 3 MEASUREMENT AND PAYMENT

3.1 Use the following bid item as indicated in the Bid Schedule. Includes all labor, material and equipment required to place choke sand and/or blotter as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Choke Sand: By the Ton.

1. Bid Schedule Payment Reference: 804.3.1.A.1.
2. Bid Schedule Description: Choke Sand…Ton (TON).

B. Blotter: By the Ton.

3. Bid Schedule Payment Reference: 804.3.1.B.1.
4. Bid Schedule Description: Blotter…Ton (TON).

END SECTION

SECTION 805

ASPHALT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Asphalt material used in asphalt surfacing.

1.2 RELATED SECTIONS

A. Section 806 – Tack.

B. Section 807 – Asphalt Prime Coat.

C. Section 808 – Seal Coat.

D. Section 809 – Surface Treatment.

E. Section 810 – Plant Mix Pavement.

F. Section 811 – Road Mix Pavement.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

1.4 SUBMITTALS

A. Asphalt grade and manufacturer's certification.

1.5 DELIVERY

A. Loading certificate to accompany each shipment of asphalt. Loading certificates to include the following information.

1. Contractor and project number.

2. Refinery.

3. Supplier, if other than refinery.

4. Car or delivery ticket number.

5. Type and grade of asphalt.

6. Specific gravity.

7. Temperature when loaded.

8. Shipment.

   a. Truck: Individual certified weights of each loaded truck and trailer and the tare weight of each vehicle. Individual compartment asphalt weight must be certified for multiple compartment hauling units.

   b. Railroad Car: Certified volume of asphalt loaded and the weight of the asphalt loaded computed from the volume corrected for temperature.

9. Consistency of the material in terms of viscosity or penetration as appropriate.

10. Signature of authorized refinery or supplier representative.

11. When an anti-stripping additive is specified, the percentage of additive by weight of asphalt and the brand, grade, or type of additive.

B. Each shipment to be accompanied by a copy of temperature viscosity curve representing the material.

C. Submit samples of anti-strip and asphalt for approval prior to use.

1.6 STORAGE AND HANDLING

A. Tanks for asphalt storage to be equipped for heating and holding the materials at the required temperatures.

B. Heating to be accomplished so that no flame comes in contact with the storage tank.

C. Asphalt circulation system to assure proper and continuous circulation during the operating period.

D. Provisions to be made for safely sampling contents of the storage tanks.

E. Level tank.

F. Provide calibrated measuring device for measuring contents of the storage tank.

PART 2 MATERIALS

2.1 ASPHALT CEMENTS

A. Product of only one supplier or source and grade of asphalt to be used at any one time.

B. Provide type and grade as specified in the Contract Documents, otherwise, notify the Engineer of type to be used prior to construction.

C. Provide asphalt binder that meets AASHTO M 320 Standard Specification for Performance Graded Asphalt Binder, except as follows:

1. When polymer modification is specified or when the sum of the grade designation values exceed 90, perform the AASHTO T-301 Elastic Recovery Test of Asphalt Materials by Means of a Ductilometer tests at 25 degrees C on residue from the Rolling thin film Oven Test (RTFOT). The binder must have at least 50 percent elastic recovery.

Provide asphalt for a specified use from one supplier unless otherwise Engineer approved.

2.2 LIQUID ASPHALTS

A. Rapid curing asphalts conform to AASHTO M 81.

B. Medium curing asphalts conform to AASHTO M 82.

C. Slow curing asphalts conform to ASTM D 2026.

D. Rubberized liquid asphalt specifications.

2.3 EMULSIFIED ASPHALTS

A. No sieve test required for asphalt tie-down.

B. Anionic emulsified asphalt to meet requirements of AASHTO M 140.

C. Cationic emulsified asphalt to meet requirements of AASHTO M 208, except Saybolt viscosity of CRS-2 to be in the range of 150 minimum to 400 maximum.

D. Ensure Rapid Setting Emulsion grades are homogenous after thorough mixing within 15 days of delivery.

E. Polymer Modified Cationic Emulsified Asphalts (CSR-2R and CSR-2L) are an emulsified blend of asphalt, polymer, water and emulsifiers.

F. CRS-2L emulsified asphalt meets AASHTO M 316, Standard Specifications for Polymer Modified Cationic Emulsified Asphalt.

G. CRS-2R emulsified asphalt includes ashalt cement, thoroughly blended with at least 1.5 percent total rubber solids meeting the requirements outlined in the table titled CRS-2R Emulsified Asphalt Requirements below.

H. CRS-2P Polymerized cationic emulsified asphalt. Mill the polymer into the asphalt or emulsion during the manufacturing of the emulsion and meeting the requirements outlined in the table titled CRS-2P Polymerized Cationic Emulsified Asphalt Requirements below.

I. STE-1 Special Tack Emulsion meeting the requirements outlined in the table titled STE-1 Special Tack Emulsion below.

CRS-2R EMULSIFIED ASPHALT REQUIREMENTS			
			AASHTO
			TEST
PROPERTY	MINIMUM	MAXIMUM	NUMBER
Viscosity, Saybolt Furol at 122°F, seconds	150	400	T-59
Storage stability test, 24 hours, Percent		1.0	T-59
Demulsibility 35 ml, 0.8% Dioctyl Sodium Sulfosuccinate, percent	40		T-59
Particle charge test		Positive	T-59
Sieve test, percent		0.10	T-59
Oil distillage by distillation: Oil distillate by volume of emulsion, percent		 3.0	T-59 T-59
Residue by evaporation, percent	65		T-59 (Method B)
Test on residue from Distillation: Penetration, 77°F, 100 g. 5 seconds	 80	 150	 T 59, T 49

CRS-2P POLYMERIZED CATIONIC EMULSIFIED ASPHALT REQUIREMENTS			
			AASHTO
			TEST
PROPERTY	MINIMUM	MAXIMUM	NUMBER
Viscosity, Saybolt Furol at 122°F, seconds	100	400	T-59
Storage stability test, 24 hours, Percent		1.0	T-59
Demulsibility 35 ml, 0.8% Dioctyl Sodium Sulfosuccinate, percent	40		T-59
Particle charge test		Positive	T-59
Sieve test, percent		0.30	T-59
Oil distillage by distillation:			T-59
Oil distillate by volume of emulsion, percent		3.0	T-59
Residue by evaporation, percent	65		T-59 (Method B)
Test on residue from Distillation:			
Penetration, 77°F, 100 g. 5 seconds	100	250	T 59, T 49
Torsional Recovery, %	18 (A)		---
or; Elastic Recovery, % at 25 Degrees C	45		T 301

(1). Distillation modified to use 300g of an emulsi0on heated to 350 degrees F ±9 degrees F and maintained for 20 minutes.
(2). The Torsional Recovery Test shall be conducted according to the California Department of Transportation Test Method 332. The Torsional Recovery Test may be used in lieu of Elastic Recovery based on modifier used, at the option of the Supplier. If the Torsional Recovery method is used for acceptance, the Supplier must supply all test data verifying specification conformance.

STE-1 SPECIAL TACK EMULSION REQUIREMENTS			
			AASHTO
			TEST
PROPERTY	MINIMUM	MAXIMUM	NUMBER
Viscosity at 77 °F, SFS		30	T-59
Storage stability test, 24 hours, Percent		1.0	T-59
Demulsibility 35 ml, 0.8% Dioctyl Sodium Sulfosuccinate, percent	25		T-59
Particle charge test	Positive		T-59
Sieve test, percent		0.10	T-59
Oil distillage by distillation: Oil distillate by volume of emulsion, percent		 5	T-59 T-59
Test on Residue, percent	45		T-59
Test on residue from Distillation: Penetration, 77°F, 100 g. 5 seconds	 100	 200	 T 59
Ductility, 77 °F , 5 cm/minute, cm	40		T 59
Solubility in Trichloroethylene, %	97.5		T 59

(1). Perform the Demulsibility Test within 30 days from date of shipment.

2.4 ANTI-STRIPPING ADDITIVE

A. Treat PG binder products with a heat-stable anti-stripping additive.

B. Not less than 0.5% of anti-stripping additive to be used.

C. Test samples of the treated asphalt in accordance with Idaho T-99.

D. Remove material which fails to indicate the presence of anti-strip when tested by Idaho T-99.

2.5 SAMPLING AND TESTING

A. Idaho T-99. Obtain one sample for each shift that hot mix is produced and supplied.

B. Idaho T-137.

C. Idaho T-24.

D. AASHTO T-40.

PART 3 WORKMANSHIP

3.1 APPLICATION OF ASPHALT

A. Protect all private property, bridges, sign posts, guardrail, and other roadway structures from being discolored by asphalt.

B. Remove asphalt from any surfaces that are discolored and repaint if necessary.

3.2 APPLICATION TEMPERATURES OF ASPHALT

APPLICATION TEMPERATURES, °F			
Type and Grade of Asphalt	Pugmill Mixture Temperatures[1]	Spraying Temperatures	
	Dense-Graded Mixes	Road Mixes	Surface Treatments
Cutback Asphalt (RC, MC, SC) [2]	°F	°F	°F
30 (MC only)			85+
70	135-173 [3]	65+	120+
250	165-210 [3]	105+	165+
800	180-240 [3]	135+	200+
3000			230+
3000R			250+
Emulsified Asphalt[4]	°F	°F	°F
RS-1			70-140
RS-2			125-185
MS-1	50-160[4]	70-160	
MS-2	50-160[4]	70-160	
MS-2h	50-160[4]	70-160	
SS-1	50-160[4]	70-160	
SS-1h	50-160[4]	70-160	
CRS-1			125-185
CRS-2 & 2h			140-175
CMS 2 & 2s	50-160[4]	70-160	
CMS-2h	50-160[4]	70-160	
CRS-2R			140-175
CSS-1	50-160[4]	70-160	
CSS-1h	50-160[4]	70-160	

NOTES: Temperatures for cutback asphalt are guides only.

[1] Temperatures of mixture immediately after discharge from the pugmill rather than temperature of cutback asphalt.
[2] Application temperatures may, in some cases, be above the flash point of the material. Caution must therefore be exercised to prevent fire or an explosion.
[3] Rapid Curing (RC) grades are not recommended for hot pugmill mixing.
[4] Temperature of the emulsified asphalt in the pugmill mixture.
[5] The maximum temperature (cutback asphalt) shall be below that at which fogging occurs.

PART 4 MEASUREMENT AND PAYMENT

4.1 Method of measurement and method of payment is specified for particular asphalt material in other sections.

END OF SECTION

SECTION 806

ASPHALT TACK COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of preparing and treating an existing surface with asphalt in accordance with these specifications and in reasonably close conformity with the lines shown in the Contract Documents as established.

1.2 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

PART 2 MATERIALS

2.1 DESCRIPTION

A. Asphalt of the type and grade called for in the contract.

1. Engineer may change grade one step with no change in unit price.

2. Asphalt will be accepted at point of delivery.

PART 3 WORKMANSHIP

3.1 EQUIPMENT

A. Meet applicable requirements for performing work.

3.2 PREPARATION OF SURFACE TO BE TREATED

A. Patch and clean existing surface.

B. Surface to be free of irregularities and reasonably smooth.

C. Remove unstable areas and replace with suitable patching.

D. Payment for patching will be made at contract unit prices unless a reconditioning item is included in the contract.

E. Clean edges of existing pavement, which will be adjacent to new pavement.

F. Broom Surface.

3.3 APPLICATON OF TACK COAT

A. Apply asphalt tack uniformly.

B. Place in a manner which will minimize inconvenience to traffic and traffic will not pick up or track.

C. When diluted emulsified asphalt is specified for tack coat, mix approximately equal volumes of emulsified asphalt and water prior to application.

D. Do not apply when surface or weather conditions would prevent proper construction.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit bid item as designated in the Bid Schedule. Includes all labor, materials and equipment required to perform the work. Any reapplication of the asphalt tack required due to time lag between the initial application and the paving operation will be at Contractor's expense. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Asphalt for Tack Coat: By the ton based on truck tickets.

1. Bid Schedule Payment Reference: 806.4.1.A.1.
2. Bid Schedule Description: Asphalt for Tack Coat…ton (TON).

B. Diluted Emulsified Asphalt for Tack Coat: By the gallon based on volume used.

1. Bid Schedule Payment Reference: 806.4.1.B.1.
2. Bid Schedule Description: Diluted Emulsified Asphalt for Tack Coat…gallon (GAL).

END OF SECTION

SECTION 807

ASPHALT PRIME COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of preparing and treating an existing surface with asphalt and blotter if required, in accordance with these specifications and in reasonably close conformity with the lines shown in the Contract Documents or as established.

1.2 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

PART 2 MATERIALS

2.1 DESCRIPTION

A. Asphalt of the type and grade called for in the contract.

B. Engineer may change grade one step with no change in unit price.

C. Asphalt will be accepted at point of delivery.

PART 3 WORKMANSHIP

3.1 EQUIPMENT

A. Meet applicable requirements for proper placement.

3.2 PREPARATION OF SURFACE TO BE TREATED

A. Shape surface to be primed to the required grade and section.

B. Surface to be free of ruts, corrugations, segregated material, or other irregularities and uniformly compacted.

3.3 APPLICATION OF PRIME COAT

A. Apply asphalt prime coat at the rate specified in Contract Documents, to width of section by means of a pressure distributor.

B. Apply in a uniform, continuous spread.

C. Ensure minimal overlap at junction of spreads.

D. Correct skipped or deficient areas.

E. When traffic is maintained, put all traffic on untreated side until treated side has cured and will not track or pick up. Switch traffic to treated side and apply prime to remaining portion of roadway. Return traffic to both sides when prime coat has cured and will not track.

F. Quantities, rate of application and areas to be treated to be approved prior to application of prime coat.

3.4 APPLICATION OF BLOTTER

A. If prime coat fails to penetrate and roadway must be used by traffic, blotter is to be used. Blotter shall meet the requirements of Section 804.

1. Spread blotter by means of a self-propelled aggregate spreader of approved design supported by at least 4 wheels equipped with pneumatic tires on 2 axles.

2. Spreader to be equipped with positive controls so that required amount of material will be deposited uniformly over area requiring blotter.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit bid items as designated in the Bid Schedule. Includes all labor, material, and equipment necessary to perform the work. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Asphalt for Prime Coat: By the ton based on truck tickets.

1. Bid Schedule Payment Reference: 807.4.1.A.1.
2. Bid Schedule Description: Asphalt for Prime Coat…ton (TON).

B. Blotter: By the ton based on truck tickets.

1. Bid Schedule Payment Reference: 804.3.1.B.1.
2. Bid Schedule Description: Blotter…ton (TON).

END OF SECTION

SECTION 808

SEAL COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of an application of asphalt, and anti-stripping additive, if required, followed by an application of cover coat material, in accordance with these specifications and in reasonably close conformity with the lines shown on the Contract Documents as established.

1.2 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

B. WAQTC – Western Alliance for Quality Transportation Construction.

C. Idaho T 72 – Cleanness of Cover Coat

1.3 SUBMITTALS

A. Unless the design is specified by the owner, submit a Seal Coat design using the McLeod Method. Complete the design at least 2 weeks before starting construction. Field verify the Seal Coat design for spread rate of asphalt and aggregate.

B. Submit test results indicating the cover coat material does not show a loss of more than 40 when tested in accordance with AASHTO T-96 Los Angeles Abrasion Test, Grading C, unless otherwise specified.

C. Submit test results indicating the cover coat material has a retained asphalt film above 95 percent when tested in accordance with AASHTO T 182. Aggregate not meeting this requirement may be used in combination with an antistrip agent, provided the combination meets the 95 percent requirement.

PART 2 MATERIALS

2.1 2.1 ASPHALT

A. Asphalt of the type and grade called for in the contract.

B. Engineer may change grade one step with no change in unit price.

C. Asphalt and anti-strip additive to meet requirements of the Contract Documents. Asphalt will be accepted at point of delivery.

2.2 COVER COAT MATERIAL

A. Cover coat material to meet requirements of the Contract Documents.

B. Material will be accepted at point of delivery.

C. Gradations for cover coat material are listed in Table 1. Testing will be in accordance with AASHTO T 11: Materials Finer Than No. 200 Sieve in Mineral Aggregates by Washing and AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates.

Table 1

SIEVE SIZE	CLASS 1	CLASS 2	CLASS 3	CLASS 4	CLASS 5
		PERCENT PASSING			
3/4 in.					100
5/8 in.	100				
1/2 in.		100	100	100	80-100
3/8 in.	30-55	30-55	40-90	95-100	
No. 4	0-15	0-15	0-15	0-15	
No. 8	0-5	0-5	0-5	0-5	7-35
No. 200	0-2	0-2	0-2	0-2	0-5

D. The aggregate for Classes 1, 2, 3, and 4 cover coat material to have a cleanness value of not less than 82 in accordance with ITD T 72: Cleanness of Cover Coat Material.

E. For gravel sources at least 70 percent by weight of the particles retained on the No. 4 sieve to have one fractured face or more as determined by AASHTO T-335.

F. Obtain one sample of cover coat material for every 400 tons or 26,000 square yards of material placed. Perform gradation, cleanness value and fractured faces tests on each sample.

G. Aggregate for choke sand and blotter shall meet the requirements of Section 804. Obtain one sample of choke sand per day for gradation testing. Obtain one sample of blotter per project for gradation testing.

PART 3 WORKMANSHIP

3.1 CONSTRUCTION LIMITATIONS

A. Do not apply asphalt when roadway surface or weather conditions would prevent satisfactory construction.

B. Following are minimum pavement surface temperatures for applying indicated grades of asphalt.

1. RC-MC 250: 60°F and rising.

2. Emulsions: 80°F and rising.

3. RC-MC 800 or 800R: 80°F and rising.

4. RC-MC 3000 or 3000R: 80°F and rising.

C. Do not seal coat when pavement temperatures exceed 140°F.

D. If bleeding on the completed seal coat becomes apparent, cease seal coat operation and provide immediate maintenance and traffic control.

1. Resume seal coat operations after corrective actions have been initiated.

E. Do not seal coat when wind velocity exceeds 15 mph.

F. Allow asphalt mixes to cure a minimum of ten days before applying seal coat.

G. If seal coats are allowed to be placed on a Friday or just before a three-day holiday weekend, emergency maintenance procedures must be in place.

H. Unless otherwise permitted do not apply seal coat before June 15 or after September 1.

I. Temporary stockpiles to be placed in approved locations.

1. Remove surplus material from temporary stockpile locations and place in an approved permanent location.

2. Temporary sites to be left in an approved condition upon completion of seal coat operations.

3.2 EQUIPMENT

A. Asphalt applying equipment to meet requirements for proper application.

B. Rotary broom(s) required.

C. Only pneumatic tire rollers.

1. Rollers to meet the requirements for proper rolling.

2. Do not operate roller at speeds in excess of 8 mph for the first coverage nor in excess of 16 mph for subsequent coverages.

D. Self propelled aggregate spreader.

1. Supported by at least 4 wheels equipped with pneumatic tires on 2 axles.

2. Spreader to be equipped with positive controls so that the required amount of material will be deposited uniformly over the full width required.

3.3 APPLYING ASPHALT

A. Seal approaches before sealing adjacent roadway.

B. Clean surface as required.

C. Do not begin applying asphalt until surface has been approved.

D. Clean all bridge decks prior to applying asphalt.

1. Clean with high-pressure water where mechanical brooming is inadequate.

2. Allow bridge deck to dry completely after cleaning with water before applying asphalt.

3. Protect all deck drains and expansion joints from seal coat application.

a. Remove and properly dispose of material used to protect joints and drains after completion of seal coat.

b. Remove all materials spilled into deck drains and expansion joints after completion of seal coat.

E. Use the quantity of asphalt per square yard as directed.

F. If the texture of the surface is such that asphalt penetrates too rapidly, a preliminary application of from 0.05 to 0.10 gallons/square yard of surface may be required.

G. Use a strip of building paper at least 3 feet in width and with a length equal to that of the spray bar of the distributor plus 1 foot at the beginning of each spread.

1. If cutoff is not positive, use building paper at the end of each spread.

2. Remove and properly dispose of paper after applying asphalt.

H. Do not open spray bar unless distributor is moving forward at proper application speed.

I. Correct any skipped or deficient areas.

J. Assure smooth riding surface at meet lines of spreads.

K. Do not vary distribution of asphalt more than 15% transversely from the average nor more than 10% longitudinally as determined by Idaho T-80.

L. Length of spread of asphalt limited to that which trucks loaded with cover coat material can immediately cover.

M. Place meet lines within 1 foot of lane lines or within 2 feet of center of lanes only. Do not place meet lines in wheel paths.

N. Spread width of asphalt not to exceed 6 inches wider than the width covered by the cover coat material from the spreading device.

O. Under no circumstances is the operation to proceed in such a manner that the asphalt will be allowed to chill, set up, dry, or otherwise impair retention of the cover coat material.

P. Do not allow the distributor spray bar or mechanism to drip on surface.

Q. Protect all utilities and utility covers by covering with building paper prior to spreading asphalt.

R. Provide Traffic Control to prevent “tracking” of asphalt.

3.4 APPLICATION OF COVER COAT MATERIAL

A. Spread aggregate in quantities as designated immediately following the application of the asphalt.

B. Spread in a manner that at no time the tires of the trucks or spreading equipment touch the uncovered asphalt.

C. Do not allow pilot car operations to cross the meet line of newly applied cover coat material.

D. Moisten cover coat material with water to eliminate or reduce dust coating on aggregate if directed.

E. Immediately after the cover coat material is spread, apply additional material to deficient areas.

F. Begin rolling immediately behind the spreader. Apply 4 complete roller coverages.

G. Complete rolling prior to returning traffic to the surface.

H. Operate equipment at a speed and in a manner, which eliminates the turning or displacement of cover coat material.

I. Prior to brooming apply sufficient reject material in areas directed to absorb free asphalt.

J. Sweep excess material from entire roadway surface by means of rotary brooms, after placing material.

K. Conduct brooming in a manner that does not displace any embedded cover coat material.

L. Pick up and dispose of excess material in curb and gutter sections as directed.

M. Broom to be in good condition and capable of sweeping a path at least 70 inches wide without loosening or displacing embedded material.

N. If working on roads open to traffic, operate all brooming equipment with proper traffic control.

1. Equip each shadow vehicle with at least one roof-mounted high intensity rotating or strobe-type amber flasher.

2. Flasher to be readily visible from front and rear for a distance of at least 0.5 mile.

O. When brooming operations could create dust to the extent that it would violate air pollution regulations or create a safety hazard, lightly spray the surface of the roadway to be swept with enough water to prevent dust from becoming airborne.

1. Water applied in this manner will be paid for as water for dust abatement.

2. If no item for dust abatement is set up in the contract, it will be paid for as extra work.

P. Do not broom material from the surface onto maintained shoulder-foreslope areas where the adjacent property owner cares for the area and maintains turf or landscape.

3.5 COVER COAT MATERIAL IN STOCKPILE

A. This work consists of furnishing and placing cover coat material of the class specified in stockpiles at designated locations.

B. Prepare stockpile sites by clearing and smoothing as directed.

C. Stockpiles to be neat and regular in form and occupy as small an area as possible.

3.6 SANDING MATERIAL IN STOCKPILE

A. This work consists of placing sand produced during the production of cover coat material and suitable for sanding material in stockpiles at designated locations.

B. Prepare stockpile sites by clearing and smoothing as directed.

C. Stockpiles to be neat and regular in form and occupy as small an area as possible.

3.7 COVER COAT MATERIAL, LOAD, HAUL AND PLACE

A. This work consists of loading cover coat material from designated sources, hauling and placing the cover coat material on the asphalt treated roadbed in accordance with the requirements of the Contract Documents.

B. Before loading, clean stockpiles of all vegetation or other objectionable material in an approved manner.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following bid item as designated in the Bid Schedule. Includes all labor, material, and equipment required to perform the work. Work to include asphalt, anti-stripping additive, cover coat material, load, haul, placement, stockpiling, blotter, choke sand, brooming, and all necessary items required to place seal coat as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Seal Coat: By the square yard.

1. Bid Schedule Payment Reference: 808.4.1.A.1.

2. Bid Schedule Description: Seal Coat…square yard (SY).

B. Seal Coat: By the Ton.

1. Bid Schedule Payment Reference: 808.4.1.B.1.

END OF SECTION

SECTION 809

SURFACE TREATMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of the construction of a single or multiple course surface treatment, in accordance with these specifications and in reasonably close conformity with the lines shown in the Contract Documents or as established.

B. The surface treatment may consist of the application of one or more seal coats, or may consist of a prime coat followed by one or more seal coats as specified.

1. Type A surface treatment consists of the application of a seal coat.

2. Type B surface treatment consists of the application of a prime coat followed by the application of a seal coat.

3. Type C surface treatment consists of the application of two seal coats.

4. Type D surface treatment consists of the application of a prime coat followed by the application of two seal coats.

1.2 RELATED SECTIONS

A. Section 805 – Asphalt.

B. Section 807 – Asphalt Prime Coat.

C. Section 808 – Seal Coat.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

PART 2 MATERIALS

2.1 ASPHALT

A. Asphalt of the type and grade called for in the contract.

B. Engineer may change grade one step with no change in unit price.

C. Asphalt and anti-strip additive to meet requirements of Section 805 – Asphalt.

D. Asphalt will be accepted at point of delivery.

2.2 COVER COAT MATERIAL

A. Cover coat material to meet requirements of the Contract Documents.

B. Material will be accepted at point of delivery.

PART 3 WORKMANSHIP

3.1 PRIME COAT

A. Prime coat, when specified to be applied in accordance with Section 807 - Prime Coat.

B. A curing period of 5 days may be required between the application of the prime coat and the next application of asphalt.

C. Keep the primed surface in repair during the curing period between the prime coat and seal coat.

1. Repair holes, ravel and areas deficient in prime with aggregate-asphalt mixtures, by penetration methods, or other approved procedures.

2. Broom off loose materials prior to subsequent applications of asphalt.

3.2 SEAL COAT

A. Apply each seal coat in accordance with Section 808 – Seal Coat.

B. If successive seal coats are required, maintain the first seal coat and allow to cure for five days.

3.3 OPENING TO TRAFFIC

A. Unless otherwise specified, keep roadway open to traffic at all times.

B. As soon as asphalt is covered, controlled traffic may be permitted.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit bid item as designated in the Bid Schedule. Includes all labor, material, and equipment required to perform the work. Work to include asphalt, anti-stripping additive, cover coat material, load, haul, placement, stockpiling, blotter, brooming, and all necessary items required to place surface treatment as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Surface Treatment: By the square yard.

1. Bid Schedule Payment Reference: 809.4.1.A.1.
2. Bid Schedule Description: Surface Treatment…square yard (SY).

END OF SECTION

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SECTION 810

PLANT MIX PAVEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of constructing one or more courses of plant mix pavement, in accordance with these specifications and in reasonably close conformity with the lines shown in the Contract Documents or as established.

1.2 RELATED SECTIONS

A. Section 803 – Plant Mix Aggregate.

B. Section 805 – Asphalt.

C. Section 806 - Tack.

D. Section 813 – Fog Coat.

E. ITD Specification Section 703.05 Aggregate for Superpave HMA.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

B. WAQTC – Western Alliance for Quality Transportation Construction.

C. Idaho Transportation Department, Standard Specifications for Highway Construction, most recent edition as of the project's first advertising date.

D. Idaho Transportation Department, Supplemental Specifications, most recent edition as of the project's first advertising date.

E. Idaho Transportation Department, Standard Quality Assurance Special Provision, most recent edition as of the project's first advertising date.

PART 2 MATERIALS

2.1 HOT MIX ASPHALT DESIGN

A. Hveem Method Design Criteria:

Table 1
Hveem Mix Requirements

Class Of Mix	Minimum Stability	Min. Film Thickness	Air Voids %	Min. Immersion Compression %
I	37	6 micron	3-5	85
II	35	6 micron	3-5	85
III	30	6 micron	3-5	85
IV	Not to be used for permanent work.			

1. Class I mix may be used in place of all other mix classes.
2. Class II mix may be used in place of Class III or IV mixes.
3. Class III mix may be used in place of Class IV mix.

B. Marshall Method Design Criteria:

Table 2
Marshall Mix Requirements

Number of compaction blows, each end of specimen	50
Stability, minimum	1200
Flow	8 – 18
Air voids, percent	3 – 5

C. Hveem and Marshall mixes shall also meet the following requirements:

Table 3

Nominal Maximum Aggregate Size	¾ inch	½ inch	3/8 inch
Voids in mineral aggregate (VMA), percent	13.0	14.0	15.0
Voids filled with asphalt (VFA), percent	65-78	65-78	65-78

D. Superpave Method Design Criteria:

1. “ITD Specifications” is defined as the Idaho Transportation Department, Standard Specifications for Highway Construction, most recent edition and the Idaho Transportation Department, Supplemental Specifications, as referenced.

2. The Contractor shall furnish a job mix formula (JMF) for a Superpave HMA pavement that complies with AASHTO R-35 and ITD Specifications Section 405-Superpave Hot Mix Asphalt, Subsection 405.02 Materials, Table 405.02-1 – Superpave Mixture Requirements. The mix shall be the class of Superpave and have the maximum aggregate size stated in the Measurement and Payment Section. The job mix shall be prepared by an Accredited Superpave Mix Design Technician and stamped by an Engineer licensed in the State of Idaho.

E. Provide virgin aggregate for all mixes in a minimum of two separate stockpiles. RAP, if included in the mix, will be in addition to the minimum two separate stockpile requirement.

F. When Contract Documents allow for a single aggregate stockpile, all mix property requirements remain in effect.

G. All HMA designs shall use a minimum one-half percent approved liquid anti-stripping additive by weight of asphalt. Lime may be used as the anti-stripping additive, if it was included in the job mix design.

H. Warm Mix Asphalt: If approved by the contracting agency, warm mix asphalt may be used to construct the project paving. Utilize a warm mix process in accordance with the ITD warm mix specification, as referenced.

2.2 AGGREGATES

A. Material for Hveem and Marshall mixes to meet requirements of Section 803 – Plant Mix Aggregates.

B. Aggregate for Superpave mixes shall comply with criteria in the ITD Specifications Section 703- Aggregates, Subsection 703.05 Aggregate for Superpave HMA Pavement.

C. Aggregate quality will be controlled at the hot plant.

1. Conduct sampling and testing at hot plant to assure a uniform combined aggregate gradation is maintained. Aggregate gradation, sand equivalency, and fractured faces will be performed on coldfeed samples as needed to control the operation but at least 1 test per each 1500 tons of plant mix produced.

2. Variation from the as crushed, combined stockpile average not to exceed $\pm$4% on the No. 4 sieve and $\pm$2% on the No. 200 sieve for samples from the combined aggregate feed.

2.3 ASPHALT

A. Material to meet requirements of Section 805 – Asphalt.

1. Asphalt to be of the type and grade called for.

2. Asphalt will be accepted at point of delivery.

B. Unless otherwise permitted, all liquid asphalt for a specified project shall be furnished by one (1) supplier. If a change of liquid asphalt supplier is proposed, mix design testing and verification are required as conditions of approval.

2.4 ANTI-STRIPPING ADDITIVE

A. Material to meet requirements of the Contract Documents.

1. Anti-strip additive will be accepted at point of delivery.

2.5 RECYCLED PLANT MIX (RAP)

A. Recycled Asphalt Pavement, (also known as Reclaimed Asphalt Pavement), will be allowed in the plant mix pavement. When used, the mixture shall be produced in accordance with an approved Mix Design. The Contractor may use up to 17% of RAP by weight of the total binder in the plant mix, as defined herein.

B. RAP is defined as salvaged, milled, pulverized, broken, or crushed bituminous material that may have minor coatings of dust or aggregate particles with no discernable seams, pockets, or amounts of base, soil, or deleterious material.

C. The amount of RAP used in HMA is defined as the amount of asphalt binder, by percent that the RAP contributes to the total amount of binder in the mixture. To determine the amount of RAP binder by weight of mix, use the following equation:

$$X\% = c(a/b)$$

Where: a = optimum % of AC content in mixture to produce 4.0% air voids

b = % AC in the RAP (from chemical extraction and/or AASHTO T 308 burn)

c = the amount of RAP binder by weight of the total binder desired in the mix (17% maximum)

X = Desired RAP percentage by total weight of mix

The following is an example of the calculation:

Total RAP binder desired equals 17% of total binder in the mixture. If RAP will contribute 5.1% AC and the optimum AC is 5.8%, then:

$$X\% = 17\% * (5.8/5.1) = 19.3\%$$

D. RAP Processing. The contractor shall only use processed RAP material that shall, as a minimum, be processed by crushing and screening to produce a uniform gradation from coarse to fine and a uniform binder content in the RAP, prior to use in the recycled mix. Millings are considered processed provided they have a reasonably uniform gradation, from coarse to fine, and a reasonably uniform binder content and do not contain oversize material. Processed RAP shall have 100 percent passing the 5/8 inch sieve upon entry into the Hot Plant.

E. RAP Testing and testing frequency. The Contractor shall show that testing of the RAP and aggregate gradation to support the design has been performed at the minimum frequency of one test per 750 tons of RAP produced.

F. For testing after stockpiling, the Contractor shall submit a plan to the Engineer for approval that proposes a satisfactory method of sampling and testing of the RAP pile, either in-situ or by re-stockpiling. The sampling plan shall meet the minimum frequency required above and detail the procedure used to obtain representative samples throughout the stockpile for testing.

G. RAP shall be introduced into the plant at a location far enough downstream from the burner to be away from the flame and extremely hot gases.

H. At any time, the agency may request a printed verification that the plant is introducing RAP at the percentage approved in the mix design as calculated in item 3 above.

I. Using RAP in the plant mix pavement will not change the contract unit price, and no separate payment will be made.

2.6 MIX DESIGN APPROVAL

A. The Contractor shall furnish a job mix formula (JMF) for HMA pavement that complies with the Hveem, Marshall or Superpave mixture requirements outlined below. The JMF shall be stamped by an Engineer licensed in the State of Idaho. Submit the JMF design documentation for review a minimum of seven (7) days prior to commencement of work. Production paving shall not begin until the Engineer has found “no exceptions” with the Contractor’s JMF.

B. Provide initial JMF design and applicable aggregate tests performed by qualified independent laboratories.

C. Furnish gradation test reports and applicable fracture count reports for all material in stockpiles.

D. Furnish new JMF design test reports whenever new stockpiles are made which have gradations that are not possible to blend to the overall gradation of the existing JMF design.

2.7 TEST METHODS

A. Particle size distribution of aggregates – AASHTO T 27.

B. Mechanical Analysis of Extracted Aggregate – AASHTO T 30.

C. Hveem Method of Testing Asphalt Mixtures for Relative Stability – AASHTO T 246 and T 247.

D. Marshall – AASHTO T 245.

E. Percent of Crushed Particles – AASHTO TP 61.

F. Theoretical Maximum Specific Gravity and Density of Hot Mix Asphalt Paving Mixtures – AASHTO T 209.

G. Bulk Specific Gravity of Compacted Bituminous Mixtures – AASHTO T 166 and T 275.

H. Percentage of Coated Particles in Bituminous Mixtures – Idaho T 96.

I. Nuclear Method for Determination of the Density of an Asphalt Pavement - Idaho WAQTC TM-8.

J. Quantitative Extraction of Bitumen from Bituminous Paving Mixtures - AASHTO T 164.

K. Standard Practice for Operating Inertial Profilers and Evaluating Pavement Profiles – AASHTO PP-50.

L. Sampling Bituminous Paving Mixture – AASHTO T 168.

M. Plastic Fines in Graded Aggregate and Soils by Use of the Sand Equivalent Test – AASHTO T 176.

N. Determining the asphalt binder content of hot mix asphalt (HMA) by the ignition method – AASHTO T 308.

O. Reducing Samples of Aggregate to Testing Size – AASHTO T 248.

P. Moisture Content of Bituminous Mixes by Oven - WAQTC TM -6.

PART 3 WORKMANSHIP

3.1 MIXING PLANT

A. The mixing plant shall be a commercially manufactured plant capable of producing a uniform mixture and conforming to the following requirements.

1. Plant Scales.

    a. Plant and truck scales to conform to the requirements of the Contract Documents.

2. Dryer.

    a. Plant to be equipped with dryer or dryers that continuously agitate the aggregates during the heating process.

3. Asphalt Control Unit.

    a. Provide satisfactory means of weighing or metering for obtaining and checking the amount of asphalt in the mix.

    b. Asphalt control unit to be interconnected with the aggregate feed control and be capable of delivering asphalt to the mix within ±2% of the intended quantity throughout the range of plant operation.

4. Sampling Devices.

    a. Equip plant with adequate sampling devices on cold feed.

        1. Sampling device to be operable from the ground or a platform.

        2. Sampling device to move at a constant rate across the full width of the falling column of material from the discharge belt or chute.

        3. Equipment to achieve a representative sample, conveyed to the ground by means of a slide, chute or other means where the sampled material can be safely and conveniently collected.

3.2 HAULING EQUIPMENT

A. Trucks used for hauling plant mix to have tight, clean, smooth, metal beds.

B. All trucks to be equipped with suitable covers to protect the mixture from adverse weather or long hauls.

C. Do not use fuel oil or other petroleum based oil as a release agent.

3.3. PAVER

A. Paver to be self propelled with an activated heated screed.

B. All screed extensions to be activated and heated except for shoulder widening not exceeding 1 foot.

C. Extended screeds to be equipped with corresponding auger and tunnel extensions to ensure a uniform head of fresh material across the entire screed.

D. Screed to be equipped with automatic controls capable of adjustments in both transverse and longitudinal directions.

E. Sensing device to be adaptable to picking up grade from a string line, rail or ski.

F. Maintain to the extent possible, a continuous, non-stopping paving operation.

G. Do not use fuel oil or other petroleum based oil as a release agent.

3.4. ROLLERS

A. Rollers to be of the steel wheel, vibratory or pneumatic tire type in good condition and capable of reversing direction.

B. Provide a sufficient number of compactive force rollers to achieve compaction as required in Section 810.3.12 (FIELD QUALITY ACCEPTANCE).

C. Equipment which produces excessive crushing of the aggregate is not allowed.

D. Rollers producing pickup, washboard, uneven compaction of the surface or other undesirable results are not allowed.

E. Roller requirements.

1. Vibratory Rollers.

a. Variable amplitude with at least two settings.

b. Variable frequency with minimum of 2000 VPM.

c. Maximum rate of travel under vibration to be 2.5 mph – 220 feet/minute.

d. Vibratory rollers with pneumatic tired drive wheels to have smooth tires that leave no visible tracks.

2. Pneumatic Tired Rollers.

a. Maximum rate of travel to be 5 mph.

b. Rollers to be equipped with smooth compactor tires.

F. Do not use fuel oil or other petroleum based oil as a release agent.

3.5. MIXING

A. Moisture content of mixture at the time of placement not to exceed 1%.

B. Mixing temperature shall comply with the Viscosity-Temperature chart and be for the same type and source as the asphalt cement supplied to the project.

3.6 PLANT MIX LEVELING COURSE

A. This work consists of constructing one or more leveling courses in accordance with these specifications and in reasonably close conformity with the lines, grades and thickness, and typical cross section shown on the Contract Documents or as established.

B. Place leveling courses with a compacted thickness greater than 0.2 feet in multiple lifts.

C. Apply a Tack Coat in accordance with Section 806 – Tack before applying leveling course.

D. Place plant mix leveling course on the existing surface in quantities as directed to accomplish the intended purpose.

E. Provide pavers, or motor graders, as specified in the Contract Documents and a sufficient number of pneumatic tire rollers to adequately place and compact the leveling course to the required cross section and grade.

F. Blade laid leveling course is used for filling in wheel ruts and other surface irregularities.

1. Blade plant mix into low areas with a motor grader.

2. Two passes will normally be required to fill depressions.

3. Follow each pass of the motor grader with a pneumatic tired roller to provide compaction.

4. Keep blade of motor grader in tight contact with the existing pavement surface at all times.

G. Machine laid leveling course is used when placing plant mix on the roadway with a paver to restore crown, super elevation and/or rideability.

1. Operate screed close to existing pavement surface.

2. Minor surface tears resulting from this operation are acceptable.

3. Use pneumatic and vibratory rollers as required to achieve compaction.

3.7. SPREADING AND FINISHING

A. Surface must be approved prior to placing mixture.

B. Place pavement in lifts as required in the contract documents. Minimum ratio of lift thickness to nominal maximum aggregate size (t/NMAS) is 3 unless otherwise approved.

C. Apply a thin, uniform asphalt tack coat to the surfaces of curbing, gutters, manholes, asphalt cement pavement, Portland cement pavement, and other structure pavement will abut.

D. Paver to be equipped with a slope shoe.

1. For initial pavement, shoe(s) must be at least 18 inches wide for placement depths of 0.2 feet or less.

2. For depths greater than 0.2 feet, shoe(s) must be 24 inches wide.

3. For all pavement overlays, shoe(s) must be 24 inches wide.

3.8. JOINTS

A. Allow for no more than one cold longitudinal joint per lane excluding tapers unless otherwise approved.

1. Place cold joint at the centerline of the roadway for the top course of plant mix, unless otherwise approved by the Engineer.

2. For lower courses, stagger cold joint and offset 6 inches to 1 foot from the centerline of the roadway.

3. Pavement surface across longitudinal joints to be consistent with the transverse slope shown on typical sections.

4. A joint is considered a cold joint when the temperature of the previously laid material has cooled to 175°F or less.

B. Test all joints for smoothness.

1. Furnish and use an approved 10-foot straight edge for checking joint smoothness. See Section 810.3.13.

2. Perform test and make necessary corrections before material drops below 185°F.

C. Do not allow rollers to pass over the unprotected edge of freshly laid mixes.

D. Cut back on previous run to expose a vertical edge, full depth of the course for transverse joints.

E. Wedge Milling.

1. Start at surface and continue into the adjoining pavement on a 200:1 slope or flatter until a vertical edge equal to 0.15 foot is reached.

2. Consider transitions to ramps and cross roads as transverse joints.

3. Where the adjoining pavement is concrete, mill the wedge from the pavement to be overlaid with the vertical edge against the concrete.

4. Taper transitions between overlays and approaches to form a smooth transition while maintaining drainage.

F. Apply an asphalt tack coat on contact surfaces of transverse and cold longitudinal joints just before mixture is placed against previously laid or existing material. CSS-1 emulsified asphalt at 0.05 gallons per SY.

G. Provide positive bond, density and finished surface at longitudinal joints equal in all respects to the mixture against which it is placed.

3.9 WEATHER LIMITATIONS

A. Do not place plant mix when weather or surface conditions otherwise prevent the proper handling or finishing of the plant mix material.

B. Conform to the following minimum temperatures for all plant mix pavement operations. Place plant mix only when the air and surface temperature are in accordance with Table 4.

Table 4

MINIMUM AIR AND SURFACE TEMPERATURE		
Compacted Thickness of Individual Courses	Top Course	Leveling and Courses Below the Top Course
Less than 0.1 foot	60°F	50°F
0.1 foot to 0.18 foot	50°F	40°F
Over 0.18 foot	40°F	40°F

C. Do not start plant mix removal or otherwise alter the surface of existing plant mix unless the progress schedule realistically shows that the pavement can be replaced or completed.

3.10 COMPACTION

A. Do not operate vibratory rollers in vibratory mode when checking or cracking of the mat occurs.

B. When rollers are not operating, park off of new mat, shut off vibrator when roller is not in compactive position.

C. Use the same type, weight rolling equipment and operate at the same VPMs for production paving as was established at the beginning of the operation, unless otherwise approved.

D. Prevent adhesion of mixture to compaction equipment. Do not use diesel fuel, kerosene or other solvents.

E. Remove all of the mixture from gutter surface prior to rolling. Protect adjoining concrete from damage. Repair all damage to concrete caused by Contractor's operation at Contractor's expense.

3.11 MISCELLANEOUS PAVEMENT

A. Miscellaneous pavement consists of placing HMA material for temporary pavements or in irregular areas such as raised or depressed medians, gores, taper, radii, etc. (excluding approach radii). Tapers from 0 to 8 feet maximum width and gore areas from roadway shoulders to termini will be included in this item.

3.12 FIELD QUALITY ACCEPTANCE

A. Unless otherwise specified, one sample shall be obtained from the mix being produced per 750 tons or fraction thereof. Minimum of one test per day. Samples shall be tested for asphalt cement content per AASHTO T 308 and gradation per AASHTO T 30. Test results must meet the requirements designated in Table 5.

Table 5
Tolerances from the Asphalt Mix Design Target Values

Asphalt Cement Content	±0.4%
Passing 3/8" Sieve	± 7%
Passing No. 8 Sieve	± 5%
Passing No. 200 Sieve	± 2%

B. The pavement shall be compacted to the percentage range of the AASHTO T 209 theoretical maximum density value as outlined in 1 or 2 below. Compaction tests are not required for plant mix leveling course or temporary pavement.

1. 91.0 to 96.0 percent for in-place density values determined by WAQTC TM 8. Nuclear densometers must be correlated to cores tested in accordance with AASHTO T 166 at a frequency of one core for every 5 density tests performed, but not less than 3 cores per project. Density testing shall be performed randomly at a frequency of one test per 100 linear feet of roadway.

2. 92.0 to 95.0 percent for in-place density values determined from cores tested in accordance with AASHTO T 166. Density testing shall be performed randomly at a frequency of one test per 300 linear feet of roadway.

C. In-place density tests shall be performed a minimum distance of 12 inches from joints.

D. Furnish new JMF design if results indicate difficulty in meeting existing JMF design requirements.

3.13 SURFACE SMOOTHNESS

A. Perform straight edge surface smoothness tests no later than the next working day following placement. Provide test results to Contracting Agency within one working day after testing. If corrective action is necessary, do not continue paving until corrective action has been taken.

1. Straight edge to be an approved device 10 feet in length.

2. Perform straight edge test in areas to be determined and randomly.

3. When straight edge is laid on the surface in a direction parallel or perpendicular to the centerline, surface variation not to exceed 0.25 inches from the lower edge over the length of the straight edge.

4. Remove any highpoints found by grinding and add fog coat per Section 813, at Contractor's expense.

B. For roadways with a speed limit of greater than 40 miles per hour, profile the surface of the roadway in accordance with the following provisions if specified in the Contract Documents, unless otherwise approved by the Contracting Agency.

1. Surface smoothness shall be verified by the International Roughness Index (IRI). Target IRI values are 7.1 to 8.0 inches per 0.1 mile with corrective action required above 9.5 inches per 0.1 mile.

2. Consecutive 0.1 mile sections of roadway tested will be added together to obtain the mile section. There will be no overlapping of either the 0.1 mile or 1 mile sections to change cumulative results.

3. Acceptance surface smoothness testing will be performed on the final lift and results submitted to the Contracting Agency prior to any corrective action. Acceptance testing shall be completed within one week after completion of paving.

4. All acceptance surface smoothness testing must be verified. The profile run must be witnessed by a Contracting Agency representative and a preliminary copy of the report and the graph chart shall be submitted to the Contracting Agency immediately after the end of the run. This testing will not be accepted unless witnessed by the contracting agency. At the Contracting Agency's request, the profile data shall be submitted in a format suitable for evaluation using Proval or other acceptable software.

5. The pavement shall be profiled to provide continuous uninterrupted

profile data. All pavement shall meet the profile smoothness requirements except for the following areas:

a. Pavement within 50 feet of a transverse joint that separates the pavement from a structure deck, an approach slab, or an existing pavement not constructed under the contract.

b. Pavement for structure decks.

c. Pavement for approaches.

d. Intersections.

e. Ramps and road sections less than 1 lane mile.

Smoothness acceptance for areas outlined in a and b above will be in accordance with straight edge requirements.

6. Profilers shall be Class I or Class II as defined by ASTM E950. Profilers shall be operated in accordance with the manufacturer's instructions and AASHTO PP-50. Profiler settings shall be as follows:

a. High pass or pre-filter-off or a minimum of 200 feet.

b. Bump detection –on

c. Dip detection-on

d. Resolution-0.01 (0.25 mm)

e. Low pass filter-off

f. All other filters-off

7. Profiles shall be made 3 feet from and parallel to each edge of each traffic lane. The average of the results for each 0.1 mile section will be used to determine sections requiring corrective action.

8. The profiling equipment shall be operated at a speed no greater than that recommended by the manufacturer. It shall be calibrated at the beginning of the project and as needed thereafter.

9. Individual high points in excess of 0.3 inch within a 25 foot distance or less, as determined by the California Profilograph simulation, shall be reduced by grinding until such high points do not exceed 0.3 inch.

10. After grinding has been completed to reduce individual high points in excess of 0.3 inch, additional grinding shall be performed in sections requiring corrective action to reduce the IRI to a maximum of 8.0 inches in any 0.1 mile section along any line parallel with the pavement edge.

11. All grinding shall be done parallel to centerline. Adjacent grinder passes within any single ground area shall be extended to produce a neat rectangular area having a uniform surface appearance. At transverse boundaries between ground and unground areas, smoothly feathered transitions shall be made.

12. After grinding has been completed, the ground pavement surface shall receive a fog coat of CSS-1 in accordance with Section 813 –Fog Coat at a rate approved by the contracting agency.

13. The contractor shall check the pavement for smoothness after grinding, in accordance with the requirements of this specification and shall make any additional corrections necessary to the pavement to achieve smoothness. The Contractor shall submit a report and a graph chart showing compliance of the final surface to the smoothness requirements.

14. The cost of such grinding or milling, and all related work such as fog coat, disposal of milled material, traffic control, flagging, profiling, surface repair of ground or milled areas, and temporary pavement markings shall be at the Contractor's expense.

15. If correction of the roadway as listed above will not produce satisfactory results as to smoothness, or will reduce pavement thicknesses and serviceability excessively, the pavement shall be removed and replaced or overlaid to correct the deficiency at no additional cost to the project.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit bid item(s) as designated in the Bid Schedule. Includes all labor, material, and equipment required to perform the work. Work to include plant mix pavement of the class specified, asphalt, aggregate, additives, fly ash, loading, hauling, placing and finishing asphalt and all other necessary items required to perform the work as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Plant Mix Pavement: By the ton based on truck tickets or by the square yard.

1. Bid Schedule Payment Reference: 810.4.1.A.1.
2. Bid Schedule Description: Plant Mix Pavement…ton (TON).

3. Bid Schedule Payment Reference: 810.4.1.A.3.
4. Bid Schedule Description: Plant Mix Pavement…square yard (SY).

4.2 Miscellaneous pavement will be measured and paid for by the square yard. Final measurement will be based on plan quantities unless those quantities are significantly altered by authorized changes. Such payment is to be in addition to the cost of HMA material.

END OF SECTION

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SECTION 811

ROAD MIX PAVEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of constructing one or more courses of road mix pavement on a prepared base or road surface, in accordance with these specifications and in reasonably close conformity with the lines shown on the Contract Documents or as established.

1.2 RELATED SECTIONS

A. Section 803 – Plant Mix Aggregate.

B. Section 805 – Asphalt.

C. Section 806 – Tack.

D. Section 810 – Plant Mix Pavement.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

PART 2 MATERIALS

2.1 AGGREGATES

A. Material to meet requirements of Section 803 – Plant Mix Aggregate.

1. Aggregate will be accepted at the point of delivery.

2. Obtain one sample of aggregate at the point of delivery to the roadway for each 700 cubic yards or 1000 tons of mix produced. Test each sample for gradation, sand equivalent and fractured faces.

2.2 ASPHALT

A. Material to meet requirements of Section 805 – Asphalt.

1. Asphalt to be of the type and grade called for.

2. Asphalt will be accepted at point of delivery.

3. Owner may change asphalt one step at no change in unit price.

2.3 ANTI-STRIPPING ADDITIVE

A. Material to meet requirements of the Contract Documents.

1. Anti-strip additive will be accepted at point of delivery.

PART 3 WORKMANSHIP

3.1 EQUIPMENT

A. Required equipment includes:

1. Scarifying.

2. Mixing.

3. Spreading.

4. Finishing.

5. Compacting.

6. Asphalt distributor.

7. Asphalt heating.

B. Distributor.

1. Capable of uniformly applying asphalt on variable widths of surface at readily determined and controlled rates with uniform pressure.

2. Distributor to be equipped with a tachometer, pressure gages, accurate volume measuring devices or calibrated tank and a thermometer for measuring temperatures of tank contents.

3. Distributor also to be equipped with a power unit for the pump, and full circulation spray bars adjustable vertically.

C. Rollers to meet the requirements for proper installation.

3.2 PREPARATION OF ROADBED

A. Bring roadbed to a uniformly compacted surface.

B. Keep compacted base in repair at all times in advance of placing the bituminous surface course.

C. When a prime coat is applied, do not disturb for at least 24 hours.

D. If traffic is to use primed roadbed and not all the asphalt penetrates, spread blotter in the amount directed to absorb excess asphalt.

3.3 PLACING AGGREGATE

A. Spread uniformly on road by use of spreader boxes or other approved mechanical spreading devices.

3.4 APPLICATION OF ASPHALT

A. Uniformly apply in successive applications in amount and at intervals as directed.

B. Follow each application of asphalt immediately with mixing equipment to partially mix the aggregate and asphalt.

C. Apply asphalt at temperature specified in Section 805-Asphalt.

3.5 MIXING

A. Windrow entire mass of asphalt and aggregate on the roadway immediately after final application of asphalt.

B. Mix until all aggregate particles are coated with asphalt, the whole mass has a uniform color, and the mixture is free from fat or lean spots, balls or non-coated particles.

C. During mixing operation, do not cut into underlying course or contaminate the mixture with earth or other extraneous matter.

D. Restrict mixing operation to those areas of the road not required for use by traffic.

E. Correct situations of uneven distribution of asphalt by adding asphalt and/or aggregate as necessary and re-blending to a proper mix.

F. Blade, aerate or otherwise manipulate mixture if it contains excessive amounts of moisture or volatile matter.

G. At the end of a production day, blade all loose material into a windrow whether mixing is completed or not and retain in windrow until operations are resumed.

3.6 SPREADING, COMPACTING AND FINISHING

A. Spread with a patrol or a mechanical spreader of approved type.

B. Take care not to cut into underlying base when spreading.

C. Roll material after spreading.

1. Perform initial rolling with a pneumatic tired roller.

2. Perform final rolling with a three wheel or tandem type steel wheel roller.

3. Roll parallel to the centerline and commence at the outer edges of the road, overlapping the shoulders.

   a. Progress towards the center, overlapping on successive passes by at least one-half the width of the roller.

4. On super-elevated curves start rolling at lower edge and progress to upper edge.

5. Terminate each pass at least 3 feet in advance or to the rear of the end of the preceding pass.

6. Blade surface as necessary during compaction to fill ruts and to remove incipient corrugations or other irregularities.

7. Continue rolling until surface is of uniform texture and satisfactory compaction is obtained.

3.7 SURFACING APPROACHES

A. Construct road mix pavement on approaches as shown on the Contract Documents or as directed.

3.8 SURFACE SMOOTHNESS

A. Test completed surface in accordance with Idaho T 87.

1. Surface may not vary more than 1/4 inch from a 10-foot straightedge.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit bid items as designated in the Bid Schedule. Includes all labor, material, and equipment required to perform the work. Work to include aggregate, asphalt, additive, load, haul, stockpiling, placement and finishing pavement as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Road Mix Pavement: By the ton based on truck tickets.

1. Bid Schedule Payment Reference: 811.4.1.A.1.
2. Bid Schedule Description: Road Mix Pavement…ton (TON).

B. Road Mix Pavement: By the cubic yard compacted in place.

1. Bid Schedule Payment Reference: 811.4.1.B.1.
2. Bid Schedule Description: Road Mix Pavement…cubic yard (CY).

END OF SECTION

SECTION 812

SCRUB COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of constructing a scrub coat on the road surface, in accordance with these specifications and in reasonably close conformity with the lines shown on the Contract Documents or as established.

1.2 RELATED SECTIONS

A. Section 803 – Plant Mix Aggregate.

B. Section 805 – Asphalt.

C. Section 806 – Tack.

1.3 REFERENCES

A. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

PART 2 MATERIALS

2.1 AGGREGATES

A. Material to meet requirements of Section 803 – Plant Mix Aggregate.

B. Aggregate will be accepted at the point of delivery.

2.2 ASPHALT

A. Material to meet requirements of Section 805 – Asphalt.

1. Asphalt to be of the type and grade called for.

2. Asphalt will be accepted at point of delivery.

2.3 ANTI-STRIPPING ADDITIVE

A. Material to meet requirements of the Contract Documents.

1. Anti-strip additive will be accepted at point of delivery.

PART 3 WORKMANSHIP

3.1 EQUIPMENT

A. Rollers to meet the requirements for proper placement.

B. Operate rollers at speeds slow enough to avoid displacement of the mix.

3.2 SPREADING AND COMPACTING

A. Do not apply asphalt when roadway surface or weather conditions would prevent satisfactory construction.

B. Apply tack coat in accordance with Section 806 – Tack.

C. Sufficiently aerate scrub coat material prior to spreading.

1. Spread and tight blade from shoulder to shoulder or as directed.

D. Fill and smooth depressions, irregularities and cracks to create a uniform surface.

E. Roll with pneumatic tired rollers concurrent with spreading.

F. Finish rolling with a steel wheel roller.

G. Route traffic over completed section for at least ten days prior to placing a subsequent course.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit bid items as designated in the Bid Schedule. Include all labor, material, and equipment required to perform the work. Work to include aggregate, asphalt, additives, load, haul, placement and finishing the scrub coat as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Scrub Coat: By the ton based on truck tickets.

1. Bid Schedule Payment Reference: 812.4.1.A.1.
2. Bid Schedule Description: Scrub Coat…ton (TON).

END SECTION

SECTION 813

FOG COAT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of constructing a fog coat, and blotter if required, in accordance with these specifications and in reasonably close conformity with the lines shown on the Contract Documents or as established.

1.2 RELATED SECTIONS

A. Section 805 – Asphalt.

1.3 REFERENCES

A. AASHTO Standard Specifications for transportation and methods of Sampling and Testing.

PART 2 MATERIALS

2.1 FOG COAT MATERIAL

A. Diluted emulsified asphalt meeting the requirements of Section 805 – Asphalt.

B. Mix approximately equal volumes of emulsified asphalt and water prior to application.

2.2 BLOTTER

A. Material to meet requirements of Section 804.

1. Obtain one sample of blotter per project for gradation testing.

PART 3 WORKMANSHIP

3.1 EQUIPMENT

A. Equipment for applying fog coat and blotter to meet the requirements for proper installation.

3.2 APPLICATION OF FOG COAT

A. Apply fog coat material in a uniform, continuous spread by means of a pressure distributor.

B. Do not apply fog coat material at junction of spreads in an amount exceeding the coverage requirements.

C. Correct skipped or deficient areas.

D. The quantities, rate of application and temperature of the fog coat material to be approved.

E. Do not apply fog coat when surface or temperature conditions would prevent proper construction.

F. Apply fog coat in a manner that offers the least inconvenience to traffic and to permit one-way traffic without pickup or tracking.

3.3 APPLICATION OF BLOTTER

A. If after applying fog coat, the asphalt fails to penetrate and the roadway must be used by traffic, spread blotter in the amount required to absorb the excess asphalt.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit bid item as designated in the Bid Schedule. Includes all labor, material, and equipment required to perform the work. Work to include asphalt after dilution, blotter, and all other items required to perform the work as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Fog Coat: By the ton based on truck tickets.

1. Bid Schedule Payment Reference: 813.4.1.A.1.
2. Bid Schedule Description: Fog Coat…ton (TON).

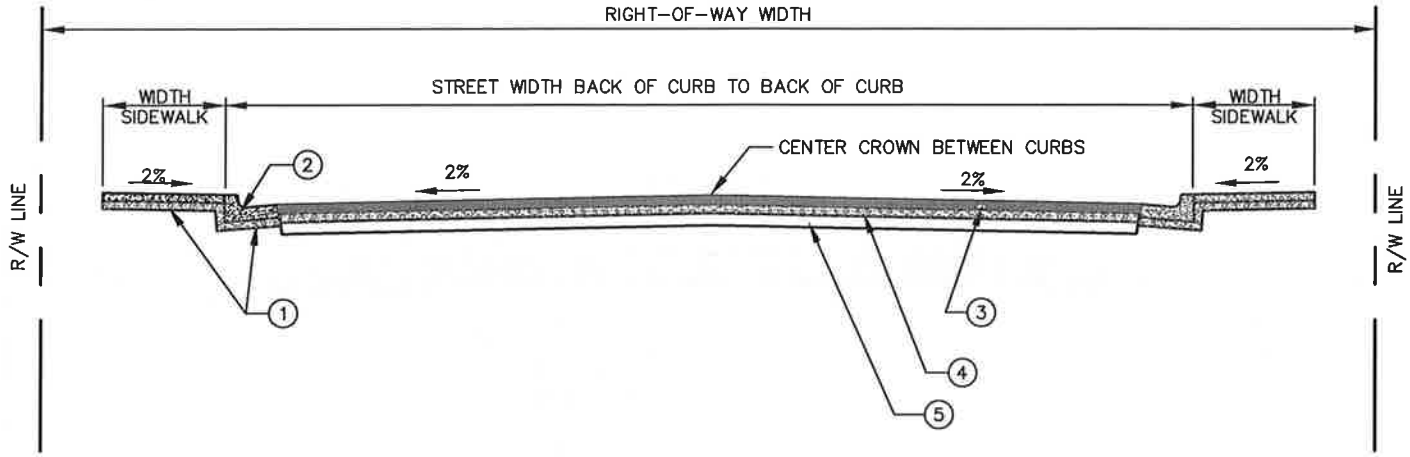
END OF SECTION

ISPWC - DIVISION 800

Aggregates and Asphalt

Standard Drawings

SD-801 – Typical Street Section
SD-802 – Typical Rural Street Section
SD-803 – Typical Paved Alley Section
SD-804 – Typical Graveled Alley Section
SD-805 – Standard Cul-de-sac
SD-806 – Typical Street Widening
SD-807 – Typical Commercial Driveway Approach
SD-808 – Typical Mailbox Turnout
SD-809 – Rural Driveway Approach



TYPICAL CURB & GUTTER SECTION

N.T.S.

LEGEND

(1) CRUSHED AGGREGATE BASE COURSE UNDER CURB AND SIDEWALK. REFER TO SD-709.

(2) 6" STANDARD CURB AND GUTTER.

(3) HOT PLANT MIX ASPHALT CONCRETE SURFACE COURSE.

(4) CRUSHED AGGREGATE BASE OR LEVELING COURSE.

(5) CRUSHED OR UNCRUSHED AGGREGATE BASE COURSE.

NOTES:

(A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.

(B) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.

(C) RIGHT-OF-WAY WIDTHS AND STREET WIDTHS SET BY LOCAL POLICY AND TYPE OF USE.

(D) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.

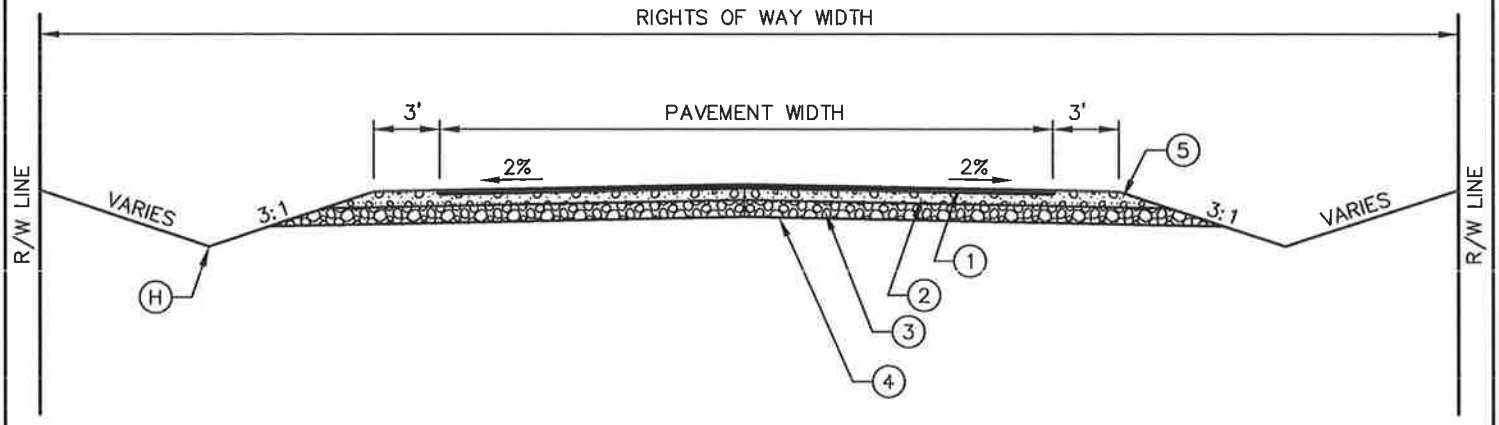
(E) MINIMUM CONCRETE PAVEMENT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND SOIL TYPE. SEE SECTION-700.

(F) STANDARD CURB AND GUTTER RECOMMENDED, WITH ROLL CURB USE BASED ON LOCAL POLICY, SEE SECTION 700.

(G) CONCRETE SIDEWALK REQUIRED WIDTH SET BY LOCAL POLICY AND TYPE OF USE. SEE SECTION-700.

(H) STREET CORNER RADII SIZES SET BY LOCAL POLICY AND TYPE OF USE.

(I) SUPER ELEVATION, VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, SET BY LOCAL POLICY AND TYPE OF USE.



TYPICAL RURAL ROAD SECTION

N.T.S.

LEGEND

(1) HOT PLANT MIX ASPHALT CONCRETE SURFACE COURSE.

(2) CRUSHED AGGREGATE BASE OR LEVELING COURSE.

(3) CRUSHED OR UNCRUSHED AGGREGATE BASE COURSE.

(4) SUBGRADE.

(5) CRUSHED AGGREGATE SHOULDERS.

NOTES:

(A) RURAL STREET SECTION USED FOR ARTERIAL, COLLECTOR, AND RESIDENTIAL TYPE STREETS IN THE AREAS OUTSIDE THE ESTABLISHED URBAN AREAS THE USE OF THIS SECTION SUBJECT TO LOCAL POLICY AND TYPE OF USE.

(B) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.

(C) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.

(D) RIGHT-OF-WAY WIDTHS AND STREET WIDTHS SET BY LOCAL POLICY AND TYPE OF USE.

(E) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.

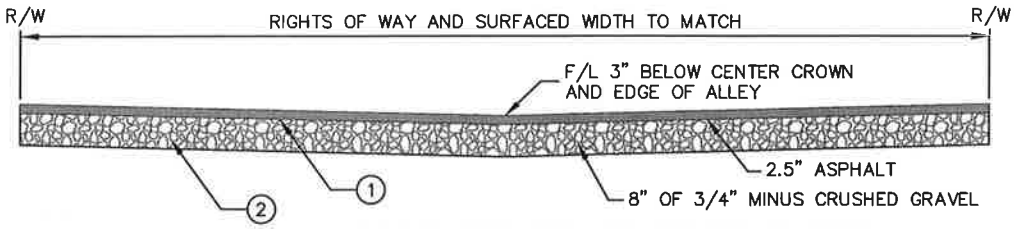
(F) STREET CORNER RADII SIZES FOR EDGE OF PAVEMENT SET BY LOCAL POLICY AND TYPE OF USE.

(G) SUPER ELEVATION, VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, SET BY LOCAL POLICY AND TYPE OF USE.

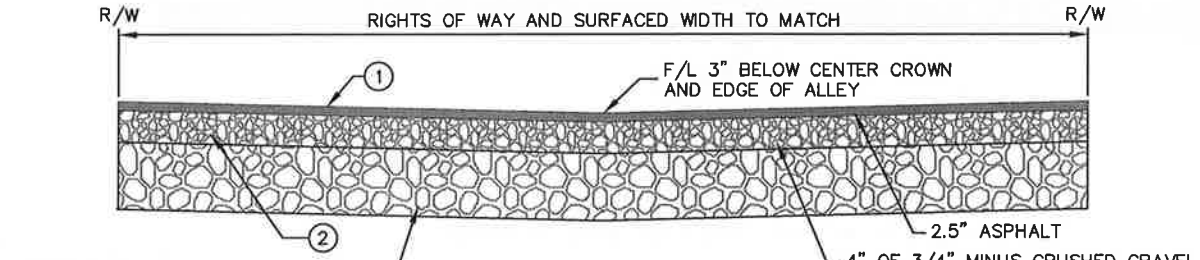
(H) BORROW DITCHES SHALL HAVE A MINIMUM 3:1 FORE SLOPE WITH 4:1 SLOPE RECOMMENDED. THE BACK SLOPE OF BORROW DITCH SHALL BE MINIMUM 1:1 BACK SLOPE WITH 4:1 BACK SLOPE RECOMMENDED. THE FLOW LINE OF THE DITCH SHALL BE MINIMUM 6" BELOW THE LOWEST AGGREGATE BASE COURSE TO ENCOURAGE DRAINAGE. PIPING DITCH UNDER DRIVEWAYS REQUIRED WITH APPROVED LENGTH AND TYPE.

2015

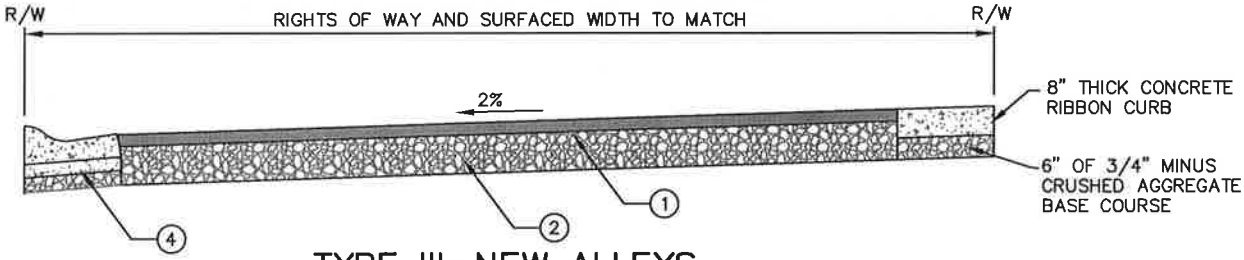
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL RURAL STREET SECTION	STANDARD DRAWING NO. SD-802



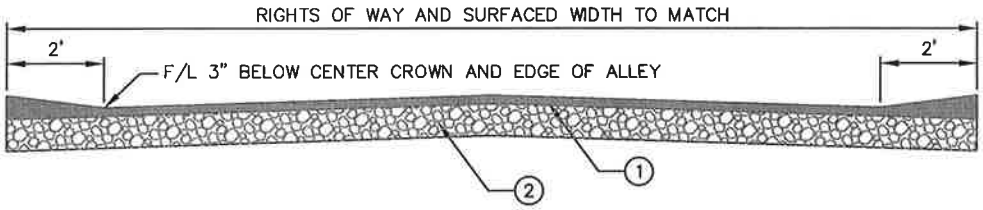
TYPE I–EXISTING GRAVEL ALLEYS OR NEW ALLEYS



TYPE II–NEW ALLEYS



TYPE III–NEW ALLEYS



TYPE IV–NEW ALLEYS

LEGEND

(1) HOT PLANT MIX ASPHALT CONCRETE COURSE.

(2) CRUSHED AGGREGATE BASE COURSE.

(3) 6" MINUS CRUSHED GRAVEL.

(4) 3" ROLLED CURB AND GUTTER OR VALLEY GUTTER.

NOTES:

(A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.

(B) ALLEY PROFILE GRADES 0.4% MINIMUM WITH CONCRETE GUTTER, 1.0% MINIMUM ON ASPHALT.

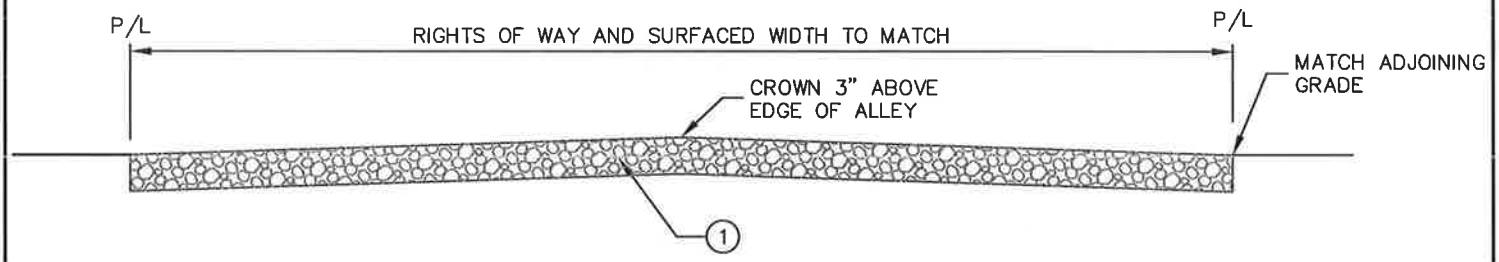
(C) RIGHT-OF-WAY WIDTHS AND ALLEY WIDTHS SET BY LOCAL POLICY AND TYPE OF USE.

(D) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.

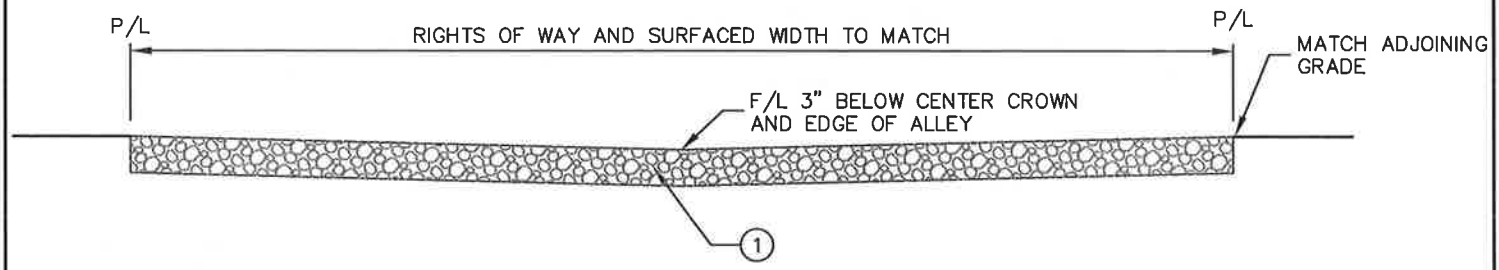
(E) SUPER ELEVATION, VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, SET BY LOCAL POLICY AND TYPE OF USE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL PAVED ALLEY SECTION	STANDARD DRAWING NO. SD-803



TYPE I



TYPE II

LEGEND

(1) 6" OF 3/4" MINUS CRUSHED AGGREGATE BASE COURSE. (MIN).

NOTES:

(A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.

(B) ALLEY PROFILE GRADES 0.3% MINIMUM WITH 0.4% MINIMUM RECOMMENDED.

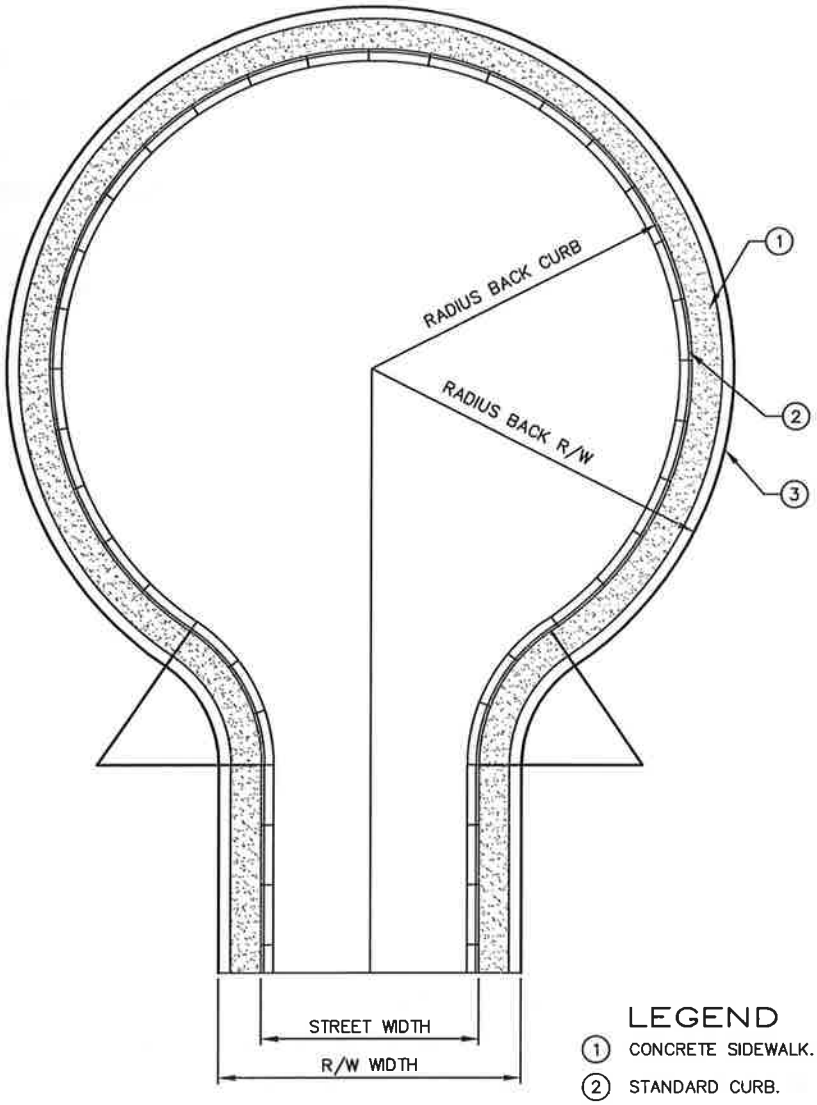
(C) RIGHT-OF-WAY WIDTHS AND ALLEY WIDTHS SET BY LOCAL POLICY AND TYPE OF USE.

(D) VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, SET BY LOCAL POLICY AND TYPE OF USE.

(E) GRAVEL ALLEYS TO BE CONSTRUCTED ONLY UPON WRITTEN PERMISSION OF LOCAL AGENCY. PAVED ALLEYS ARE NORMALLY REQUIRED REF TO SD-802.

3015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL GRAVELED ALLEY SECTION	STANDARD DRAWING NO. SD-804



LEGEND

(1) CONCRETE SIDEWALK.

(2) STANDARD CURB.

(3) RIGHT-OF-WAY LINE.

NOTES:

(A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECFICATIONS.

(B) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.

(C) RIGHT-OF-WAY STREET WIDTHS AND DIAMETER SET BY LOCAL POLICY AND TYPE OF USE.

(D) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.

(E) MINIMUM CONCRETE PAVEMENT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND SOIL TYPE. SEE SECTION-700.

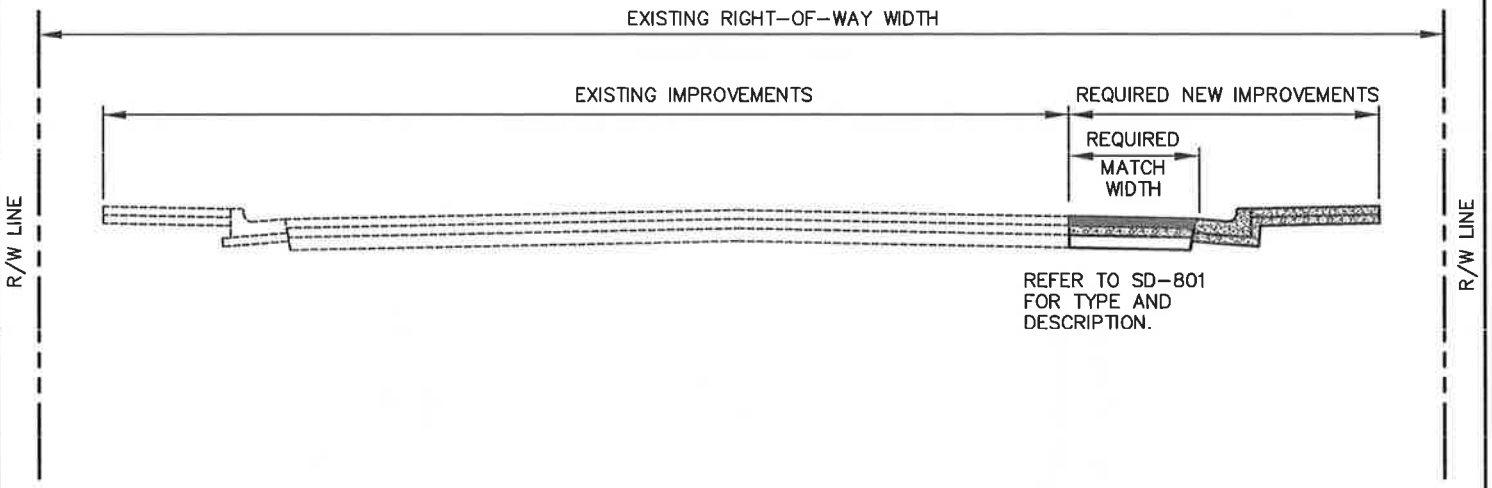
(F) STANDARD CURB AND GUTTER RECOMMENDED, WITH ROLL CURB USE BASED ON LOCAL POLICY, SEE SECTION-700.

(G) CONCRETE SIDEWALK REQUIRED WIDTH SET BY LOCAL POLICY AND TYPE OF USE. SEE SECTION-700.

(H) STREET CORNER RADII SIZES SET BY LOCAL POLICY AND TYPE OF USE.

(I) CUL-DE-SAC RADIUS REQUIRED DETERMINED BY MINIMUM TURNAROUND RADIUS FOR MOTOR VEHICLES. ACTUAL RADIUS SET BY LOCAL POLICY AND TYPE OF USE.

(J) CUL-DE-SAC MAY BE OFFSET TO THE LEFT OR RIGHT SO THAT APPROACH STREET CURB IS TANGENT WITH CUL-DE-SAC CIRCLE.



NOTES:

(A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.

(B) STREET PROFILE GRADES 0.4% MINIMUM UNLESS OTHERWISE APPROVED BY THE OWNER.

(C) RIGHT-OF-WAY WIDTHS AND STREET WIDTHS SET BY LOCAL POLICY AND TYPE OF USE.

(D) MINIMUM ASPHALT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND "R" VALUE OF SUBGRADE SOILS AND APPROVED BY LOCAL AGENCY.

(E) MINIMUM CONCRETE PAVEMENT AND AGGREGATE BASE THICKNESS SET BY LOCAL POLICY AND TYPE OF USE. ACTUAL THICKNESS SHALL BE DESIGNED BY ENGINEER BASED ON TRAFFIC INDEX AND SOIL TYPE. SEE SECTION-700.

(F) STANDARD CURB AND GUTTER RECOMMENDED, WITH ROLL CURB USE BASED ON LOCAL POLICY, SEE SECTION-700.

(G) CONCRETE SIDEWALK REQUIRED WIDTH SET BY LOCAL POLICY AND TYPE OF USE. SEE SECTION-700.

(H) STREET CORNER RADII SIZES SET BY LOCAL POLICY AND TYPE OF USE.

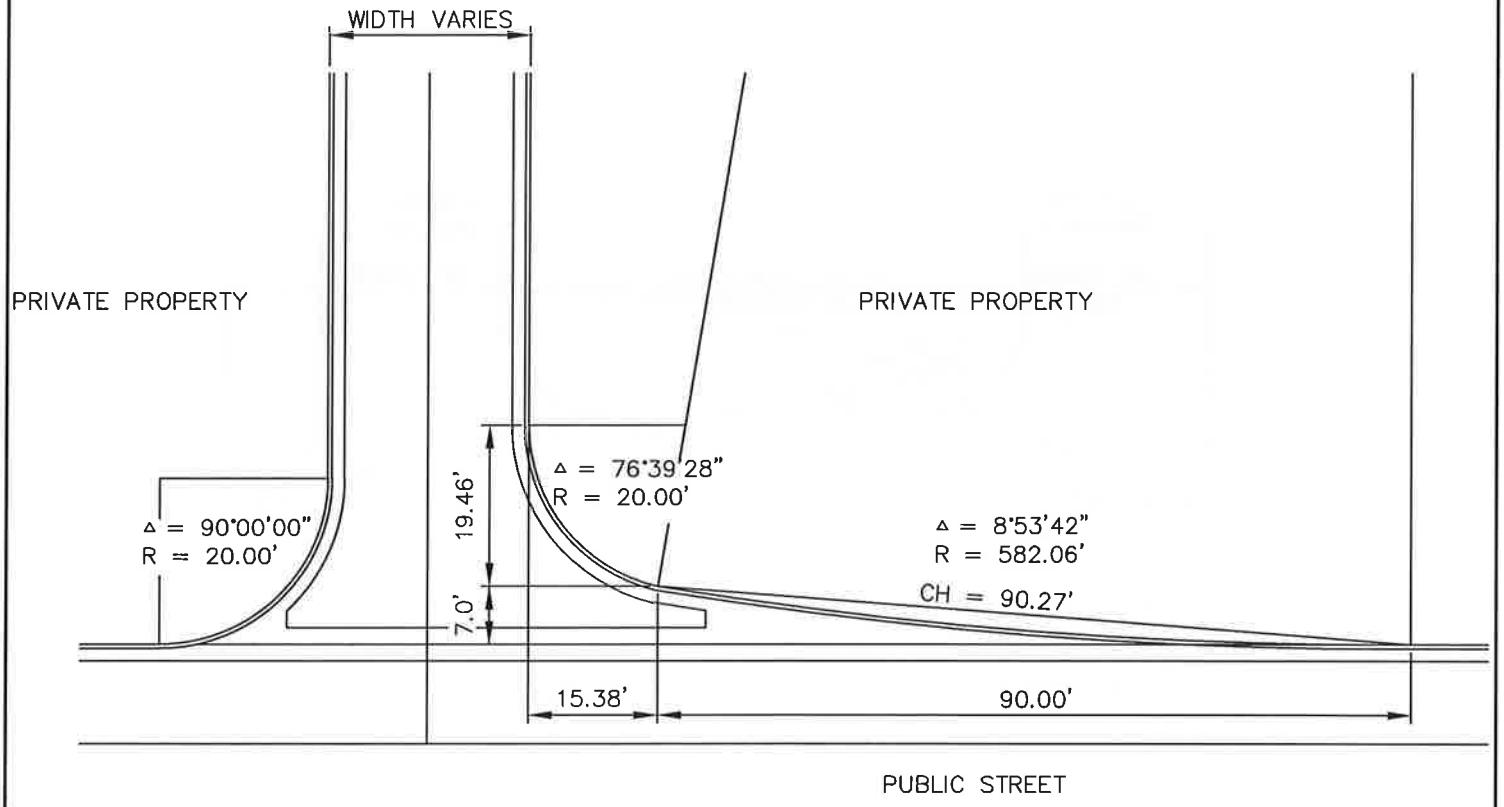
(I) SUPER ELEVATION, VERTICAL CURVE AND HORIZONTAL CURVE REQUIREMENTS BASED ON SIGHT DISTANCE, VEHICLE DESIGN SPEEDS, MATCHING EXISTING IMPROVEMENTS AND SET BY LOCAL POLICY AND TYPE OF USE.

(J) ASPHALT MATCH SHALL DRAIN TOWARD EDGE OF PAVEMENT OR CONCRETE CURB AND SHALL HAVE A MINIMUM CROSS SLOPE OF 1% WITH 2% RECOMMENDED. CROSS SLOPE OF 4% MAXIMUM IN TRAFFIC LANE WITH 8% MAXIMUM IN PARKING AREA.

(K) EXISTING ASPHALT SHALL BE CUT TO A NEAT STRAIGHT LINE PARALLEL AND/OR PERPENDICULAR TO THE CENTERLINE OF THE STREET AND SEALED WITH AN ASPHALT TACK COAT BEFORE PAVING.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL STREET WIDENING	STANDARD DRAWING NO. SD-806



NOTES:

(A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.

(B) THIS TYPE OF APPROACH RECOMMENDED IN PLACE OF A CONCRETE DRIVEWAY TO MOVE LARGE VOLUMES OF VEHICLES AND/OR TRUCK TRAFFIC ON OR OFF THE ROADWAY FOR PRIVATE COMMERCIAL DEVELOPMENTS.

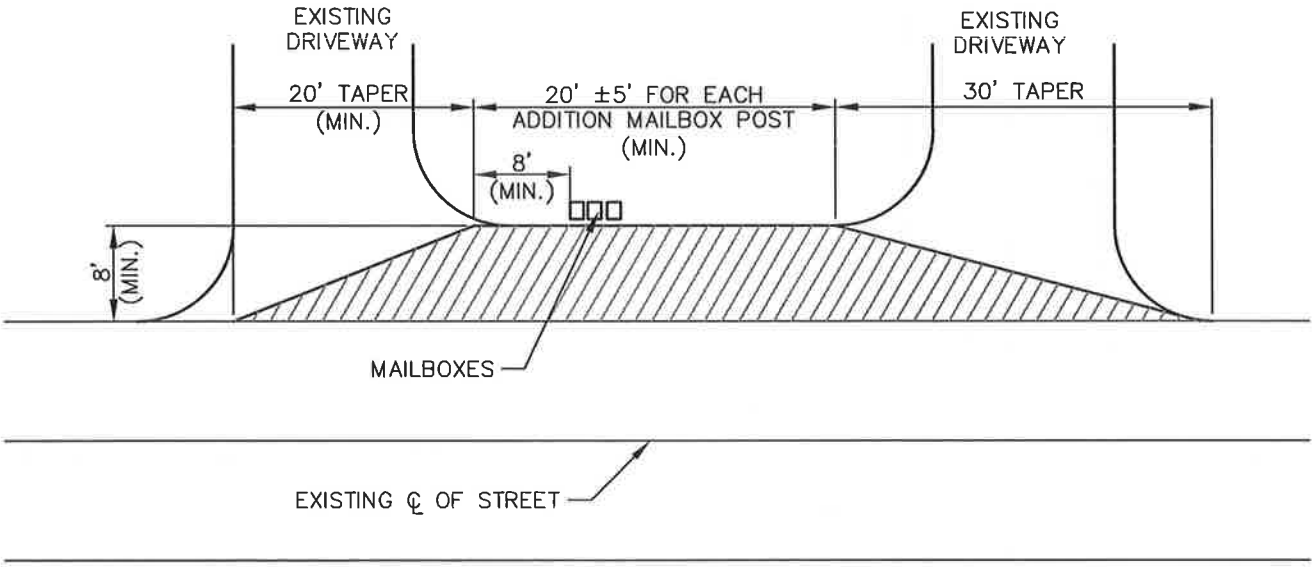
(C) CURB RADII SHOWN ARE MINIMUMS AND SHOULD BE MADE PROPORTIONATELY LARGER BASED ON TYPE, SIZE AND VOLUME OF VEHICLES.

(D) CONCRETE VALLEY GUTTER MAY BE REQUIRED TO FACILITATE DRAINAGE.

(E) THE PORTION OF THE COMMERCIAL DRIVEWAY APPROACH WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE CONSTRUCTED TO THE SAME PAVEMENT AND GRAVEL SECTION AS THE PUBLIC STREET.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL COMMERCIAL DRIVEWAY APPROACH	STANDARD DRAWING NO. SD-807



NOTES:

(A) ALL CONSTRUCTION SHALL BE PER ISPWC SPECIFICATIONS.

(B) BORROW DITCHES SHALL BE RELOCATED PER SD-802 AND/OR PIPED FOR WIDENINGS. DRIVEWAYS SHALL BE PIPED IN ALL CASES TO FACILITATE CONTINUOUS FLOW IN DITCH.

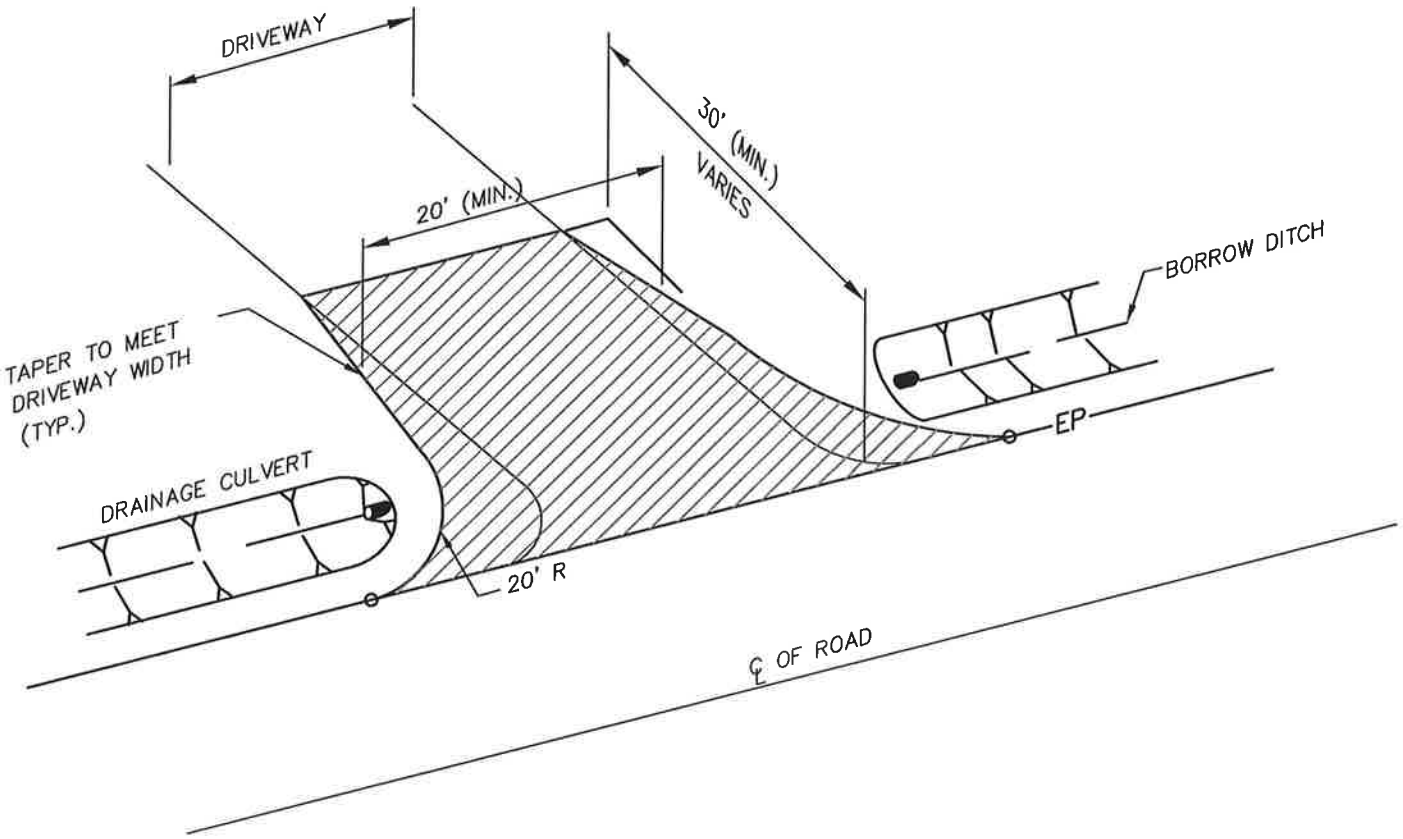
(C) TAPERS SHOWN ARE MINIMUM, LONGER TAPERS RECOMMENDED.

(D) ASPHALT AND GRAVEL BASE THICKNESS PER SD-802.

(E) EXISTING OR NEW DRIVEWAYS SHALL BE REPAIRED WITH THEIR EXISTING SURFACE TYPES TO BLEND INTO THIS WIDENING.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL MAILBOX TURNOUT	STANDARD DRAWING NO. SD-808



NOTES:

(A) INSTALL 12" OF 3/4" MINUS CRUSHED AGGREGATE BASE WITH 2 1/2" OF HOT PLANT MIX PAVEMENT.

(B) INSTALL 12" MINIMUM DIAMETER PIPE CULVERT TO CONTINUE BORROW DITCH DRAINAGE WHERE APPLICABLE.

(C) AMOUNT OF DRIVEWAY REPAIR VARIES BASED ON GRADE CHANGE. USE 30' AS A MINIMUM.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	RURAL DRIVEWAY APPROACH	STANDARD DRAWING NO. SD-809

ISPWC – DIVISION 900

Pressure Irrigation

Section 901 – Pressure Irrigation Pipe and Fittings
Section 902 – Pressure Irrigation Valves
Section 903 – Pressure Irrigation Service Lines and Appurtenances

SECTION 901

PRESSURE IRRIGATION PIPE AND FITTINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pressure irrigation water transmission and distribution pipe and fitting materials, installation and testing.

B. Refer to Division 600 for gravity irrigation transmission and distribution pipe and appurtenance materials, installation and testing.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 304 – Trench Foundation Stabilization.

C. Section 305 – Pipe Bedding.

D. Section 306 – Trench Backfill.

E. Section 401 – Water Pipe and Fittings.

F. Section 405 – Non-Potable Water Line Separation.

G. Section 703 – Cast-in-Place Concrete.

1.3 REFERENCES

A. ANSI/AWWA C 104: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.

B. ANSI/AWWA C 105: Polyethylene Encasement for Ductile Iron Pipe Systems.

C. ANSI/AWWA C 110: Ductile Iron and Gray-Iron Fittings for Water and Other Liquids.

D. ANSI/AWWA C 111: Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.

E. ANSI/AWWA C 151: Ductile Iron Pipe.

F. ANSI/AWWA C 153: Ductile Iron Compact Fittings.

G. ANSI/AWWA C 200: Steel Water Pipe 6 inches and Larger.

H. ANSI/AWWA C 605: Underground Installation of Thermoplastic Pressure Piping.

I. ANSI/AWWA C 906: Polyethylene Pressure Pipe and Fittings.

J. ASTM D 2241: PVC Pressure-Rated Pipe.

K. ASTM D 2672: Joints for IPS PVC Pipe.

L. ASTM D 2774: Installation of Ductile Iron Pipe and Appurtenances.

M. ASTM D 3261: Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

N. ASTM F 1483: Standard Specifications for Oriented Poly (Vinyl Chloride), PVCO, Pressure Pipe.

O. ASTM F 2164: Pressure testing of HDPE pipe shall be per ASTM F 2164 Field Leak Testing of Polyethylene (PE) Pressure Piping Systems using Hydrostatic Pressure.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed under this section.

B. Submit manufacturer's certification that pipe and fittings meet or exceed specified requirements.

C. Submit manufacturer's installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of constructed pipelines and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle and store pipe in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from sunlight and contamination until installation.

PART 2 MATERIALS

2.1 PIPE AND FITTINGS SIZE, TYPE AND STRENGTH

A. Comply with pipe and fitting size, type and strength classification indicated in the Contract Documents.

B. If type and strength classifications are not indicated in the Contract Documents, contact the Engineer.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match those contemplated by the Contract Documents.

2.2 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. PVC Pressure-Rated Pipe: ASTM D 2241.

1. Pressure Class: As indicated in the Contract Documents.

2. Standard Dimension Ratio: 21 or stronger.

3. Dimension Basis: CIOD for size 14 inches and over.

4. Joints: Bell and spigot end with ASTM F 477 elastomeric gaskets.

5. Markings: If used to convey reclaimed municipal wastewater, pipe to be purple in color and stamped “Non-Potable Water”.

B. Molecular-Oriented PVC Pipe: ASTM F 1483:

1. Pressure Rating: As indicated in the Contract Documents.

2. Dimension Basis: 4” through 16” Iron-Pipe-Size (IPS) only.

3. Joints: Gasketed Bell and Spigot complying with ASTM D 3139 and ASTM F 477.

4. Markings: If used to convey reclaimed municipal wastewater, pipe to be purple in color and stamped “Non-Potable Water”.

C. Pipe Fittings:

1. Ductile or Gray Iron Fittings: ANSI/AWWA C 110.

a. Pressure Class: 350 psi minimum.

b. Petroleum Asphaltic Outside Coating: 1.0 mil minimum thickness.

c. Lining: Cement mortar.

d. Usage: 8-inch diameter and larger and where indicated in the Contract Documents.

2. PVC Fittings: ASTM D 1784.

a. Pressure Class: 200 psi injection molded and gasketed with HDB of 4000 psi.

b. Usage: 6 inch diameter and smaller.

D. Pipe Joints:

1. Rubber Gasket Joints for DIP and Fittings: ANSI/AWWA C 111.

2. Joints for Plastic Pressure Pipe Using Flexible Elastomeric Seals: ASTM D 3139.

2.3 DUCTILE IRON PIPE AND FITTINGS

A. Ductile Iron Pipe, 3 inches through 64 inches, Centrifugally Cast, for Water: ANSI/AWWA C 151.

1. Thickness Class: As indicated in the Contract Documents.

2. Joints: Push-on unless otherwise noted in the Contract Documents.

B. Flanged Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges: ANSI/AWWA C 115.

1. Pressure Class: 250 psi.

C. Ductile Iron Compact Fittings Using Mechanical or Push-on Joints, 3 inches through 24 inches: ANSI/AWWA C 153.

1. Pressure Class: 350 psi.

D. Ductile Iron or Gray Iron Fittings Using Mechanical, Flanged, or Push-on Joints, 3 inches through 24 inches: ANSI/AWWA C 110.

1. Pressure Class for Mechanical or Push-On Ductile Iron Joints: 350 psi.

2. Pressure Class for Flanged Ductile Iron Joints: 250 psi.

3. Pressure Class for All Gray Iron Joints: 250 psi.

E. Ductile Iron or Gray Iron Fittings Using Mechanical, Flanged, or Push-on Joints, 30 inches through 48 inches: ANSI/AWWA C 110.

1. Pressure Class for All Material and Joint Types: 250 psi.

F. Rubber Gasket Joints Ductile Iron Pressure Pipe and Fittings: ANSI/AWWA C 111.

G. Outside Coating for Pipe and Fittings: ANSI/AWWA C 110.

1. Petroleum Asphaltic Outside Coating: 1.0 mil minimum thickness.

2.4 CEMENT MORTAR LINING

A. Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water: ANSI/AWWA C 104.

1. Usage: Line all cast, ductile iron, pipe and fittings.

2. Thickness: Standard.

3. Seal Coat: Yes.

2.5 POLYETHYLENE (PE) PRESSURE PIPE AND FITTINGS

A. PE Pressure Pipe and Fittings for Water Distribution: ANSI/AWWA C 906.

1. Standard PE Designation: PE 3408.

2. Outside Diameter Base: Steel pipe (IPS).

3. Dimension Ratio: As indicated in the Contract Documents.

4. Fittings: PE 3408, thermal butt-fusion welded per ASTM D 3261.

2.6 STEEL PIPE AND FITTINGS

A. Steel Water Pipe 6 inches and Larger: ANSI/AWWA C 200.

1. Design Pressure: As indicated in the Contract Documents.

2. Minimum Yield Strength: 33 ksi.

3. Interior and Exterior Coatings: Provide cement mortar lining per ANSI/AWWA C 205.

4. Joints: Ring seal with rubber gasket.

5. Fittings: Per ANSI/AWWA C 208.

2.7 COUPLINGS

A. Couplings: Rockwell OMNI Coupling System 413, Romac, or approved substitution.

B. Coupling Adapter: Rockwell Model 912 flanged coupling adapter, or approved substitution.

C. HDPE Couplings: Electrofusion couplings to a solid wall HDPE and flange by flange elsewhere or as directed by the Engineer.

2.8 POLYETHYLENE ENCASEMENT

A. Polyethylene Encasement for Ductile Iron Pipe Systems: ANSI/AWWA C 105

1. Material: ASTM D 1248 tubular high-density cross-laminated film.

2. Class: C, Black.

2.9 THRUST BLOCKS

A. Concrete: Per Section 703 – Cast-in-Place Concrete.

B. Placement: Per this section and Standard Drawing 403 – Thrust Block and Anchor Details.

2.10 PIPE ANCHORS

A. Concrete and Rebar: Per Section 703 – Cast-in-Place Concrete.

B. Placement: Per this section and Standard Drawing SD-510 - Pipe Anchors.

2.11 LOCATING WIRE

A. Type: No. 12 AWG copper with insulation.

B. Splicing: Epoxy splice kits.

2.12 IDENTIFICATION TAPE

A. Type: Purple colored plastic tape, 2 inches wide.

B. Marking: “Caution – Buried Irrigation Water Line”, 1-1/2 inch letters.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify trench excavations are to required alignment and grade and that installation complies with Section 405 – Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Verify that excavation will allow a minimum pipe cover of 30 inches, unless otherwise indicated in the Contract Documents.

D. Examine pipe and fittings for defects or damage.

E. Verify all pipe, fittings, aggregate, and all materials delivered to the site meet the requirements of these Contract Documents.

F. Verify utility locations and existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 PIPE INSTALLATION

A. Prepare trench bottom as required by Section 301 – Trench Excavation.

B. If excavation enters an area of petroleum or other contamination stop work and notify the Engineer for verification of piping and gasket material usage.

C. Do not lay pipe unless groundwater is below the pipe invert and a foundation has been provided in accordance with Section 304 – Trench Foundation Stabilization.

D. Provide pipe bedding and initial backfill as required by Section 305 – Pipe Bedding with the following modifications to allow pipe assembly above grade and lowering of pipe into narrow trenches (when pre-approved by Engineer).

1. Pipe Bedding: Use of native materials containing no rock, organic matter, or materials larger than 3/4 inch in diameter is acceptable.

2. Compaction: Mechanical compaction of bedding is not required.

3. Support: Provide bedding to support the entire length of pipe.

E. Install pipe in accordance with the manufacturer's recommendations.

F. Use standard lengths of pipe unless otherwise required for installation of tees, fittings, or valves.

G. Utilize proper tools for cutting and beveling pipe ends and joining pipe. Use manufacturer's recommended tools designed for this task.

H. Move pipe carefully and prevent damage to pipe and manufactured ends while lowering pipe into trench.

I. Prevent foreign material from entering the pipe. Remove dirt and other foreign material from pipe.

J. Prepare pipe joint using specified gasket and manufacturer's recommended lubricant.

K. Mark, or verify that pipe ends are marked, to indicate insertion stop position (home). Ensure that pipe is inserted into bell to this mark. Push spigot into bell using methods recommended by the manufacturer. Protect the end of the pipe during "homing" and do not use excessive force that may result in over-assembled joints, dislodged gaskets, or damaged ends. If full entry is not achieved, disassemble and clean the joint and reassemble.

L. Provide sufficient restraint for the pipe to ensure that joints are held in place while bedding and initial backfill are placed.

M. When pipe installation is not in progress, block and plug the open end of the pipe to prevent creep, uplift or floating and entrance of water or other material into the pipe.

N. Ensure pipe is installed to lines and grades indicated in the Contract Documents.

O. Place locating wire directly above pipe.

P. Install anchors and supports as indicated in the Contract Documents.

Q. Backfill trench as required by Section 306 – Trench Backfill.

3.3 POLYETHYLENE ENCASEMENT

A. Secure polyethylene encasement around ductile iron pipe per ANSI/AWWA C 105 Method A.

B. Cut tube to a length 24 inches longer than the pipe section and wrap around pipe in accordion fashion.

C. After placement in trench and jointing, secure overlapping tubing. Provide 24 inches of overlap at each joint. Repair any cuts or tears with tape or patch secured in place.

3.4 THRUST BLOCKS

A. Place thrust blocks at each angled fitting, tee, cross, reducer, cap, plug and valve in accordance with Standard Drawing SD-403 - Thrust Block and Anchor Details.

B. Provide bearing area against undisturbed earth.

C. Place thrust blocks such that fitting or valve can be removed at a later date without damage to the pipeline, valve or fitting.

D. Place 6 mil polyethylene sheet between thrust block and fitting.

E. Place concrete so no concrete touches the nuts and bolts of the fitting or valve, and the nuts and bolts can be removed and replaced without removing any concrete.

F. Thrust block bearing areas as listed on Standard Drawing SD-403 - Thrust Block and Anchor Details. For test pressures greater than 150 psi or soil bearing pressures less than 1500 psi, increase thrust block bearing areas as directed by the Engineer.

G. Upon approval of the Engineer, the use of fitting and bell joint restraints may be used as an alternative to a thrust block.

3.5 PIPE ANCHORS

A. Place pipe anchors on all pipe installed on slopes of 20% or greater measured along the centerline of pipe. Install per Standard Drawing SD-510 - Pipe Anchors.

B. Provide bearing area against undisturbed earth.

3.6 PRESSURE TESTING

A. Perform testing in the presents of the Engineer per Section 401 – Water Pipe and Fittings after service lines are installed.

B. Pressure testing of HDPE pipe shall be per ASTM F 2164 Field Leak Testing of Polyethylene (PE) Pressure Piping Systems using Hydrostatic Pressure.

3.7 LOCATING WIRE

A. Place locating wire on top of the pipe.

B. Test for and ensure continuity.

3.8 PIPE MARKERS

A. Install identification tape 12 inches below subgrade overall main line irrigation pipe.

B. Furnish and install pipe markers at stub-outs (not protruding above grade) per Standard Drawing SD-512 - Standard Service Marker.

C. Provide Engineer with two working days notice to allow measurement of the vertical and horizontal location of pipe ends before the pipeline is covered.

3.9 FLUSHING

A. Flush the mains thoroughly after the pressure and leakage test are completed.

B. Unless otherwise approved by the Engineer, use a minimum flushing velocity in the main of 2.5 feet/second. Refer to Section 401 for rates of flow required to produce a velocity of 2.5 feet/second in various size pipes.

3.10 CONNECTIONS TO EXISTING IRRIGATION MAINS

A. Expose existing main and verify line size and type of pipe.

B. Furnish and install necessary fittings to make connection.

C. Maximum allowable gap between pipe ends at couplings is 1/2 inch.

3.11 ABANDONMENT OF EXISTING IRRIGATION MAINS

A. Expose main to be abandoned and verify line size and type of pipe.

B. Cut out existing fitting that connects abandoned main to pipe that is to remain in service.

C. Replace fitting with section of new pipe and required couplings.

D. Cap or plug any abandoned pipe let in the ground utilizing a 1'-0" thick concrete grout plug.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use either the first or both of the following unit prices as designated on the Bid Schedule. Includes all labor, materials and equipment to provide the work, as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. _____ Diameter, Pressure Irrigation Pipe, Type _____: By the linear foot for the type and size of pipe measured along the horizontal centerline of the pipe through all fittings and valves. Includes pipe, fittings, (unless provided in a separate Bid Item) connections, thrust blocks, restraint, flushing, and testing, excavation, bedding, backfill and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 901.4.1.A.1.
2. Bid Schedule Description: ____Diameter, Pressure Irrigation Main, Type _____:…linear foot (LF).

B. Pressure Irrigation Main Fitting – Size _____ - Type _____: Per each for the type, size and material of the fitting. Includes fittings, connections, thrust blocks, restraint, cleaning, disinfection and testing, excavation, bedding, backfill and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 901.4.1.B.1.
2. Bid Schedule Description: Pressure Irrigation Main Fitting – Size _____ - Type _____…each (EA).

END OF SECTION

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SECTION 902

PRESSURE IRRIGATION VALVES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Irrigation Valves.

B. Valve Boxes.

1.2 RELATED SECTIONS

A. Section 703 – Cast-in-Place Concrete.

B. Section 901 – Pressure Irrigation Pipe and Fittings.

1.3 REFERENCES

A. ANSI/AWWA C 504: Rubber Seated Butterfly Valves.

B. ANSI/AWWA C 509: Resilient Seated Gate Valves.

C. ANSI/AWWA C 512: Air Release/Air Vacuum and Combination Air Valves.

D. ANSI/AWWA C 515 – Reduced Wall Resilient-Seated Gate Valves for Water Supply Service.

E. ANSI/AWWA C 550: Protective Epoxy Interior Coatings for Valves and Hydrants.

1.4 SUBMITTALS

A. Submit shop drawings for materials to be installed or furnished under this section.

B. Submit manufacturer’s certification that valves and appurtenances meet or exceed specified requirements.

C. Submit manufacturers’ installation instructions and maintain copy at the jobsite.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with manufacturer's recommendations.

1.6 O & M MANUAL

A. Provide operation and maintenance manuals with all valves.

1.7 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of constructed valves and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to owner prior to issuance of substantial completion.

1.8 DELIVERY, STORAGE AND HANDLING

A. Handle and store valves in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect valve gasket and seal materials from sunlight and contamination until ready for installation to the pipe.

PART 2 MATERIALS

2.1 VALVE SIZE, TYPE AND STRENGTH

A. Valve size, pressure class, and fitting type to match pipe on which it is installed, unless otherwise indicated in the Contract Documents.

B. If type and strength classifications are not indicated in the Contract Documents, notify the Engineer.

C. Notify the Engineer if installation conditions do not match those contemplated by the Contract Documents.

2.2 RESILIENT SEATED GATE VALVES

A. Resilient Seated Gate Valves and Reduced Wall Resilient Seated Gate Valves for Water Supply Service: ANSI/AWWA C 509 and/or ANSI/AWWA C 515.

1. Stem: Non-rising.

2. Actuator: Keyed wrench opening counterclockwise.

3. Valve Ends: As shown in the Contract Documents and consistent with pipe system.

4. Gate: Cast iron double disk.

5. Stem Seal: O-ring.

6. Testing: At rated pressure.

7. Interior Coating: Required.

8. Application: Any size.

2.3 BUTTERFLY VALVES

A. Rubber Seated Butterfly Valves: ANSI/AWWA C 504.

1. Body Type: Wafer.

2. Valve Ends: As shown in the Contract Documents and consistent with pipe system.

3. Class: 150 psi Class B.

4. Disk: Cast iron.

5. Shaft: One-piece stainless steel.

6. Seats: Resilient with stainless steel mating surface.

7. Seal: Stuffing box and pull down packing gland.

8. Actuator: Keyed wrench opening counterclockwise.

9. Interior Coating: Required.

10. Application: Valves 6 inches and larger.

2.4 AIR RELEASE/AIR VACUUM AND COMBINATION AIR VALVES

A. Air Release/Air Vacuum and Combination Air Valves: ANSI/AWWA C 512.

1. Valve Operation and Valve Ends or Connections: As indicated in the Contract Documents and consistent with pipe system.

2. Body and Cover: Ductile iron, reinforced nylon, or stainless steel.

3. Outlet: Hooded.

4. Interior Coating: Required.

2.5 PROTECTIVE EPOXY COATINGS FOR VALVES

A. Protective Epoxy Interior Coatings for Valves and Hydrants: ANSI/AWWA C 550.

2.6 VALVE BOXES

A. Paved or Traffic Areas.

1. Valve boxes in accordance with Section 401 and Standard Drawing SD-406.

B. Non-Traffic Areas

1. Valve boxes in accordance with Section 401 and Standard Drawing SD-406, however, the riser pipe may be an eight (8”) inch diameter Class 200 pipe section, notched for the irrigation main, with a ten (10”) inch fiberglass box and lid is acceptable. Concrete collars not required.

2.7 THRUST BLOCKS

A. Concrete: Per Section 703 – Cast-in-Place Concrete.

B. Placement: Per Standard Drawing SD-403 - Thrust Block and Anchor Details.

PART 3 WORKMANSHIP

3.1 EXAMINATION

A. Verify that excavations are to required grade and pipe is installed per Section 901 – Pressure Irrigation Pipe and Fittings.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Examine valves and appurtenances for defects or damage.

D. Verify valves and appurtenances delivered to the site meet the requirements of the Contract Documents.

E. Verify utility locations, existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 INSTALLATION

A. Install valves in accordance with manufacturer's recommendations.

B. Install valves plumb and vertical.

C. Install all valves so a watertight seal is provided at joints.

D. Install valve appurtenances as required in the Contract Documents.

E. Install all valves so weight and torque forces are supported by the valve and thrust block and not adjacent piping.

F. Install valve boxes and collars flush with finish grade.

3.3 DEMONSTRATION

A. Demonstrate valve operation, adjustments and maintenance.

B. Demonstrate valve functions within specified requirements.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. _____ Diameter, Pressure Irrigation Valve, Type _____: Per each for the type and size of valve specified. Includes valve, fittings, valve boxes, connections, actuators, spare parts, and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 902.4.1.A.1.
2. Bid Schedule Description: _____ Diameter, Pressure Irrigation Valve - Type _____…each (EA).

END OF SECTION

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SECTION 903

PRESSURE IRRIGATION SERVICE LINES AND APPURTENANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Service Pipe.

B. Appurtenances.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 304 – Trench Foundation Stabilization.

C. Section 306 – Trench Backfill.

D. Section 405 – Non-Potable Water Line Separation.

E. Section 901 – Irrigation Pipe and Fittings.

F. Section 902 – Irrigation Valves.

1.3 REFERENCES

A. ANSI/AWWA C 800: Underground Service Line Valves and Fittings.

B. ANSI/AWWA C 901: Polyethylene (PE) Pressure Pipe for Water Service.

C. ANSI/AWWA C 902: Polybutylene (PB) Pressure Pipe for Water Service.

D. ASTM D 1785: PVC Pipe and Fittings for Irrigation Water Service.

1.4 SUBMITTALS

A. Submit shop drawings and product data for materials to be installed or furnished under this section.

B. Submit manufacturer's certification that service pipe and meters meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of water services and risers in relation to existing benchmarks.

B. Provide copy of record documents to owner prior to issuance of substantial completion.

1.6 DELIVERY, STORAGE AND HANDLING

A. Unload, store and service pipe and appurtenances in a manner which prevents shock, damage or excessive exposure to sunlight and weather.

B. Protect gasket material from sunlight and contamination until ready for installation.

1.7 OWNERSHIP AND MAINTENANCE

A. It is recommended that pressure irrigation be kept out of the public right-of-way unless no alternative is available. Sleeved mainline crossings will only be allowed in exceptional cases. Maintenance for pressure irrigation in the public right-of-way is the responsibility of the local municipal public works department or the irrigation company within that jurisdiction. Homeowners and private corporations are not acceptable as responsible parties.

PART 2 MATERIALS

2.1 PIPE AND FITTINGS SIZE, TYPE AND STRENGTH

A. Comply with pipe and fitting size, type and strength classification indicated in the Contract Documents. Unless otherwise indicated, service pipe shall be polyethylene.

B. If type and strength classifications are not indicated in the Contract Documents, use any of the alternate pipe materials meeting the minimum requirements of this section.

C. Notify the Engineer if installation conditions such as trench width, depth, soils, and bedding conditions do not match those contemplated by the Contract Documents.

2.2 SERVICE PIPE AND FITTINGS

A. PVC Pipe and Fittings for Irrigation Water Services.

1. PVC Service Pipe: ASTM D 1785.

a. Schedule: 40.

b. Solvent Weld Fittings: Schedule 40 per ASTM D 2466.

c. Threaded Fittings: Schedule 80 per ASTM D 2467.

2. PVC Service Pipe: ASTM D 2241.

a. Class: 200 psi.

b. Dimension Ratio: SDR 21 or better.

c. Fittings: Meet or exceed the pressure rating of the pipe.

B. Polyethylene (PE) Pressure Pipe for Water Service: ANSI/AWWA C 901.

1. Pressure Class: 160 psi unless otherwise indicated in the Contract Documents.

2. Dimension Ratio: SIDR 9 for PE 3408, SIDR 11 for PE 4710.

3. Dimension Base: Iron pipe size.

4. Standard PE Code Designation: PE 3408 or PE 4710 per ASTM D 3350.

5. Fittings: Brass threaded insert with 2 stainless steel clamps over the insert end.

2.3 APPURTENANCES

A. Service Saddles for PVC Main.

1. Material: Ductile or malleable iron.

2. Straps: Stainless steel with minimum width of 2 inches.

3. Service Tees: Rated 200 psi and made by pipe manufacturer.

B. Service Connections for PE Main.

1. Per Contract Documents or as recommended by the pipe manufacturer.

2. HDPE: Electrofusion or conventional fusion saddles.

C. Service Valves.

1. Type: 200 psi rated gate valve with non-rising stem.

2. Material: All bronze or brass.

3. Ends: Female threaded.

4. Actuator: Keyed wrench opening counterclockwise.

D. Couplings.

1. Type: Pack joint couplings for polyethylene pipe, or approved substitution. Threaded for PVC threaded nipples.

E. Service Valve Box for Irrigation Risers.

1. Size and Type: 4-inch sewer pipe per ASTM D 3034.

2. Cover: Toro, or approved substitution.

3. When specified in the Contract Documents: Fiberglass valve box 13 inches by 18 inches by 12 inches deep.

4. Marking Tag “Irrigation: – Non-Potable, Do Not Drink”.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that excavations are to required alignment and grade and alignment meets the requirements of Section 405 – Non-Potable Water Line Separation.

B. Verify that trench conditions and shoring, sheeting, and bracing protect workers and meet the requirements of OSHA.

C. Verify that trench depth will allow a minimum of 30 inches cover over service lines.

D. Examine service pipe, fittings, and appurtenances for defects or damage.

E. Verify service pipe, fittings, and materials delivered to the site meet the requirements of the Contract Documents.

F. Verify utility locations, required separations, and existing piping locations and structures where connections are to be made prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents. Allow 4 hours for the Engineer to modify the design, if necessary, unless otherwise specified.

3.2 INSTALLATION

A. Install per Standard Drawings SD-901 - Pressure Irrigation Service with 4” PVC Valve Box and SD-902 - Pressure Irrigation Service with Fiberglass Valve Box based on valve box type.

B. Install service lines, valves and boxes in the locations indicated in the Contract Documents.

C. Install pipe, fittings, valves, and boxes in accordance with the manufacturer's recommendations.

D. Install service lines under paved concrete surfaces by pulling or boring the new service line in place from the new riser to the main. If, according to the Engineer, pulling or boring is not readily feasible, install service lines by trenching.

E. Prepare trench bottom as required by Section 301 – Trench Excavation and per Standard Drawing SD-306 - Utility Trench, unless reduction in depth and bedding requirements are approved by the Engineer.

F. Do not lay pipe unless groundwater is 1 foot below the pipe invert and a foundation has been provided in accordance with Section 304 – Trench Foundation Stabilization, unless otherwise approved by the Engineer.

G. Provide pipe bedding and initial backfill as required by Section 306 – Trench Backfill, with the following modifications to allow direct bury in narrow trenches:

1. Pipe Bedding: Use of native materials containing no rock, organic matter, or materials larger than 1/2 inch in diameter is acceptable.

2. Compaction: Mechanical compaction of bedding is not required.

3. Support: Provide bedding to support the entire length of pipe.

H. Utilize proper tools for cutting and beveling pipe ends and installing fittings.

I. Clean and prepare pipe and fittings.

J. Assure that no dirt or other foreign material is allowed in pipe.

K. Assure that continuity is maintained in locating wire for both open cut and bored service lines.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated on the Bid Schedule. Includes all labor, materials and equipment to provide the work, as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. _____ Diameter Pressure Irrigation Pipe Service, Type _____: Per each as specified. Includes excavation, bedding, backfill, service tap and saddle, valve, service pipe, fittings, box and all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 903.4.1.A.1.
2. Bid Schedule Description: _____ Diameter Pressure Irrigation Pipe Service, Type _____…each (EA).

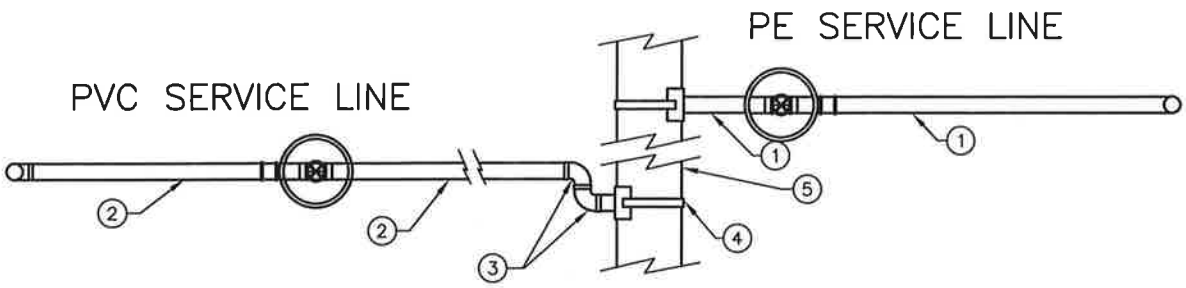
END OF SECTION

ISPWC - DIVISION 900

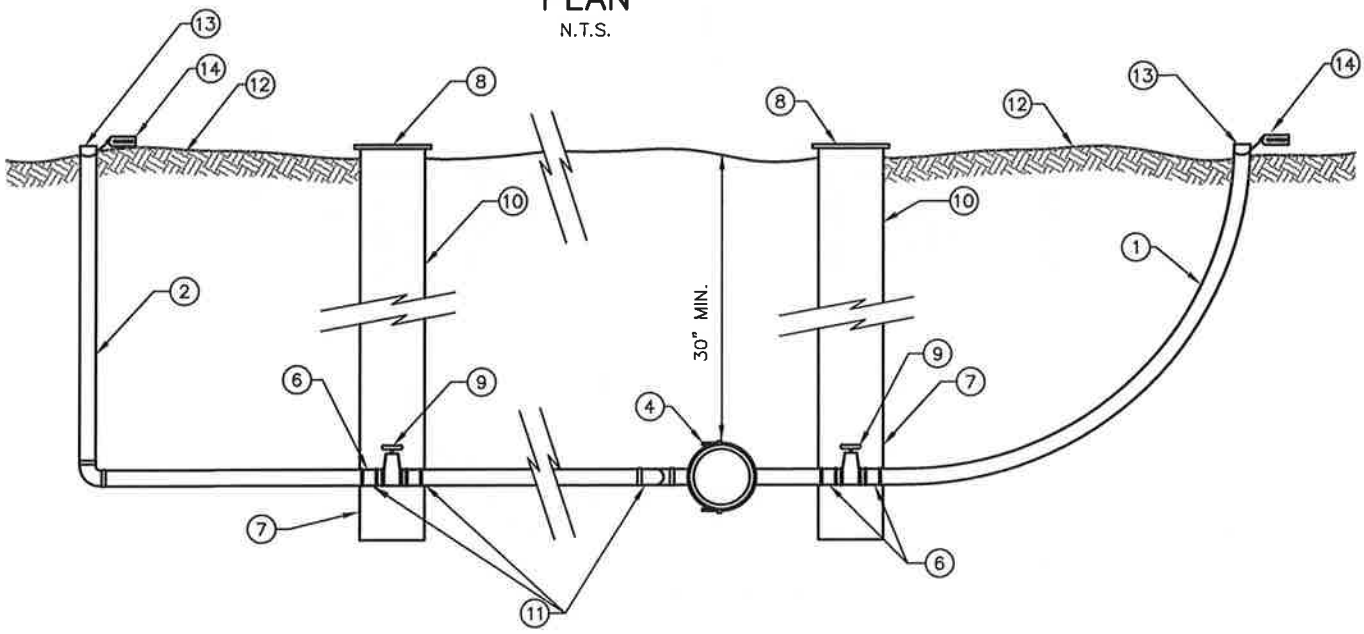
Pressure Irrigation

Standard Drawings

SD-901 – Pressure Irrigation Service with 4” PVC Valve Box
SD-902 – Pressure Irrigation Service w/Fiberglass Valve Box
SD-903 – Pressure Irrigation Riser Location



PLAN
N.T.S.



PROFILE
NTS

MATERIAL – PVC SERVICE LINE

THREADED STREET ELBOW–SCHD 80
PVC ADAPTER – SCHD 80 – SOLVENT WELD X MALE, IRON PIPE THREADED (MIPT).
PIPE – PVC – SCHD 40
VALVE – BRASS, 200 P.S.I. GATE VALVE, FEMALE IRON PIPE THREADED (FIPT).
BRASS ADAPTER – MIPT X INSERT.
STAINLESS STEEL CLAMPS – 2 FOR EACH INSERT.
POLYETHYLENE (PE) PIPE – 160 P.S.I..
PVC VALVE BOX RISER PIPE – PVC, ASTM D 3034, SDR35.
CAP.

MATERIAL – PE SERVICE LINE

BRASS ADAPTER – MIPT X INSERT.
STAINLESS STEEL CLAMPS – 2 FOR EACH INSERT.
POLYETHYLENE (PE) PIPE – 160 P.S.I..
VALVE – BRASS, 200 P.S.I. GATE VALVE, FEMALE IRON PIPE.
PVC VALVE BOX RISER PIPE.
CAP.
FITTINGS–COMPRESSION PACK JOINT TYPE.

NOTES:

(A) DRAWING AND MATERIAL LIST APPLICABLE TO 1" AND 1 1/2" SIZE SERVICE LINE.

(B) REFER TO SD 903 FOR RISER LOCATIONS AND REQUIRED SERVICE LINE SIZE.

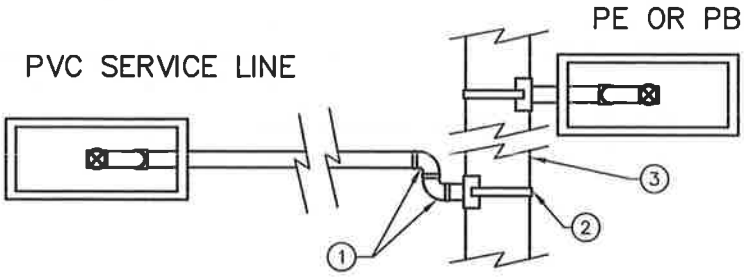
(C) "NON–POTABLE" TAG TO BE CLEARLY VISIBLE ON PIPE TERMINATION.

LEGEND

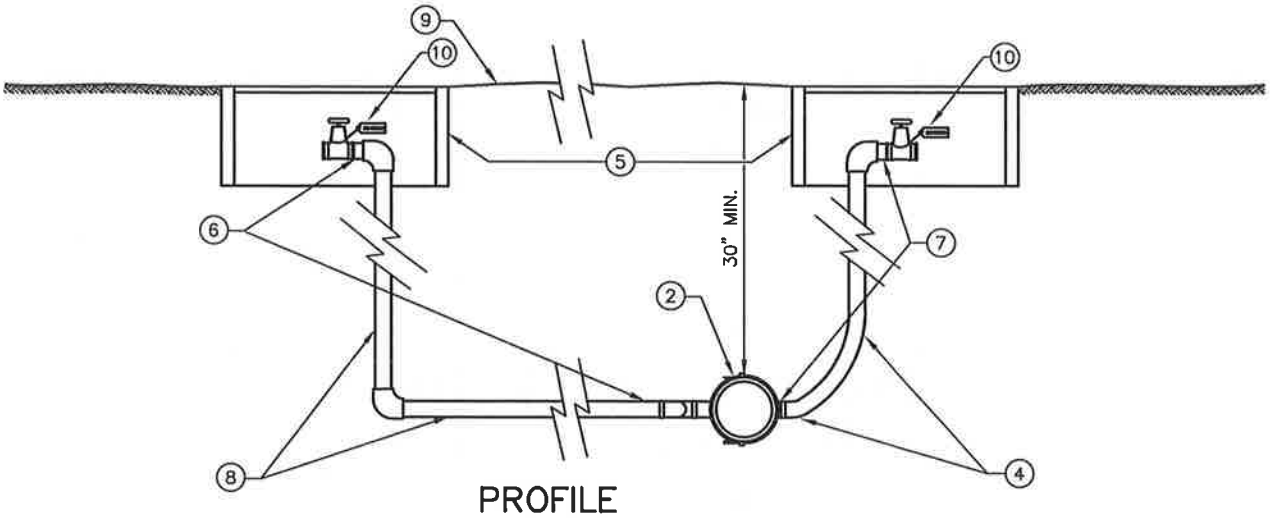
(1) PVC PIPE WITH CURB STOP VALVE IF SPECIFIED.
(2) PVC PIPE.
(3) 90° THREADED STREET ELBOW PVC.
(4) SADDLE W/FIPT.
(5) MAINLINE PIPE.
(6) MIPT X INSERT BRASS ADAPTER WITH TWO STAINLESS STEEL CLAMPS.
(7) SLOT SLEEVE TO FIT OVER VALVE AND SERVICE PIPE.
(8) 4" CAP.
(9) GATE VALVE.
(10) 4" X 36" VALVE SLEEVE.
(11) SOLVENT WELD X MIPT PVC ADAPTER.
(12) FINISHED GRADE.
(13) PLUG (TYPICAL).
(14) NON–POTABLE TAG.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PRESSURE IRRIGATION SERVICE WITH 4" PVC VALVE BOX	STANDARD DRAWING NO. SD–901



PLAN
NTS



PROFILE
NTS

MATERIAL – PVC SERVICE LINE

THREADED STREET ELBOW–SCHD 80.
PVC ADAPTER – SCHD 80 – SOLVENT WELD X MALE, IRON PIPE THREADED (MIPT).
PIPE – PVC – SCHD 40.
VALVE – BRASS, 200 P.S.I. GATE VALVE, FEMALE IRON PIPE, THREADED (FIPT).
REINFORCED FIBERGLASS VALVE BOX WITH LID.

MATERIAL – PE SERVICE LINE

BRASS ADAPTER – MIPT X INSERT.
STAINLESS STEEL CLAMPS – 2 FOR EACH INSERT.
POLYETHYLENE (PE) PIPE – 160 P.S.I..
VALVE – BRASS, 200 P.S.I. GATE VALVE, FEMALE IRON PIPE.
90° ELBOW–BRASS–INSERT X INSERT.
REINFORCED FIBERGLASS VALVE BOX WITH LID.
FITTINGS–COMPRESSION PACK JOINT TYPE.

LEGEND

(1) 90° THREADED STREET ELBOW PVC.
(2) SADDLE W/FIPT.
(3) MAINLINE PIPE.
(4) PE PIPE WITH CURB STOP VALVE, IF SPECIFIED.
(5) FIBERGLASS VALVE BOX.
(6) PVC ADAPTER.
(7) BRASS ADAPTER.
(8) PVC PIPE WITH CURB STOP VALVE, IF SPECFIED.
(9) EXISTING GROUND.
(10) NON–POTABLE TAG

NOTES:

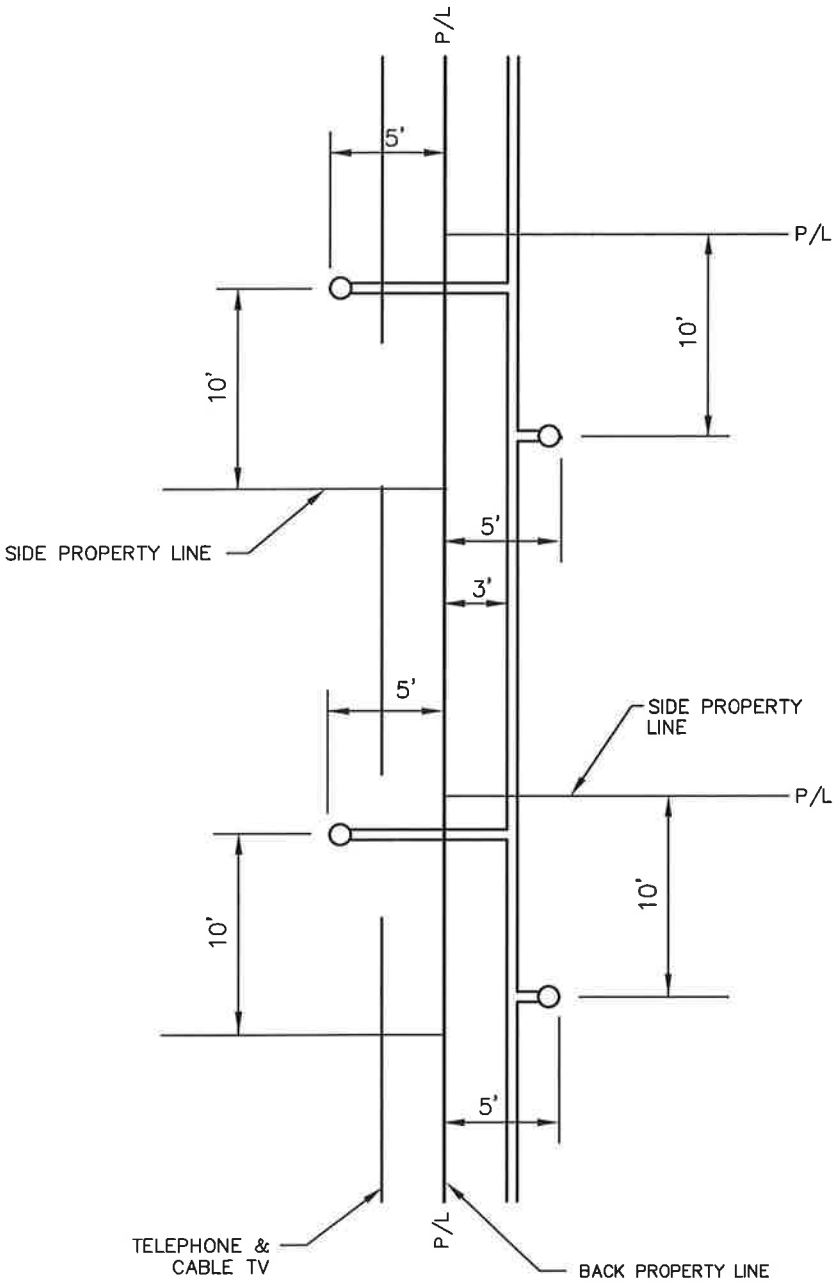
(A) DRAWING AND MATERIAL LIST APPLICABLE TO 1" AND 1 1/2" SIZE SERVICE LINE.

(B) REFER TO SD 903 FOR RISER LOCATIONS AND REQUIRED SERVICE LINE SIZE.

(C) "NON–POTABLE" TAG TO BE CLEARLY VISIBLE ON FAUCETS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PRESSURE IRRIGATION SERVICE W/FIBERGLASS VALVE BOX	STANDARD DRAWING NO. SD–902



NOTE:

(A) MINIMUM SERVICE LINE AND VALVE SIZE:

FOR LOTS UP TO 22,000 GROSS SQUARE FEET = 1".

FOR LOTS LARGER THAN 22,000 GROSS SQUARE FEET UP TO AN ACRE = 1 1/2".

(B) VERIFY SERVICE LINE LOCATION WITH ENGINEER AND LOCAL IRRIGATION AUTHORITY, PRIOR TO CONSTRUCTION.

(C) "NON-POTABLE" TAG TO BE CLEARLY VISIBLE ON IRRIGATION FAUCETS AND PRESSURE PIPE TERMINATIONS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PRESSURE IRRIGATION RISER LOCATION	STANDARD DRAWING NO. SD-903

ISPWC – DIVISION 1000

Construction Stormwater Best Management Practices (BMPs)

Section 1001 – Construction Site Management
Section 1002 – Construction Site Housekeeping
Section 1003 – Sediment Collection
Section 1004 – Runoff Diversion
Section 1005 – Slope Protection
Section 1006 – Storm Drain and Channel Protection
Section 1007 – Slope Stabilization

SECTION 1001

CONSTRUCTION SITE MANAGEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short-term construction site management including:

1. Timing of Construction.
2. Staging Areas.
3. Preservation of Existing Vegetation.
4. Clearing Limits.
5. Stabilized Construction Entrance.
6. Erosion Prevention of Temporary Roads.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 202 – Excavation and Embankment.

C. Section 205 – Dewatering.

D. Section 206 – Permanent Erosion Control.

E. Section 301 – Trench Excavation.

F. Section 305 – Pipe Bedding.

G. Section 306 – Trench Backfill.

H. Division 1000 – Construction Stormwater Best Management Practices.

1.3 REFERENCES

A. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices for Idaho Cities and Counties.

1.4 SUBMITTALS

A. Submit a Construction Site Discharge and/or Storm Water Pollution Prevention Plan for materials and methods to be installed or furnished under this section.

B. Submit manufacturer's certification that construction site management materials meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

D. When construction will disturb more than one acre, submit a Notice of Intent (NOI) to the Environmental Protection Agency and prepare and implement a Storm Water Pollution Prevention Plan, unless specified otherwise in the Contract Documents.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load construction site management materials in a manner which prevents damage.

PART 2 MATERIALS

2.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

PART 3 WORKMANSHIP

3.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

B. Unless otherwise specified in the Contract Documents, monitor, maintain, and remove BMPs in accordance with the Stormwater Pollution Prevention Plan and NOI.

PART 4 MEASUREMENT AND PAYMENT

4.1 Unless specifically indicated in the Bid Schedule, all labor, materials and equipment required for construction site management will be considered incidental to other Bid Items.

A. Sediment Control: By the lump sum for all work associated with erosion and sediment control including preparation and submittal of Sediment and Erosion Control Plans. Includes all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment Reference: 1001.4.1.A.1
2. Bid Schedule Description: Sediment Control…lump sum (LS).

4.2 Use the following unit price option as designated on the Bid Schedule. Includes all labor, materials and equipment for permitting, preparing, installing, maintaining, and removing temporary stabilized surfaces. If not separately indicated in the Bid Schedule, include this item in other Bid Items.

A. Staging Area: Per each as specified in the Bid Schedule. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1001.4.2.A.1
2. Bid Schedule Description: Staging Area…each (EA).

B. Stabilized Construction Entrance: Per each as specified in the Bid Schedule. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1001.4.2.B.1
2. Bid Schedule Description: Stabilized Construction Entrance… …each (EA).

C. Erosion Prevention of Temporary Roads: Per lump sum as specified in the Bid Schedule. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1001.4.2.C.1
2. Bid Schedule Description: Erosion Prevention of Temporary Roads… …lump sum (LS).

END OF SECTION

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SECTION 1002

CONSTRUCTION SITE HOUSEKEEPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short-term construction site housekeeping practices for storm water management including:

1. Dust Control.

2. Cover Materials and Equipment.

3. Spill Prevention and Control.

4. Vehicle/Equipment Washing and Maintenance.

5. Waste Management.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 202 – Excavation and Embankment.

C. Section 205 – Dewatering.

D. Section 206 – Permanent Erosion Control.

E. Section 301 – Trench Excavation.

F. Section 305 – Pipe Bedding.

G. Section 306 – Trench Backfill.

H. Division 1000 – Construction Stormwater Best Management Practices.

1.3 REFERENCES

A. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices.

1.4 SUBMITTALS

A. Submit a Construction Site Discharge and/or Storm Water Pollution Prevention Plan for materials and methods to be installed or furnished under this section.

B. Submit manufacturer's certification that construction site management materials meet or exceed specified requirements.

C. Submit manufacturer's installation instructions and maintain copy at the jobsite.

D. When construction will disturb more than one acre, submit a Notice of Intent (NOI) to the Environmental Protection Agency and prepare and implement a Storm Water Pollution Prevention Plan, unless specified otherwise in the Contract Documents.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load construction site management materials in a manner which prevents damage.

PART 2 MATERIALS

2.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

PART 3 WORKMANSHIP

3.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

B. Unless otherwise specified in the Contract Documents, monitor, maintain, and remove BMPs in accordance with the Stormwater Pollution Prevention Plan and NOI.

PART 4 MEASUREMENT AND PAYMENT

4.1 Unless specifically indicated in the Bid Schedule, all labor, materials and equipment required for construction site housekeeping will be considered incidental to other Bid Items.

END OF SECTION

SECTION 1003

SEDIMENT COLLECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short-term sediment collection for construction activities including:

1. Straw Bales.
2. Biofilter Bags.
3. Silt Fence.
4. Vegetative Buffer Strip.
5. Sediment Trap Basin.
6. Portable Sediment Tank.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 202 – Excavation and Embankment.

C. Section 205 – Dewatering.

D. Section 206 – Permanent Erosion Control.

E. Section 301 – Trench Excavation.

F. Section 305 – Pipe Bedding.

G. Section 306 – Trench Backfill.

H. Division 1000 – Construction Stormwater Best Management Practices.

1.3 REFERENCES

A. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices.

1.4 SUBMITTALS

A. Submit a Construction Site Discharge and/or Storm Water Pollution Prevention Plan for materials and methods to be installed or furnished under this section including design of sediment basins.

B. Submit manufacturer's certification that construction site management materials meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

D. When construction will disturb more than one acre, submit a Notice of Intent (NOI) to the Environmental Protection Agency and prepare and implement a Storm Water Pollution Prevention Plan, unless specified otherwise in the Contract Documents.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load construction site management materials in a manner which prevents damage or excessive exposure to sunlight and weather.

PART 2 MATERIALS

2.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

PART 3 WORKMANSHIP

3.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

B. Unless otherwise specified in the Contract Documents, monitor, maintain, and remove BMPs in accordance with the Stormwater Pollution Prevention Plan and NOI.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Includes all labor, materials and equipment for permitting, preparing, installing, maintaining, and removing temporary sediment collection facilities. If not separately indicated in the Bid Schedule, include this item in other Bid Items.

A. Straw Bales: Per linear foot Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1003.4.1.A.1.
2. Bid Schedule Description: Straw Bales…linear foot (LF).

B. Biofilter Bags: Per linear foot. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1003.4.1.B.1.
2. Bid Schedule Description: Biofilter Bags…linear foot (LF).

C. Silt Fence: Per linear foot measured on a horizontal basis along the centerline of the silt fence. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1003.4.1.C.1.
2. Bid Schedule Description: Silt Fence…linear foot (LF).

D. Vegetation Buffer Strip: Per linear foot measured on the horizontal centerline of the vegetation buffer strip. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1003.4.1.D.1.
2. Bid Schedule Description: Vegetation Buffer Strip…linear foot (LF).

E. Sediment Trap Basin: Per each as specified in the Bid Schedule. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1003.4.1.E.1.
2. Bid Schedule Description: Sediment Trap Basin…each (EA).

F. Portable Sediment Tank: Per each as specified in the Bid Schedule. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1003.4.1.F.1.
2. Bid Schedule Description: Portable Sediment Tank…each (EA).

END OF SECTION

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SECTION 1004

RUNOFF DIVERSION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short-term runoff diversion for construction activities including:

1. Temporary Swales.
2. Earth Dike.
3. Perimeter Dikes/Swales.
4. Temporary Berm (Sandbag).
5. Temporary Storm Drain Diversion.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 202 – Excavation and Embankment.

C. Section 205 – Dewatering.

D. Section 206 – Permanent Erosion Control.

E. Section 301 – Trench Excavation.

F. Section 305 – Pipe Bedding.

G. Section 306 – Trench Backfill.

H. Division 1000 – Construction Stormwater Best Management Practices

1.3 REFERENCES

A. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices.

1.4 SUBMITTALS

A. Submit a Construction Site Discharge and/or Storm Water Pollution Prevention Plan for materials and methods to be installed or furnished under this section.

B. Submit manufacturer's certification that construction site management materials meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

D. When construction will disturb more than one acre, submit a Notice of Intent (NOI) to the Environmental Protection Agency and prepare and implement a Storm Water Pollution Prevention Plan, unless specified otherwise in the Contract Documents.

E. Submit necessary Federal, State, and Local permits required for diversion or temporary stream crossing.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load runoff diversion materials in a manner which prevents damage or excessive exposure to sunlight and weather.

PART 1 MATERIALS

2.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

PART 2 WORKMANSHIP

3.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

B. Unless otherwise specified in the Contract Documents, monitor, maintain, and remove BMPs in accordance with the Stormwater Pollution Prevention Plan and NOI.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Includes all labor, materials and equipment for permitting, preparing, installing, maintaining, and removing temporary runoff diversion facilities and stream or channel crossings. If not separately indicated in the Bid Schedule, include this item in other Bid Items.

A. Temporary Swale: Per linear foot measured on a horizontal basis along the centerline of the temporary swale. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1004.4.1.A.1
2. Bid Schedule Description: Temporary Swale…linear foot (LF).

B. Earth Dike: Per linear foot measured on a horizontal basis along the centerline of the dike. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1004.4.1.B.1
2. Bid Schedule Description: Earth Dike, Type ____…linear foot (LF).

C. Perimeter Dike/Swale: Per linear foot measured on the horizontal centerline of the perimeter dike/swale. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1004.4.1.C.1
2. Bid Schedule Description: Perimeter Dike/Swale…linear foot (LF).

D. Temporary Berms (Sandbags): Per each as specified in the Bid Schedule. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1004.4.1.D.1
2. Bid Schedule Description: Temporary Berm (Sandbags)…each (EA).

E. Temporary Storm Drain Diversion: Per linear foot measured on along the centerline of the temporary storm drain diversion. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1004.4.1.E.1
2. Bid Schedule Description: Temporary Storm Drain Diversion… linear foot (LF).

END OF SECTION

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SECTION 1005

SLOPE PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short-term slope protection for construction activities including:

1. Temporary Mulching
2. Temporary Hydromulching
3. Temporary Geotextile
4. Temporary Matting
5. Pipe Slope Drain
6. Slope Roughening
7. Gradient Terracing
8. Retaining Walls

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing

B. Section 202 – Excavation and Embankment

C. Section 205 – Dewatering

D. Section 206 – Permanent Erosion Control

E. Section 301 – Trench Excavation

F. Section 305 – Pipe Bedding

G. Section 306 – Trench Backfill

H. Section 601 – Culvert, Storm Drain, and Gravity Irrigation Pipe

I. Division 1000 – Construction Stormwater Best Management Practices

1.3 REFERENCES

A. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices.

1.4 SUBMITTALS

A. Submit a Construction Site Discharge and/or Storm Water Pollution Prevention Plan for materials and methods to be installed or furnished under this section.

B. Submit manufacturer's certification that construction site management materials meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

D. When construction will disturb more than one acre, submit a Notice of Intent (NOI) to the Environmental Protection Agency and prepare and implement a Storm Water Pollution Prevention Plan, unless specified otherwise in the Contract Documents.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load slope protection materials in a manner which prevents damage or excessive exposure to sunlight and weather.

PART 2 MATERIALS

2.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

PART 3 WORKMANSHIP

3.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

B. Unless otherwise specified in the Contract Documents, monitor, maintain, and remove BMPs in accordance with the Stormwater Pollution Prevention Plan and NOI.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit price options as designated on the Bid Schedule. Includes all labor, materials and equipment for preparing, installing and maintaining temporary slope protection and soil stabilization required to prevent soil erosion. If not separately indicated in the Bid Schedule, include these items in other Bid Items.

A. Temporary Mulching: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1005.4.1.A.1
2. Bid Schedule Description: Temporary Mulching, Type____……square yard (SY).

B. Temporary Hydromulching: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1005.4.1.B.1
2. Bid Schedule Description: Temporary Hydromulching…square yard (SY).

C. Temporary Geotextile: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1005.4.1.C.1
2. Bid Schedule Description: Temporary Geotextile…square yard (SY).

D. Temporary Matting: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1005.4.1.D.1
2. Bid Schedule Description: Temporary Matting…square yard (SY).

E. Pipe Slope Drain: Per linear foot measured on a horizontal basis along the centerline of the pipe slope drain. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1005.4.1.E.1
2. Bid Schedule Description: Pipe Slope Drain…linear foot (LF).

F. Slope Roughening: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1005.4.1.F.1
2. Bid Schedule Description: Slope Roughening…square yard (SY).

G. Gradient Terracing: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1005.4.1.G.1
2. Bid Schedule Description: Gradient Terracing…square yard (SY).

H. Retaining Walls: By the linear foot for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1005.4.1.H.1
2. Bid Schedule Description: Gradient Terracing…linear foot (LF).

END OF SECTION

SECTION 1006

STORM DRAIN AND CHANNEL PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short-term storm drain and channel protection for construction activities and permanent channel protection including:

1. Gabions.

2. Riprap Slope and Outlet Protection.

3. Inlet Protection.

4. Check Dam.

5. Temporary Stream Crossing.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 202 – Excavation and Embankment.

C. Section 205 – Dewatering.

D. Section 206 – Permanent Erosion Control.

E. Section 301 – Trench Excavation.

F. Section 305 – Pipe Bedding.

G. Section 306 – Trench Backfill.

H. Section 601 – Culvert, Storm Drain, and Gravity Irrigation Pipe.

I. Division 1000 – Construction Stormwater Best Management Practices.

1.3 REFERENCES

A. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices.

1.4 SUBMITTALS

A. Submit a Construction Site Discharge and/or Storm Water Pollution Prevention Plan for materials and methods to be installed or furnished under this section.

B. Submit manufacturer's certification that construction site management materials meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

D. When construction will disturb more than one acre, submit a Notice of Intent (NOI) to the Environmental Protection Agency and prepare and implement a Storm Water Pollution Prevention Plan, unless specified otherwise in the Contract Documents.

E. Submit necessary Federal, State, and Local permits required for diversion or temporary stream crossing.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load construction site management materials in a manner which prevents damage or excessive exposure to sunlight and weather.

PART 2 MATERIALS

2.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

PART 3 WORKMANSHIP

3.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

B. Unless otherwise specified in the Contract Documents, monitor, maintain, and remove BMPs in accordance with the Stormwater Pollution Prevention Plan and NOI.

PART 4 MEASUREMENT AND PAYMENT

4.1 Unless specifically indicated in the Bid Schedule, all labor, materials and equipment required for storm drain and channel protection will be considered incidental to other Bid Items.

A. Gabions: By the cubic yard for the locations and type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1006.4.1.A.1
2. Bid Schedule Description: Gabions…cubic yard (CY).

B. Riprap Slope and Outlet Protection: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1006.4.1.B.1
2. Bid Schedule Description: Riprap Slope and Outlet Protection… …square yard (SY).

C. Inlet Protection: Per each as specified in the Bid Schedule. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1006.4.1.C.1
2. Bid Schedule Description: Inlet Protection…per each (EA).

D. Check Dams: Per each as specified in the Bid Schedule. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1006.4.1.D.1
2. Bid Schedule Description: Check Dams, Type ____…each (EA).

E. Temporary Stream Crossing: By the linear foot measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1006.4.1.E.1
2. Bid Schedule Description: Temporary Stream Crossing…linear foot (LF).

END OF SECTION

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SECTION 1007

SLOPE STABILIZATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Short-term slope stabilization for construction activities including:

1. Top Soiling.

2. Seeding.

3. Sodding.

4. Erosion Control Planting.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

B. Section 202 – Excavation and Embankment.

C. Section 205 – Dewatering.

D. Section 206 – Permanent Erosion Control.

E. Section 301 – Trench Excavation.

F. Section 305 – Pipe Bedding.

G. Section 306 – Trench Backfill.

H. Section 601 – Culvert, Storm Drain, and Gravity Irrigation Pipe.

I. Division 1000 – Construction Stormwater Best Management Practices.

1.3 REFERENCES

A. Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices.

1.4 SUBMITTALS

A. Submit a Construction Site Discharge and/or Storm Water Pollution Prevention Plan for materials and methods to be installed or furnished under this section.

B. Submit manufacturer's certification that construction site management materials meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

D. When construction will disturb more than one acre, submit a Notice of Intent (NOI) to the Environmental Protection Agency and prepare and implement a Storm Water Pollution Prevention Plan, unless specified otherwise in the Contract Documents.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load slope protection materials in a manner which prevents damage or excessive exposure to sunlight and weather.

PART 2 MATERIALS

2.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

PART 3 WORKMANSHIP

3.1 INCORPORATED BY REFERENCE

A. Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

B. Unless otherwise specified in the Contract Documents, monitor, maintain, and remove BMPs in accordance with the Stormwater Pollution Prevention Plan and NOI.

PART 4 MEASUREMENT AND PAYMENT

4.1 Unless specifically indicated in the Bid Schedule, all labor, materials and equipment required for slope stabilization will be considered incidental to other Bid Items.

A. Topsoiling: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1007.4.1.A.1
2. Bid Schedule Description: Topsoiling… square yard (SY).

B. Seeding: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1007.4.1.B.1
2. Bid Schedule Description: Seeding… square yard (SY).

C. Sodding: By the square yard measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1007.4.1.C.1
2. Bid Schedule Description: Sodding…square yard (SY).

D. Erosion Control Planting: Per each measured on a horizontal basis for the type specified. Includes all appurtenances not itemized in the Bid Schedule.

1. Bid Schedule Payment Reference: 1007.4.1.D.1
2. Bid Schedule Description: Erosion Control Planting,

Type ____, Size _____…per each (EA).

END OF SECTION

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ISPWC - DIVISION 1000

Construction Stormwater BMP's

Standard Drawings

Refer to Idaho Department of Environmental Quality's Catalog of Stormwater Best Management Practices at:

www.deq.state.id.us

ISPWC – DIVISION 1100

Traffic

Section 1101 – Traffic Signals and Appurtenances
Section 1102 – Street Lighting
Section 1103 – Construction Traffic Control
Section 1104 – Permanent Pavement Markings
Section 1105 – Permanent Traffic Signing

SECTION 1101

TRAFFIC SIGNALS AND APPURTENANCES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Traffic signal installation.

1.2 RELATED SECTIONS

A. Section 301 - Trench Excavation.

B. Section 306 - Trench Backfill.

C. Section 307 - Street Cuts and Surface Repairs.

D. Section 308 - Boring and Jacking.

E. Section 703 – Cast-in-Place Concrete.

F. Section 1103 – Construction Traffic Control.

G. Section 1104 – Permanent Pavement Markings.

H. Section 1105 – Permanent Signing.

1.3 REFERENCES

A. AASHTO T 99: Moisture-Density Relations of Soils Using a 5.5 pound Rammer and a 12-inch Drop.

B. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

C. Idaho Transportation Department Standard Specifications for Highway Construction, latest edition (herein referred to a “Standard Specifications”).

D. Idaho Transportation Department Standard Drawings.

E. Manual on Uniform Traffic Control Devices (MUTCD), latest edition.

F. National Electrical Code (NEC).

G. National Electrical Manufacturers Association (NEMA).

1.4 SUBMITTALS

A. Submit shop drawings and manufacturer’s cut sheets on all equipment and materials to be installed under this section.

B. Provide submittals with contractor's shop stamp stating that he has reviewed the products and that they conform to the specifications.

C. Submit manufacturer's certification of materials and guarantees for any materials purchased, prior to request for payment.

D. Approval of shop drawings does not constitute final acceptance.

E. Submit warranty for all supplied material and workmanship for a period of one year from final acceptance. The warranty must state that the products supplied were free of defects and suitable for the uses set forth in the specifications.

1.5 PROJECT RECORD DOCUMENTS

A. Provide accurate drawings showing number and size of all components installed.

B. Provide accurate drawings showing all electrical equipment and field wiring diagrams.

C. Provide a copy of the signal controller program output showing phasing and timing setting for the signal.

1.6 DELIVERY, STORAGE AND HAULING

A. Deliver, store and handle all materials in accordance with the manufacturer's recommendations.

B. Protect all products from damage and theft.

PART 2 PRODUCTS – Refer to Standard Revisions and/or Special Provisions.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS.

A. Verify authorization of Engineer to disrupt traffic for a maximum of five minutes during installation of mast arms (weekdays between 9 am and 2 pm).

B. Obtain necessary permits.

C. Keep copy of electrical permits from the State of Idaho and applicable municipality onsite.

D. Verify and maintain required clearances for controller cabinets, poles, and mast arms.

E. Examine materials for defects or damage. Repair or replace defective materials at no cost to Owner.

3.2 LOOP INSTALLATION

A. Connect loop wires and loop lead-in at junction box.

B. Solder splices between loop wires and loop lead-in.

C. Use heat-shrink splice kit with appropriate sealant (no epoxy splices) or approved re-enterable equal for encapsulating the spice between loop wires and loop lead-in wire.

D. Install during conditions of zero precipitation and when pavement temperatures are between 40^0 F and 100^0 F.

E. Clean roadway of surface debris and standing water.

F. Mark the location of all loop detectors, before any saw cutting, for approval by the Engineer.

G. Confirm depth of pavement where loops are to be installed and consult engineer if pavement thickness is inadequate.

H. Sawcut to uniform depth in one continuous pass. Minimum width: 1/8 inch greater than the width of loop wires. Depth as to allow for 1/4 inch below wires and 1 inch above wires.

I. Expand sawcut as needed for junctions, cracks, or joints in pavement.

J. Allow wire to form a small “S” through cracks or expansion joints to accommodate future pavement movement.

K. Clean sawcuts and conduit with compressed air or blunt object.

L. Smooth sawcut of rough edges.

M. Bore under any existing curbing and route lead-in wire in conduit.

N. Place loop wires in sawcut without binding against pavement or any tension on wires.

O. Place each turn of wire into the sawcut in the same direction.

P. Coil at least 10 feet of extra wire at the junction box. Tag end of wire to designate “to” loop.

Q. Allow sufficient wire to extend past junction box by 10 feet and tag end to designate “from” loop.

R. Melt rubberized asphalt with a double boiler type melting unit. Temperature of heat transfer medium not to exceed 475^0 F.

S. Apply hot-melt sealant with pressure feed applicator in two equal lifts to pavement surface.

T. Test each loop for continuity and inductance. Induced voltages on the loop wires shall be less than 1 volt at all locations. Inductance of loops and loop detectors shall be within 20% of specifications. Resistance of loop detector wire, associated lead-in and splices not to exceed 7 ohms for any one loop.

U. Record test results and submit to the Engineer.

V. Connect loop circuits to appropriate digital, self-timing loop detector amplifier and test to ensure sensitivity at controller.

3.3 CONDUIT INSTALLATION

A. Install to locations shown on the plans.

B. Separate conduit by a minimum of 3 inches.

C. Surround conduit with a minimum of 3 inches of clean sand.

D. Use standard manufactured elbows, bends, or couplings.

E. Use greatest radius possible when bending is needed. Do not allow flattening or kinking of conduit. Use 8 foot minimum radius for fiber optic cable.

F. Attach or tape locating wire on a 10 to 13 feet interval to prevent a separation of more than 6 inches.

G. Maintain minimum burial depth 30 inches or the requirement of NEC, whichever is greater.

H. Seal conduit with the required plug, per manufacturer's recommendation using care to encase conductors or cables to achieve a secure seal.

I. Arrange conduit that enters the controller cabinet foundation to the front of the cabinet for accessibility.

J. Trenching and backfill per Division 300.

K. Backfill with lean concrete where required.

3.4 INSTALLATION OF SIGNAL CABLE AND CONDUCTORS

A. Extend cable minimum of 3 feet up into signal pole base.

B. Run individual cables from signal and pedestrian heads into pole base and splice with 12 conductors.

C. No splicing of traffic signal conductor is permitted unless otherwise indicated on the Contract Documents.

D. Trim and cable together all wiring inside controller cabinet to make a neat and clean installation.

E. Terminate all wires at a terminal block with an open end, crimp style solderless terminal.

F. Install terminals with a tool designed for specific purpose.

G. Color code terminals to wire.

H. Install 1/8-inch minimum of insulation under crimp.

I. Label unspliced wired that pass through junction boxes.

3.5 INTERCONNECT CABLE INSTALLATION

A. Terminate interconnect cable on a terminal strip within the designated controller cabinet.

B. No spinning of interconnect cable.

C. General corridor for interconnect conduit is south or west side of roadway.

3.6 JUNCTION BOX INSTALLATION

A. Mark location of junction boxes for approval of Engineer. No junction box to be in the travel way, handicapped ramp, or driveway, or interfere with any other previous or relocated installation.

B. Install a minimum 6-inch depth of ¾ inch minus crushed aggregate base for drainage within sidewalk area.

C. Set lid flush frame and with surrounding finished grade.

D. Neatly upsweep entering conduit and terminate not less than 2 inches nor more than 4 inches above the bottom of the box.

E. Space for interconnect junction boxes at each intersection or a maximum of 450 feet apart.

F. Separate interconnect from signal head and illumination conduits except where the connection is made to the controller cabinet.

3.7 STEEL SIGNAL AND LUMINAIRE POLES

A. Install poles in compliance with the manufacturer's recommendations, NEC, Idaho State Utility, and local requirements.

B. Check separation with power lines. Use davit poles for power line conflicts.

C. Install with mast arm perpendicular to the centerline of the roadway from which it is stationed, unless otherwise noted on the plans.

D. Install on leveling nuts and washers, secured to the anchor bolts, and with nuts and washers on the top of the base flange.

E. Adjust leveling nuts so the shaft opposite the load is plumb.

F. Fill space between concrete base and bottom of the pole flange with dry pack mortar (1:3 mixture of cement and fine sand) then trowel to the contour of the pole flange.

G. Insert plastic 1/2-inch diameter hose through mortar to provide drainage from the pole interior.

H. Prepare any metal exposed during installation by removal of loose or cracked coatings and wire brushing.

I. Paint all exposed metal, after preparation, with two coats of zinc rich primer and paint to match existing color.

3.8 SIGNAL HEAD INSTALLATION

A. Cover vehicle heads, pedestrian heads, and pedestrian push buttons with opaque material between installation and signal turn-on.

B. Mount using approved brackets and clamp kits.

C. Aim highest intensity of red lens at a point four times the posted speed limit from the stop bar (using mph and feet).

D. Position vehicular and pedestrian heads as shown on the plans.

E. Check clearances. The bottom of the housing for signal heads on mast arms shall be less than 19 feet and more than 17 feet above the pavement grade at the centerline of the street.

3.9 PEDESTRIAN PUSHBUTTON INSTALLATION

A. Position pushbuttons generally so that sign points at the crosswalk for which button is intended to serve.

B. Securely fasten pushbuttons and signs to poles by means of bolts, as shown on the standard detail.

3.10 LUMINAIRE INSTALLATION

A. Date lamps with the month and year prior to installation in the socket.

3.11 CONCRETE FOUNDATION

A. Dimensions specified in the Contract Documents and Standard Drawings.

B. Notify local One Number Locator Service for utility locations.

C. Confirm foundation locations with the Engineer.

D. Pothole for signal pole locations to a depth adequate for intended foundations at intended locations.

E. Avoid damage to existing utilities. Replace or repair to original condition at no cost to Owner.

F. Backfill at Engineer's direction if conflicts exist. Compact 12 inch lifts to 95% maximum density in accordance with AASHTO T99 with ¾ inch minus crushed aggregates.

G. Remove concrete sidewalk, when necessary, to existing expansion joints. Replace sidewalk per Division 700.

H. Anchor bolt pattern shall match item to be installed to mast arm will be properly aligned.

I. Locate all conduit required including spare 2 inch conduit.

J. Place and finish concrete per Division 700.

K. Foundations to cure for two-week minimum period.

L. Clean concrete from exposed portions of conduit and anchor bolts promptly after placement.

M. Concrete to be Class 3000 psi.

N. Place reinforcing steel as shown on the plans or standard details.

O. Place foundation flush with finished sidewalk grade, if foundation is adjacent to sidewalk.

P. Place concrete in sono tube for signal pole bases.

Q. Notch sidewalk around foundation with 3/4 inch expansion joint where sidewalk and foundation are in contact.

R. Controller foundation to conform to Standard Drawings.

S. Pour controller and service cabinet foundation as one piece.

3.12 CONTROLLER CABINET INSTALLATION

A. Orient cabinet door away from traffic.

B. Assignment for controller cabinet and field terminal numbers as shown in the Contract Documents.

C. Label field terminals, as numbered on the Plans.

D. Show a cabinet wiring schematic with field wiring numbers where the terminal strip is illustrated.

E. Permanently label every module or device stating the component's function. For example, each loop detector amplifier to be labeled so as to indicate the loop numbers of the loop detectors connected to it and what phase the output of the amplifier is applied to.

F. Attach a waterproof envelope (with side access) to the inside cabinet door. Enclose two complete sets of schematic and manuals for each assembly and sub-assembly located in the cabinet with one set of "as-constructed" wiring diagrams and drawings for the overall construction project

3.13 EMERGENCY VEHICLE PREEMPTION INSTALLATION

A. No splicing allowed between the Opticom detector and the controller cabinet.

B. Install wiring from controller cabinet to the end of the mast arm on all projects whether Opticom is installed or not.

3.14 SERVICE CABINET INSTALLATION

A. Provide a copy of the wiring diagram within a plastic holder mounted inside the service cabinet.

B. Provide screw-fastened nameplates, white letters on a black background, for each control component.

C. Arrange wiring so that any component may be removed without disconnection wiring, except the lead.

D. Mark all wiring with a permanent, indelibly marked, clip sleeve wire marker.

E. Control wire to be seven-strand No. 14 AWG THHN.

F. All wiring to conform to NEMA Class II C.

G. Connect illumination components to 240 vac, 60 Hz, unless otherwise noted.

H. Connect traffic signal components to 120 vac, 60 Hz, unless otherwise noted.

I. Photocell to be mounted inside the service cabinet.

J. Coordinate with power company for service installation.

K. Service cabinet to be inspected by the State Electrical Inspector.

3.15 GROUNDING

A. Grounding shall conform to NEC requirements and as shown in Standard Drawings or the Plans. The more stringent requirements shall govern.

B. Secure, mechanically and electrically, all metallic appurtenances containing electrical conductors to form a grounded continuous system.

C. Include equipment grounding conductor as noted in the Plans and Standard Drawings.

D. Install two service ground rods at each electrical service installation and each separately derived power source.

E. Locate service ground rods at least 6 feet apart.

F. Ground neutral only at the service.

G. Ground neutral and conduit at the service point per the applicable Code.

H. Connect the first service ground rod to a continuous grounding electrode conductor running to the neutral service bus.

I. Connect the second service ground rod to the same continuous grounding electrode conductor.

J. Make connections of grounding electrode conductor to grounding electrode with two approved ground clamps.

K. Use approved bushings and clamps for all grounding of equipment grounding conductors in system.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Traffic Signal: By the lump sum for all work included in the Contract Documents or specified herein. Work to include the sum total of all items for a complete system to be furnished, installed, and tested, including full compensation for all costs involved in furnishing all labor, materials, and equipment necessary or incidental to the construction of a complete new signal system as show in the Contract Documents. Work to include sawcutting, excavation, backfilling, concrete foundations, conduit, wiring, loops, controller and service cabinets, signal heads, signal poles, mast arms, emergency preemption devices, restoration of facilities destroyed or damaged during construction, and for making all required tests. All additional materials and labor not shown in the Contract Documents, or called for herein, and which are required to complete the specified system are incidental to the construction and included in the lump sum contract price.

Owner to pay permit costs and costs to utility to initiate electrical service.

1. Bid Schedule Payment Reference: 1101.4.1.A.1.
2. Bid Schedule Description Traffic Signal …….Lump Sum (LS).

END OF SECTION

SECTION 1102

STREET LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Materials and installation of street lights.

1.2 RELATED SECTIONS

A. Section 301 – Trench Excavation.

B. Section 305 – Pipe Bedding.

C. Section 306 – Trench Backfill.

D. Section 307 – Street Cuts and Surface Repair.

E. Section 308 – Boring and Jacking.

F. Section 703 – Cast-in-Place Concrete.

1.3 REFERENCES

A. AASHTO T 99: Moisture-Density Relations of Soils Using a 5.5 pound Rammer and a 12-inch Drop.

B. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

C. National Electrical Code (NEC).

D. Idaho State Electrical Code.

E. City and Local Agency Codes.

1.4 SUBMITTALS

A. Submit shop drawings and manufacturers' cut sheets for materials to be installed under this section.

B. Submit manufacturer's certification that materials meet or exceed specified requirements.

C. Submit manufacturers' installation instructions and maintain copy at the jobsite.

D. Submit warranty for all supplied materials and workmanship for a period of one year from final acceptance. The warranty must state that the products

supplied were free of defects and suitable for the uses set forth in the Specifications.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record locations of constructed street lights and other encountered utilities in relation to existing permanent benchmarks.

B. Provide copy of record documents to owner prior to issuance of substantial completion. Show number and size of all components installed, including field wiring diagrams.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle materials in accordance with the manufacturer's recommendations, to prevent shock, damage or excessive exposure to sunlight and weather.

1.7 GENERAL RESTRICTIONS

A. Contact local utility company for power location and installation requirements. All connections to a utility company facility shall be done by the utility.

B. No privately owned electrical systems, sprinkler irrigation systems, outlets, or area lighting will be allowed to connect to any public street light systems.

1.8 INSPECTIONS

A. Street light installation inspections will be required for the concrete base reinforcing for poles with concrete bases.

B. Visual confirmation of the backfill compaction around the pole base.

C. The conduit trench installation shall be inspected for the depth of trench and verification of the bedding suitability and placement.

D. The final inspection shall be to verify the pole is installed plumb and that the wiring in the pole and junction boxes conform to these specifications.

PART 2 MATERIALS

2.1 GENERAL

A. All materials to have Underwriter Laboratories, Inc. seal of approval or meet the requirements of the National Electrical Manufacturer's Association, as appropriate.

B. Conform to the National Electrical Code and meet all local codes and requirements of the connecting utility.

2.2 JUNCTION BOXES

A. For roadway area, provide a reinforced concrete box approved for roadway installation with a bolt down galvanized lid and frame.

B. For non-roadway areas, provide junction boxes per plans or if no box is specified provide the approved concrete box, composite or a plastic box, UL approved, with a bolt-down lid marked “electrical”.

2.3 FUSE HOLDERS

A. Insulated fuse holders (installed at the base of each metal or fiberglass pole), one per each ‘hot’ line.

1. Fuse Holder and Insulating Boot: In-line, waterproof, SEC Model 1791-DF or SEC Model 1791-SF or approved substitution.

B. Insulated fuse holders (in fused junction box), one per each ‘hot’ line.

1. Fuse Holder and Insulating Boot: In-line, waterproof, SEC Model 1791-DF or SEC Model 1791-SF or approved substitution.

2.4 CONDUCTOR

A. Conductors shall be per plans when provided and electrical codes in Part 1.3 References but not less than the following:

B. Underground wire.

1. Minimum standard for fuse system to power source: No. 6 AWG copper, Type THWN- 600 volt, insulated.

2. Wires to be color-coated per NEC Code. Phase tape not acceptable.

C. Overhead Wire.

1. General: No. 6 AWG duplex with an ACSR neutral messenger.

2. Overhead installation only: Aluminum wire equivalent to copper wire will be allowed.

D. Pole wiring.

1. Between power source and the over-current protection source (located in the pole). Minimum No. 6 AWG THWN insulated copper wire.

2. Between over-current protection fuse and luminaire: Minimum No. 10 AWG THWN insulated copper wire.

2.5 CONDUIT

A. Above Ground.

1. Galvanized metal conduit: UL approved.

2. Schedule 40 PVC conduit: UL approved, 1 inch minimum diameter (ground level to disconnect box), 3/4 inch minimum diameter (disconnect box to luminaire).

B. Underground Conduit.

1. Schedule 40 PVC conduit: UL approved, 1 inch minimum diameter.

2. Standard manufactured bends of no less than 45 degrees.

3. Locating wire only required for empty (spare) conduit.

2.6 PHOTOCELLS

A. Photoelectric (PE) controls to be twist lock type base with a label to mark installed and removed dates.

B. Outdoor Lighting Photoelectric Controls (OLPC) to be of a solid state crystal sensing type with inverted turn-on and turn-off design. Designed to turn-on at 3.0 (FC) 32.3 lux $\pm$ 20%, turn-off value will be 60% of the turn-on value (1.8 (FC) 19.4 lux $\pm$ 20%). Designed to operate in 105 to 285 voltage range. Output control relay to have a 45 second time delay to prevent false turn-off from momentary brightness. Output relay rated at 1800 VA, 15 amps for all HID lamps with a fail safe (fail-on) design. OLPC to have a built-in MOV for lightning and transient/surge protection. OLPC to have secondary zenier diodes and transient filters. Circuit board to be properly coated to prevent corrosion. OLPC cover to be made of blue (ANSI color coding of 105-285 voltage range) hi-impact Noryl plastic, UL approved break resistant and flame retarding material. OLPC window to be acrylic with proper UV stabilizers to prevent discoloration. OLPC to conform to all IES street lighting standards and the ANSI C 136.10 specification for twist lock photo-control devices.

2.7 DISCONNECT BOXES (as required by governing agency)

A. Boxes shall conform to National Electrical Code (NEC), Article 370-15.

B. Overload protective devices allowed under NEC, Article 240.

C. Grounded as allowed in NEC Article 250-81 through Article 250-155.

2.8 MAST ARMS FOR WOOD POLES

A. Galvanized steel pipe bracket to be 2-inch diameter (General Electric Cat. No. RBSCWH6X2GV or equal).

B. Length to be 6 feet unless otherwise specified on plans.

2.9 WOOD POLES

A. Contact local agency controlling street light installations for height, fixture, burial depth, and mast arm requirements.

B. Meet or exceed the ANSI 05.1-1992, Class 6.

C. Meet Federal Specification TT-W571J for pressure treatment.

2.10 METAL POLES

A. All poles must be wind-load rated in accordance with AASHTO's Standard Specification for Structural Supports for Highway Signs, Luminaries, and Traffic Signal Dated 2013 or latest version thereof. The wind load Rating Number is calculated on the Allowable Project Area (corrected for shape) at an 80 mph steady wind plus a 1.3 Gust Factor.

B. Pole Finish:

1. Concrete base mounted poles: Hard coated anodic anodized or baked enamel.
2. Direct burial poles: Electrostatic powder coated, fusion bonded, externally and internally to one foot above bury depth.

C. Pole installation to be an approved direct burial pole or be installed with a concrete base (see paragraph 2.14). See Standard Drawings SD-1109, SD-1117, SD-1119.

D. Pole height to be as shown on the Contract Documents measured from finished grade.

E. Use only fixtures and mast arms compliant with manufacturer's recommendations.

2.11 FIBERGLASS POLES

A. All poles must be wind-load rated in accordance with AASHTO's Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signal, dated 2013 of latest version thereof. The wind-load Rating Number is calculated on the Allowable Project Area (corrected for shape) at an 80 mph stead wind plus a 1.3 Gust Factor.

B. Use only fixtures and mast arms compliant with manufacturer's recommendations.

C. Pole installation to be an approved direct burial pole or be installed with a concrete base (see paragraph 2.14). See Standard Drawings SD-1109, SD-1117, SD-1119.

2.12 HISTORICAL POLES

A. Historical Pole and light fixtures shall be per plans and local agency standards. In the absence of agency or plan requirements the contractor shall use Holophane, Granvill Series, 150 Watt, High Pressure Sodium Light Fixtures or an approved substitutes.

B. Historical Poles to meet the materials, design, surface texture, and color approved by the local agency controlling street lights.

2.13 BOLLARDS

A. Bollard lighting may be approved in special cases for pedestrian pathways when overhead lighting cannot be utilized.

2.14 CONCRETE POLE BASES

A. Concrete to be Class 3000 psi meeting the requirements of Section 703 – Cast-in-Place Concrete.

B. Steel Reinforcement to be deformed bar conforming to Section 702 – Concrete Reinforcement.

C. Pole anchors to be conform to requirements stipulated by pole manufacturer.

D. Base dimensions and construction shall conform to Standard Drawing SD-1109.

2.15 PREFABRICATED BASES

A. Prefabricated bases for historical poles will be allowed with approval of the local agency.

2.16 SERVICE PEDESTAL

A. Refer to Section 1101- Signal if street lighting power service is combined with Signal Service.

B. Street Lighting Only Service:

1. Per the ITD Qualified Product List, (Meyers Power Products MEUG20-M100 W/TB-ITD (MOD) Type1 or 2 depending on metering requirements)

2. Paint per plans and specifications. White powder coat finish in accordance with ASTM B-117 or as directed by agency.

3. Equipped with a test switch to override photo electric control.

4. Cabinet supplied with a pad mount base available for concrete foundation installation.

5. Cabinet supplied with a meter base as recommended by the manufacturer.

2.17 LIGHT FIXTURES

A. Recommended fixtures wattage or equivalent for LED: 100 Watt residential, 100 or 150 Watt historical, 200 or 250 Watt residential/collector, and 250/400 Watt general roadway lighting or as required by local agency.

B. LED or Multi-tapped ballast for voltage, high pressure sodium light source.

C. LED Fixtures shall have Independent LM-79 and LM-80 test results of luminaire, Min lamp life of 50,000 hours.

D. LED lighting color temperature between 4100ºK to 4400ºK.

E. Fixtures to have E.I.S. full cutoff distribution reflector.

F. Acrylic or glass lens with internal refractor providing an E.I.S. Type III distribution.

G. Fixture type and style as required by local agency.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify pole excavation location and depth matches plans prior to pole installation.

B. Verify that required clearances are available:

1. Transformers: 10 feet. front, 2 feet. side and back. See SD-1122.

2. Primary or Secondary Power Wires: 10 feet vertical and horizontal. See SD-1122.

3. Power Junction Box: 3 feet.

4. Curbing: 2 feet min., 6 feet max. from face of curb.

5. Structures: in accordance with National Electrical Safety Code.

6. Fire Hydrants: 10 feet side, 3 feet to the front.

7. Roadways: 18 feet vertical clearance for wires.

C. Examine pole and fixtures for defects or damage.

D. Verify pole, fixtures, electrical wiring, concrete, and materials delivered to the site meet the requirements of the Contract Documents.

E. Keep copies of electrical permits from the State of Idaho or the applicable municipality on-site.

3.2 JUNCTION BOX INSTALLATION

A. Install to locations as shown on the plans and at the power source (per SD-1117 or SD-1119). If not shown, space equidistant not to exceed 400 feet along straight conduit runs occur, at sharp bends, wire splices, or where direct burial and conduit junctions occur.

B. Excavate for box and aggregate foundation.

C. Install the junction box on 6 in. bed of compacted ¾-inch crushed aggregate base that extends 4 inches beyond the exterior of the box sides.

D. Do not install in any driveway or travel way unless box is fully rated for traffic.

E. Place top of junction box flush with surrounding ground, concrete, or pavement.

3.3 WIRE OR CONDUCTORS

A. Splice underground wire only by means of approved connectors.

B. Splice underground wire only at pole bases or junction boxes.

C. Coil an additional 27 to 36 inches of wire at each connection point with transformer or junction box.

D. Attach overhead wire to the pole top and bond to the pole ground.

E. For overhead installation: Attach to the top of the new pole a complete coil of wire, long enough to span the distance between the new light and the power connection point.

3.4 CONDUIT INSTALLATION

A. Above Ground: All conduits required to be strapped, connected, or fastened to the pole at a minimum 5-feet interval.

B. Underground:

1. Raceways: Separate conduits by minimum of 3 inches.

2. Bedding: Surround conduit with a minimum of 3 inches clean sand.

3. Bends: Use standard manufactured elbows, bends, or couplings.

4. Kinking: Do not allow kinking or flattening of conduit if bending, use greatest radius possible.

5. Locating Wire: Attach or tape locating wire to the outside of conduit on a 10- to 13-foot interval so not to allow a separation of more than 6 inches. Locating wires only repaired for conduit in which the conductors are not installed in conjunction with the conduit.

6. In landscaped areas: Minimum burial depth is 18 inches.

7. In travel way: Minimum burial depth is 30 inches or the requirement of the NEC, whichever is greater.

8. At installations where a street light is to be installed at a later date; provide nylon or other non-biodegradable conductor pull cord and seal ends of the conduit to prevent moisture and/or debris from entering.

3.5 PHOTO CELL INSTALLATION

A. Mark date on every new or replacement installation.

B. Install to the manufacturer's recommendations.

C. Test Photoelectric Cell in the presence of the Engineer.

3.6 DISCONNECT BOXES

A. Mount at 10 feet minimum height and maximum height of 3 feet from top of pole.

B. Place box, conduit, and fittings so to prevent moisture from entering or accumulating the box, conduit, and fittings.

C. Confirm adequacy of overload protective devices (NEC, Article 240).

D. Ground disconnect box per NEC Article 250-81 through 250-155.

3.7 GROUNDING

A. Drive an 8-foot, 5/8-inch iron or steel rod 7.5 feet into the ground next to the pole.

B. Attach No. 6 AWG bare copper wire fastened to the pole at 5-foot intervals from the ground rod to the disconnect box, mast arm, and fixture.

C. Grounding per NEC, Article 250.

3.8 CONCRETE POLE BASES

A. Excavate pole base foundations to neat lines where soil conditions permit.

B. Place metal reinforcement and anchors per the Standard Drawing SD-1109.

C. Engineer to observe reinforcement and anchors prior to placement of concrete. Provide 48 hours notice.

D. Place and finish concrete per ISPWC Division 700.

E. Concrete forming will be constructed per ISPWC Division 700.

F. Base dimensions and installation details shall conform to Standard Drawings SD-1109, SD-1116 and SD-1117.

G. Place and compact required backfill per ISPWC Division 300, Section 306.

3.9 POLE INSTALLATION

A. Excavate pole foundations to neat lines when soil conditions permit.

B. Install wood poles in accordance with Standard Drawings SD-1118. Install metal or fiberglass poles in accordance with SD-1109, SD-1116, SD-1117 and SD-1119.

C. Historical poles to be installed in accordance with standard drawings supplied by governing agency.

D. All poles shall be installed meeting the power company required clearances as shown on Standard Drawing SD-1122.

E. Street light connections to the power source shall be done by the power company.

F. Backfill and Compaction Requirements:

1. Backfill voids within 6 inches of the pole with crushed aggregate conforming to Section 802, Type I. Compact the backfill material to 95% maximum dry density in accordance with AASHTO T99. Use of sonotube forms to contain the imported material is acceptable, but is not required.

2. Backfill other disturbed soils in accordance with Section 204. Compact the backfill material to 92% maximum dry density in accordance with AASHTO T99.

G. Assure minimum burial depth (wood poles):

Mounting Height	Burial Depth	Pole Length
25 feet	5 feet, min	30 feet
29.5 feet	5.5 feet, min	35 feet

H. Install direct burial poles in accordance with SD-1119. The insertion hold to be a minimum diameter of 12 inches. (See paragraph F for compaction requirements.)

I. Set pole plumb and true, mast arm and fixture perpendicular to public roadway or as approved by the Engineer.

J. Install prefabricated base, if applicable, per manufacturer's recommendations.

3.10 LUMINAIRE INSTALLATION

A. Install luminaire to manufacturer's recommendations.

B. Mark lamps with a month and year on the brass screw base to denote an installation date.

C. Test light in presence of the Engineer.

3.11 SERVICE PEDESTAL

A. Service pedestal shall be installed in accordance with Standard Drawing SD-1127.

B. Service pedestal wiring shall conform to the wiring diagrams shown on Standard Drawings SD-1125 and SD-1126 as directed by the Engineer.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated on the Bid Schedule. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Street Light: Measurement and payment per each for the type and size of pole, mast arm and fixtures specified on the Contract Documents. Includes materials, labor, and equipment needed for the excavation, foundation, pole, internal pole wiring, wiring, conduit, mast arms, fixtures, junction boxes, disconnect boxes, fuses, luminaires, connections, cabinets, fittings, connections and all appurtenances not itemized in the Bid Schedule to produce a fully functional street light.

Owner to pay permit costs and costs to initiate electrical service.

1. Bid Schedule Payment Reference: 1102.4.1.A.1.
2. Bid Schedule Description: Street Light Type _____… per each (EA).

B. Payment for relocation of an existing light pole per each, all materials to be reused at new location.

1. Bid Schedule Payment Reference: 1102.4.1.B.1.
2. Bid Schedule Description: Relocate Street Light Type _____… per each (EA).

C. Payment per each for installing a light pole as an intermediate line pole.

1. Bid Schedule Payment Reference: 1102.4.1.C.1.
2. Bid Schedule Description: Intermediate Pole Type _____… per each (EA).

D. Install Wire or Conductors: Measurement and payment on a per horizontal linear foot basis for type (underground or above ground) of the wire following the alignment of the wire provided and installed from the centerline of the pole to power source, including connections in accordance with the Contract Documents.

1. Bid Schedule Payment Reference: 1102.4.1.D.1
2. Bid Schedule Description: Wire/Conductor, Type _____… per linear foot (LF).

E. Install Conduit: Measurement and payment on a per horizontal linear foot basis for size of conduit installed from the centerline of the pole to power source, including connections in accordance with the Contract Documents.

1. Bid Schedule Payment Reference: 1102.4.1.E.1.
2. Bid Schedule Description: Conduit, Size _____… per linear foot (LF).

F. Junction Box: Measurement and payment on a per each basis for providing and installing junction box as required by the Contract Documents.

1. Bid Schedule Payment Reference: 1102.4.1.F.1.
2. Bid Schedule Description: Junction Box… per each (EA).

G. Service Pedestal: Measurement and payment on a per each basis for a service pedestal provided and installed in accordance with the Contract Documents. Including the cabinet, base, foundation, wiring, breakers, switches and all other work and materials necessary for a complete installation.

1. Bid Schedule Payment Reference: 1102.4.1.G.1.
2. Bid Schedule Description: Service Pedestal… per each (EA).

END OF SECTION

SECTION 1103

CONSTRUCTION TRAFFIC CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of furnishing, erecting, maintaining and relocating necessary traffic control dividers at locations prescribed in the Contract Documents or as directed by the Engineer. Furnish all traffic control devices unless otherwise specified in the contract. Retain ownership throughout the project and remove when no longer needed.

1.2 RELATED SECTIONS

A. Section 301 – Trenching.

B. Section 307 – Street Cuts and Surface Repair.

1.3 REFERENCES

A. Manual on Uniform Traffic Control Devices (MUTCD), latest edition as modified by the State of Idaho or Local Agency.

B. AASHTO Standard Specifications for transportation and methods of Sampling and Testing.

C. American Society for Testing and Materials (ASTM).

D. ATSSA Quality Standards for Work Zone Traffic Control Devices.

E. Local jurisdiction requirements.

PART 2 MATERIALS

2.1 GENERAL

A. Material used in the construction of sign panels and other devices and their supporting structures will be at the Contractor's option.

B. All sign, barricade, drum and vertical panel colors, except black, to be reflectorized.

1. Reflective sheeting.

a. Reflectivity sheeting to conform to ASTM D 4956.

b. Retro-reflective sheeting to conform to ASTM D 4956 supplemental requirement S1, if specified.

c. Reboundable retro-reflective sheeting to conform to ASTM D 4956 including supplemental requirement S2.

2. Reflectivity requirements.

a. All reflective sheeting used for signs, barricades, drums vertical panels, must meet MUTCD retro-reflectivity requirements and ASTM D 4956-04. STOP, YIELD, DO NOT ENTER, and WRONG WAY signs must be Type III, or Type IV, sheeting minimum. Local agencies may require higher standards.

3. Fabrication.

a. Apply the reflective sheeting on aluminum or plywood sections as required in accordance with the manufacturer's recommendations and in such a manner that no background material will be visible when the sign is assembled.

b. Do not splice reflectorized material on panel 24 inches or less in width.

c. For panels larger than 24 inches in width, only one splice is allowed.

1) Placement: Place splice horizontal or at 45 degrees from horizontal with the top sheet overlapping the bottom sheet not less than 3/16 inches.

2) Butt Splices: Signs, which are screen processed with transparent color to have butt splices.

3) Butt Splice Gaps: Less than or equal to 1/32 inches between the sheets or reflective material.

4) Other: In addition to the above limitations, manufactured splices will be accepted.

4. Match color of sign faces composed of two or more pieces of panel or reflective sheeting. Non-uniform shading and undesirable contrast between adjacent widths of applied sheeting will not be accepted.

5. Cracks, discoloration, appearance of air pockets, or any other indication of non-adherence in the sheeting will not be accepted.

6. Finish.

   a. Sealing: Seal sign edges and all splices of the reflective sheeting in conformance with the methods specified by the reflective sheeting manufacturer.

   b. Cutting: Cut direct applied cutout reflective sheeting legends, borders and symbols with a smooth regular outline, free from ragged or torn edges.

   c. Cutting: Cut letters, numerals and symbols having interior or exterior rounded corners with a smooth 3/16 inches ±1/16 inches radius.

C. Drums used for traffic control devices to be constructed of plastic or other approved yielding materials.

   1. Metal drums are not acceptable for use.

   2. Plastic or other yielding drums to be designed to limit rolling to a minimum if upset by outside forces.

   3. All drums to have reflective markings on the bottom and top unless the base and top are designed to separate on impact.

   4. Sandbags or other weights are not permitted on top of drums.

D. Striping material to be 4 inches wide, retro-reflective pressure sensitive tape manufactured for use as pavement striping, suitable for use on either concrete or asphalt surfaces.

   1. Tape to be either white or yellow as specified.

   2. Tape to have a precoated pressure-sensitive adhesive with no protective liner that does not require activation procedures.

   3. The striping materials to be thin, flexible, formable and durable, and after placement remain conformed to the texture of the pavement surface.

   4. Average thickness of material, based on 5 μm readings of different locations, to be greater than or equal to 9 mils.

E. Striping material used as temporary striping to be removable without requiring sandblasting, solvents, or grinding methods. It will not be necessary to remove material between successive asphalt overlays.

2.2 Advance warning arrow panels to meet the following requirements:

TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM LEGIBILITY DISTANCE*
A	24 x 48 inches	12	0.5 mile
B	30 x 60 inches	13	0.75 mile
C	48 x 96 inches	15	1.0 mile

Minimum legibility requirements are the distance at which the arrow panel message can be comprehended by a driver on a sunny day or a clear night.

A. Panels to be of solid construction and be finished non-reflective black.

1. Mount panels on a vehicle, trailer, or other suitable support, with the bottom of the panel at least 6 feet above the roadway surface.

2. Panels to be provided with remote controls and appropriate self-contained power source.

3. Panels to be equipped with hour meters which record only actual hours of operation.

B. Advanced warning arrow panels to have the following mode selections:

1. Left or right flashing or sequential arrows, or

2. Left or right sequential chevrons, and

3. Double flashing arrows, and

4. Caution (4 or more lamps arranged in a pattern which will not indicate a direction).

C. Advanced warning arrow panels to be capable of minimum 50% dimming from rated lamp voltage.

1. The flashing rate of the lamps should not be less than 25 nor more than 40 flashes per minute.

2. Minimum lamp on-time to be 50% for the flashing arrow and 25% for the sequential arrow.

D. Temporary flexible raised pavement markers to be yellow body with yellow reflective tape on two sides and a protective cover or white body with white reflective tape on one side and a protective cover.

1. Marker body and cover to be manufactured from a flexible polyurethane material with a factory applied adhesive on the marker base with release paper.

2. Cover to be attached to vertical portion of the marker in such a way that it will not come off because of traffic, but can be easily removed manually.

3. Reflective tape for the marker to be metalized polycarbonate microprism retro-reflective material with acrylic backing or equal.

4. Tape to have a minimum reflectance of 1800 candlepower/ footcandle/sf at 0.1° observation and 0° entrance angles.

E. Portable tubular markers used for traffic control devices.

1. To be constructed of plastic or other approved yielding materials.

2. Metal markers are not acceptable for use.

3. Markers to be orange or fluorescent orange plastic, 36 inches minimum height, 3 inches minimum width when facing traffic.

4. Markers to have two 3 inches wide retro-reflective white bands placed a maximum of 2 inches from the top with a maximum of 6 inches between the bands.

5. Base to weigh a minimum of 5 pounds.

6. Reflectivity to meet the requirements of Class B sheeting of this subsection.

PART 3 WORKMANSHIP

3.1 General.

A. Conform to the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) for the design and use of traffic control devices.

B. Submit a Traffic Control Plan and obtain necessary permits for approval by the Engineer and the Agency responsible for the roadway.

C. Do not cause unnecessary inconvenience to the public, as determined by the Engineer.

D. Provide and maintain continuous, safe and adequate pedestrian and vehicle access to each residence, fire hydrant, commercial and industrial establishment, church, school, parking lot, service station, motel, fire station, police station, hospital, and similar establishments, unless otherwise approved by the Engineer. All work done in public rights-of-way must be in accordance with the Americans with Disabilities Act of 1990 (ADA).

E. Allow traffic to pass through the work area unless a detour is approved by the Engineer.

F. Maintain traffic control devices by immediately cleaning, servicing, or replacing any device that is lost, stolen, destroyed, damaged, inoperative, or when its retro-reflectivity is reduced to 75% for Class A or Class B sheeting of the required initial retro-reflectivity.

G. Used signs with the specified sheeting materials, legends, and colors, will be considered satisfactory if they meet the above retro-reflectivity requirements.

H. Repair or replace all damaged traffic control devices. This work is considered incidental to this item.

I. Provide positive devices to prevent barricades and drums from being blown over.

J. Employ properly trained, equipped, attired and certified flaggers if traffic is constricted or if deemed necessary by the Engineer.

K. Use pavement-marking tape to temporarily mark lane separation lines for traffic channelization. Install pavement-marking tape as soon as practicable and before nightfall, on all newly placed pavements, including leveling courses, scrub coats, asphalt treated bases, road mix pavements, and asphalt plant mix surface courses.

1. Install 4 inch x 4 foot sections of pavement-marking tape at the same cycle length as detailed on the permanent marking plan.

2. On roads of severe curvature, install 4 inch x 2 foot lengths of pavement-marking tape at half cycle lengths.

3. During its period of use, maintain the tape in its proper location and in and effective condition to serve the purpose for which it is intended.

3.3 Use temporary flexible raised pavement markers to temporarily mark lane separation lines on all pavement being used by traffic during seal coating operations on a daily basis.

A. Do not apply markers more than 24 hours prior to seal coat operations.

B. Apply markers on their own respective color of pavement markings.

C. Place one marker at the same cycle length as permanent marking.

D. Use half cycle length on roadways with severe curvature.

E. Place markers within a turn bay or painted median at no more than 25 feet intervals including all angle points.

F. Supply and apply additional markers and vary spacing as directed.

3.4 Maintain all traffic control items when in use such that functionality is maintained in accordance with the MUTCD and to the satisfaction of the Engineer. Maintenance will be considered incidental to other bid items unless specifically listed in the Bid Schedule.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit price options as designated on the Bid Schedule. Includes all labor, material, and equipment required to provide temporary construction traffic control as specified and all other items incidental thereto. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items. Traffic control maintenance will be considered incidental to other bid items unless specifically listed in the Bid Schedule.

A. Construction Traffic Control: By the lump sum. Includes labor, maintenance and all ancillary items necessary.

1. Bid Schedule Payment Reference: 1103.4.1.A.1
2. Bid Schedule Description: Construction Traffic Control….lump sum (LS)

B. Traffic Control Signs: Per square foot for the types and signs specified.

1. Bid Schedule Payment Reference: 1103.4.1.B.1
2. Bid Schedule Description: Traffic Control Signs…. square foot (SF)

C. Traffic Control Barricades: Per each for the type of barricade specified.

1. Bid Schedule Payment Reference: 1103.4.1.C.1.
2. Bid Schedule Description: Traffic Control Barricades, Type _____…. each (EA).

D. Traffic Control Drums: Per each for the type of drums specified.

1. Bid Schedule Payment Reference: 1103.4.1.D.1.
2. Bid Schedule Description: Traffic Control Drums … each (EA).

E. Advance Warning Arrow Panel: Per each for the type specified.

1. Bid Schedule Payment Reference: 1103.4.1.E.1.
2. Bid Schedule Description: Advance Warning Arrow Panel….each (EA)

F. Temporary Flexible Raised Pavement Markers: Per each for the color of marker specified.

1. Bid Schedule Payment Reference: 1103.4.1.F.1.
2. Bid Schedule Description: Temporary Flexible Raised Pavement Markers….each (EA).

G. Traffic Control Maintenance: For each day traffic control is in use.

1. Bid Schedule Payment Reference: 1103.4.1.G.1.
2. Bid Schedule Description: Traffic Control Maintenance….day (DAY)

H. Portable Tubular Markers: Per each for the type of marker specified.

1. Bid Schedule Payment Reference: 1103.4.1.H.1.
2. Bid Schedule Description: Portable Tubular Markers….each (EA)

I. Traffic Control Flaggers: Per man-hour of traffic control during construction.

1. Bid Schedule Payment Reference: 1103.4.1.I.1.
2. Bid Schedule Description: Traffic Control Flaggers … man hours (MH).

J. Traffic Control Maintenance: Per man-hour of approved maintenance during construction. Maintenance shall be required on all projects, but incidental to other traffic control bid items if not listed as a separate bid item.

1. Bid Schedule Payment Reference: 1103.4.1.J.1.
2. Bid Schedule Description: Traffic Control Maintenance:… man hours (MH).

K. Temporary Striping Tape: Per linear foot of centerline for the type of tape installed.

1. Bid Schedule Payment Reference: 1103.4.1.K.1.
2. Bid Schedule Description: Temporary Striping Tape… linear foot (LF).

END OF SECTION

SECTION 1104

PERMANENT PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pavement marking materials and installation.

B. Reflectorized thermoplastic pavement markings.

1.2 RELATED SECTIONS

A. Section 1103 – Construction Traffic Control.

1.3 REFERENCES

A. Manual on Uniform Traffic Control Devices (MUTCD), U.S. Department of Transportation, Federal Highway Administration.

B. Federal Specifications, TT-P-1952-D.

C. Idaho Waterborne Traffic Line Paint Specifications.

D. Federal Specifications, TT-B-1325.

E. American Society for Testing and Materials (ASTM).

1.4 SUBMITTALS

A. Submit manufacturer's certification that paint and beads meet or exceed specified requirements.

B. Submit certified copies of test results on the pre-formed thermoplastic pavement marking material.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load materials in a manner which prevents damage or excessive exposure to sunlight and weather.

B. Store paint in an area prepared to contain spills and prevent contamination of storm water.

PART 2 MATERIALS

2.1 PAVEMENT PAINT (Waterborne)

A. Paint to be waterborne with volatile organic compound (VOC) less than 150 g/L.

B. Paint to conform to either the current ITD Waterborne Traffic Line Paint Specifications (Formula No. 14) or to Federal Specification TT-P-1952-D with the following modifications:

1. Viscosity: 80-95 K.U. per ASTM D 562.

2. Total Nonvolatile Solids: 75% minimum per ASTM D 2369.

3. Scrub Resistance: 1,000 cycles minimum per ASTM D 2486.

4. pH: 9.6 S.U. minimum per (ASTM E 70).

C. Paint Colors: Meet the Federal Test Standard 595 with color chip designations:

1. White: 37875.

2. Yellow: 33538.

2.2 GLASS BEADS

A. Specification: Federal Specification TT-B-1325 (glass spheres) Retro-Reflective, Type I (Low index of Refraction).

B. Coating: Chemically adherence coated.

C. Gradation:

Sieve Number	Opening Size (inch)	Percent Passing
18	0.0394	100 min.
20	0.0331	90-100
40	0.0165	10-35
50	0.0117	0-10
60	0.0070	0-5

2.3 THERMOPLASTIC PAVEMENT MARKINGS

A. Reflective thermoplastic pavement markings material to be pre-formed with a minimum thickness of 60 mils.

B. Material to be capable of being affixed to non-bleeding bituminous or portland cement concrete pavement by means of a pre-coated adhesive.

C. Material to be flexible and conform to the typical road pavement surface.

D. Material to be patchable with minimum surface preparation and are to exhibit no flagging.

E. Material to be supplied free of cracks.

F. Material to have true, straight, and unbroken edges.

G. Material to be within 3/16 inch of the specified width.

H. Glass beads must be strongly bonded and not easily removed by traffic wear.

I. Material must meet the following requirements:

1. Color:

   a. White No. 37875 per Fed. Std. 595.

   b. Yellow No. 33538 per Fed. Std. 595.

   c. Daylight Reflectance 75% (White): ASTM 1347.

   d. Daylight Reflectance 45% (Yellow): ASTM 1347.

2. Color Retention: After 500 hours of exposure using a cycle of 8 hours ultra-violet light at 60°C. and 4 hours condensation at 40°C according to ASTM G 53.

   a. Daylight Reflectance 70% (White): ASTM 1347

   b. Daylight Reflectance 40% (Yellow): ASTM 1347

3. Retrorelectance (White):

a.	Observation Angle:	0.2	0.5
	Specific Luminance:	550	380

   b. Per ASTM D 4061 (White)

4. Retrorelectance (Yellow):

a.	Observation Angle:	0.2	0.5
	Specific Luminance	410	250

   b. Per ASTM D 4061 (Yellow)

5. Wear Index: Less than 10% of beads should be lost by pop out. Predominant failure mode shall be wear down of the beads. Federal test Method 141-6192.1 using a Taber Abrader with CS-17 wheel and 2.2 pounds load, inspected after 200 cycles.

6. Adhesion: 1 pound/inch of width 50°, 75°, 115°F per ASTM D 1000 and ASTM D 4505.

7. Tensile Strength: 100 psi 6 x 1 inch specimen per ASTM D 638 pull 10 to 12 inch/minute @ 78.4 ±3.6°F.

8. Elongation: 75% minimum per ASTM D 638.

9. Skid Resistance: 45 BPN (British Portable Skid Tester) per ASTM E 303.

2.4 SOURCE QUALITY CONTROL

A. Provide test and inspection reports required of the Manufacturer.

B. Provide application test section when requested.

C. Inspect material shipping lists to verify type, class, color, thickness and marking information required by the Standard for paint and thermoplastic markings.

PART 3 WORKMANSHIP

3.1 EQUIPMENT

A. Airless spray-type marking equipment, compatible with waterborne paint, and capable of providing a uniform wet film thickness of 15 ± 2 mils.

B. Equipment for glass bead application must distribute the beads uniformly and at the appropriate application rate according to the speed of the distributing equipment.

C. Equipment for application of thermoplastic markings must conform to the recommendations of the manufacturer.

3.2 EXAMINATIONS

A. Verify that pavement preparation work is complete prior to painting operations.

B. Verify paint delivered to the site meet the requirements of the Contract Documents.

C. Verify Traffic Control Plan is prepared for painting operation per Section 1103 – Construction Traffic Control.

D. Verify pavement has had cure time exceeding 7 days.

E. Verify size and dimension of pre-formed thermoplastic markings.

3.3 PAINT APPLICATION

A. Pavement surface must be clean and thoroughly dry.

B. Ambient air temperature must be above 50°F.

C. Paint stripes to be uniform and free of erratic waves.

D. Width and location of marking to be as designated in the Contract Documents and be within a tolerance of 5%.

E. Paint stripes must not deviate from the intended alignment by more than 2 inches in 100 feet.

F. Apply paint in accordance with the manufacturer's recommendations.

G. Apply painted pavement markings (school crosswalk text, RR crossings, turn arrows, etc.) using an approved template.

H. Mix paint thoroughly prior to application.

I. Do not thin paint.

J. Apply paint at a rate of not more than 100 square feet/gallon.

K. Apply glass beads immediately following the application of paint in such a manner as to provide good adhesion and reflection.

L. Apply glass beads at a rate of 6 pounds/gallon.

M. All pavement markings to conform to the MUTCD.

N. If paint is unagitated for a period greater than 15 minutes, thoroughly agitate until the mixture is homogeneous prior to continuance of application.

3.4 THERMOPLASTIC PAVEMENT MARKING APPLICATION

A. Properly clean and prepare surface.

B. Confirm size and dimension of pre-formed marking.

C. Confirm marking location.

D. Apply pavement markings in conformance with the manufacturer’s recommendations.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following bid items as designated in the Bid Schedule. Include all labor, materials and equipment required to place permanent pavement markings. If not indicated in the Bid Schedule, pavement markings are considered incidental to other bid items.

A. Pavement Line Paint or Painted Pavement Markings: By the square foot measured on a horizontal basis.

1. Bid Schedule Payment Reference: 1104.4.1.A.1.
2. Bid Schedule Description: Pavement Line Paint or Painted Pavement Markings…square foot (SF).

B. Thermoplastic Pavement Markings: By the square foot measured on a horizontal basis.

1. Bid Schedule Payment Reference: 1104.4.1.B.1.
2. Bid Schedule Description: Thermoplastic Pavement Markings… square foot (SF).

END OF SECTION

SECTION 1105

PERMANENT TRAFFIC SIGNING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Signs, posts, materials and installation.

1.2 RELATED SECTIONS

A. Section 1103 – Construction Traffic Control.

1.3 REFERENCES

A. Manual on Uniform Traffic Control Devices (MUTCD), U.S. Department of Transportation, Federal Highway Administration.

B. American Wood Preservers Association (AWPA) Standards, C14, P5, M4.

C. American Society for Testing and Materials (ASTM).

1.4 SUBMITTALS

A. Submit manufacturer's certification for sign and sign post materials to be installed or furnished under this section.

B. Submit certified testing reports for all treated timber products with a certificate of compliance stating the species of wood and conformance to specified grading rules.

C. For locations with signs totaling larger than 10 square feet: Submit sign, post and foundation plans or shop drawings in accordance with the MUTCD and ITD standards for approval by the Engineer prior to installation. Sign design and materials deviating from ITD standards shall be approved by the engineer prior to submittal.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of signs installed in relation to existing permanent benchmarks.

1.6 DELIVERY, STORAGE AND HANDLING

A. Unload, store and load materials in a manner that prevents damage or excessive exposure to sunlight and weather.

PART 2 MATERIALS

2.1 SIGN POSTS

A. Wood.

1. D-1: 4 inch x 4 inch.

2. D-2: 4 inch x 6 inch, w/ 2 breakaway holes 1-1/2 inch diameter, the first located 4 feet 3 inches above the post bottom and the second 5.5 feet above. Holes centered in the long side, 6-inch side, of the post.

3. Wood Posts: Douglas Fir or West Coast Hemlock, pressure treated with Pentacholorphenol in AWPA P-9 oil, chromated copper arsenate (CCA), or ammoniacal copper zinc arsenate (ACZA) in accordance with the requirements of the American Wood Preservers Association Standards (AWPA) C-14 and P-5, except: the minimum retention of preservative as determined by assay to be 0.40 pounds ACZA, CCA, or net pentacholorophenol per cubic foot of wood.

4. Handling and Care of pressure treated timber products: Conform to AWPA Standard M4.

5. Sign Posts treated with waterborne preservatives: Air dried a minimum of 30 days prior to installation. During the 30-day period, separate each layer of posts by spacers at least 1-1/2 inch thick. Between September 1 and May 31, air dry under cover.

6. Backfill: ¾ inch minus crushed aggregate meeting the requirements of Section 802 – Crushed Aggregate, Subsection 802.06, or granular material approved by the Engineer.

B. Steel Posts, square tubing.

1. E-1: For signs with face area less than 8 square feet, 20F12, 2 inch x 2 inch, 12 gage wall thickness.

2. E-2: For signs with face area less than 10 square feet, 24H12, 2-1/2 inch x 2-1/2 inch, 10 gage wall thickness.

C. Anchor Assembly, square steel tubing.

1. Sleeve: 18 inch.

2. Anchor Post: 36 inch.

3. Concrete: Minimum 3000 psi compressive strength.

2.2 SIGNS

A. Signs must conform to the MUTCD in shape, color, and size.

B. Aluminum sign blanks must conform to ASTM B 209M, Alloy 6061-T6 or 5052-H38 with and alodine 1200 finish.

C. Sheet aluminum for sign blanks to have a minimum thickness of 0.080 inch.

D. All sign sheeting must meet ASTM D 4956-04 and the requirements of the MUTCD Retroreflectivity Levels regardless of compliance dates. As a minimum, Type III or IV sheeting for "Stop, Yield, Wrong Way, and Do Not Enter" signs must be used. Remaining signs may be fabricated of Type I sheeting. Local agencies may require higher standards. Splicing of reflective sheeting will not be allowed on panels of less than 24 inches in length or width. One splice may be permitted on larger panels if any gaps are less than 0.04 inches in width and color matches.

2.3 SOURCE QUALITY CONTROL

A. Provide test and inspection reports required of the manufacturer by this contract.

B. Inspect material shipping lists to verify type, class, thickness and marking information required by the standard for posts and signs.

PART 3 WORKMANSHIP

3.1 EXAMINATIONS

A. Verify that visual obstructions do not hinder view of any sign to be installed at the locations specified in the Contract Documents. Notify the Engineer if field conditions are different from those contemplated in the Contract Documents. Under direction of the Engineer, relocate sign, if necessary.

B. Examine sign posts and signs for defects or damage.

C. Verify signs, and sign posts delivered to the site meet the requirements of the Contract Documents.

3.2 SIGN INSTALLATION

A. Wood Posts:

1. Preparation: Clear vicinity of sign location of vegetation or visual obstructions.

2. Embedment depth: 3.5 feet for post D-1, 4 feet for post D-2.

3. Orientation: Place long dimension of post cross section perpendicular to sign face.

4. Breakaway holes for post D-2: Field drilled parallel to sign face.

5. Handling and care of pressure treated timber products: Conform to the requirement of AWPA standard M4.

6. Verify Location: Check sign height, distance from roadway, and sign face alignment with respect to the travel lane.

7. Backfill: Compact approved backfill material about the newly installed sign post.

B. Tubular Steel Posts:

1. Preparation: Clear vicinity of sign location of vegetation or visual obstructions.

2. Embedment Depth: 3 foot for post E-1 and E-2.

3. Concrete Foundation (when required): Compressive strength of 3,000 psi with a minimum cement content of 560 pounds/cubic yard, a maximum water Cement Ratio of 0.49, and a maximum of 5 inch slump. Slope top of foundation positively away from post and anchor.

4. Bottom of anchor post: Leave open to promote free drainage of moisture into ground.

5. Top holes of anchor sieve: To be free of any obstructions.

6. To be set plumb.

7. Verify Location: Check sign height, distance from roadway, and sign face alignment with respect to the travel lane. Install signs per Standard Plans SD-1130 Sign Installation and SD-1131 Sign Installation, unless otherwise indicated in the Contract Documents.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following pay items as designated in the Bid Schedule. Includes all labor, materials and equipment to install and maintain signs as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Permanent Signing: By the square foot of rectangular aluminum plate needed for each sign.

1. Bid Schedule Payment Reference: 1105.4.1.A.1.
2. Bid Schedule Description: Permanent Signing…square foot (SF).

B. Wood Sign Posts: By the cubic foot and include labor and materials necessary for a foundation as shown on the Contract Documents.

1. Bid Schedule Payment Reference: 1105.4.1.B.1.
2. Bid Schedule Description: Wood Sign Post… cubic foot (CF).

C. Steel Sign Posts: By the pound and include labor and materials necessary for a foundation as shown on the Contract Documents.

1. Bid Schedule Payment Reference: 1105.4.1.C.1.
2. Bid Schedule Description: Steel Sign Posts…pound (LB).

D. Anchor Assembly (for square steel tubing): Per each and include all labor, equipment, and materials necessary, including concrete, for installation as shown on the Contract Documents.

1. Bid Schedule Payment Reference: 1105.4.1.D.1.
2. Bid Schedule Description: Anchor Assembly…each (EA).

END OF SECTION

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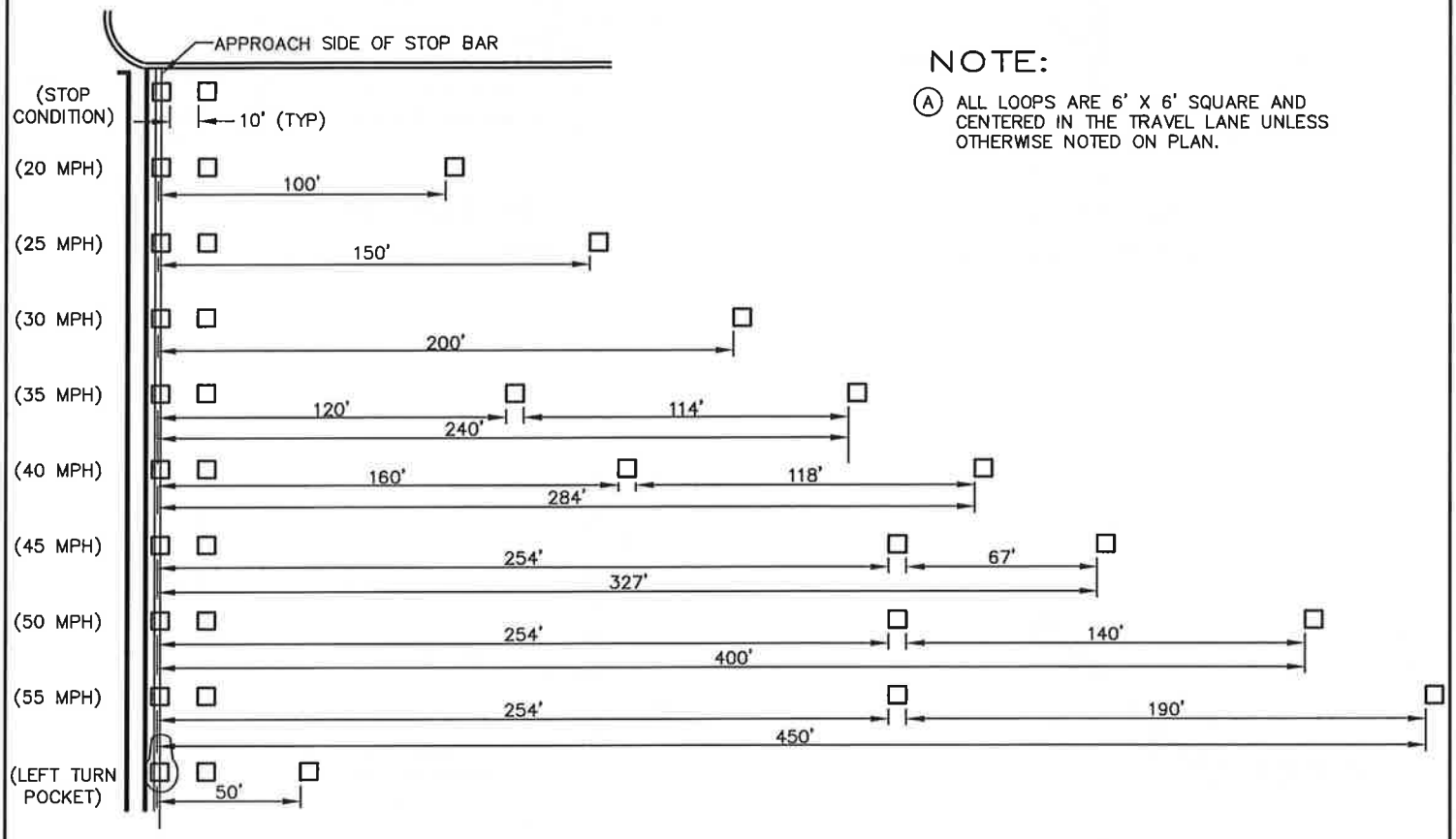
ISPWC - DIVISION 1100

Traffic

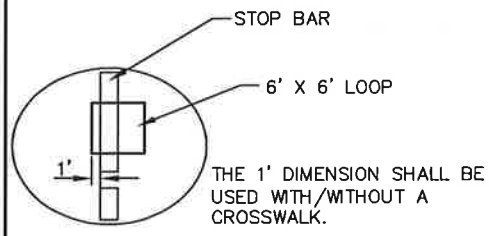
Standard Drawings

SD-1101 – Standard Detector Loop Spacing Detail
SD-1102 – Standard Detector Loop Slot Detail
SD-1103 – Standard Cable Color Designation Detail
SD-1104 – Junction Box and Detector Detail
SD-1105 – Standard Loop Detector Detail
SD-1106 – Standard Pedestrian Push Button Detail
SD-1107 – Pedestrian Signal and Push-pole Button
SD-1108 – Standard Signal Pole Pedestal Details
SD-1109 – Standard Signal Pole Foundation Detail
SD-1110 – Standard Cabinet Foundation – Detail A
SD-1111 – Standard Cabinet Foundation – Detail B
SD-1112 – Standard Detector Loop Wire Color Scheme Detail
SD-1113 – Typical Junction Box and Trench Detail
SD-1114 – Standard Traffic Signal Mast Arm and Pole – Detail A
SD-1115 – Standard Traffic Signal Mast Arm and Pole – Detail B
SD-1116 – 25’ Standard Metal/Fiberglass Streetlight w/Mast Arm Greater than 6’
SD-1117 – Street Light Installation – 25’ Standard Concrete Base
SD-1118 – Standard 25’ Wood Pole Street Light with 6’ Mast Arm and Cobra Head Fixture Only
SD-1119 – Street Light Installation – 25’ Standard Direct Burial
SD-1122 – Required Power Clearance
SD-1125 – Metered Illumination Electrical Service Pedestal
SD-1126 – Metered Illumination and Metered Signalization Electrical Service Pedestal
SD-1127 – Street Light Service Pedestal Base
SD-1128 – Construction Traffic Control
SD-1129 – Construction Traffic Control
SD-1130 – Sign Installation
SD-1131 – Sign Installation
SD-1132 – Terminus Barricade



NOTE:

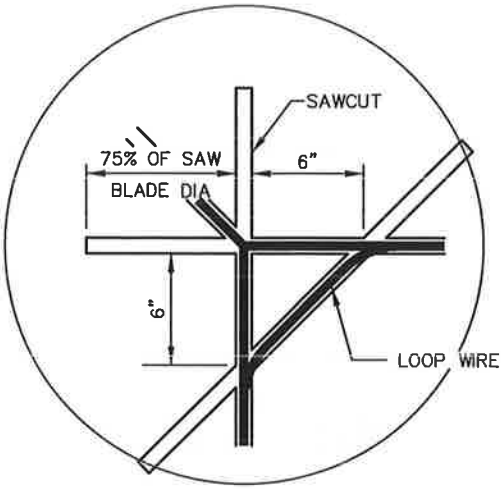
(A) ALL LOOPS ARE 6' X 6' SQUARE AND CENTERED IN THE TRAVEL LANE UNLESS OTHERWISE NOTED ON PLAN.



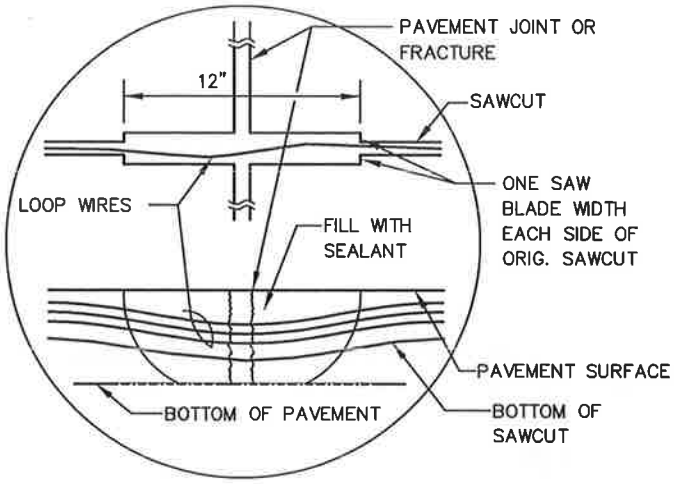
THE 1' DIMENSION SHALL BE USED WITH/WITHOUT A CROSSWALK.

2015

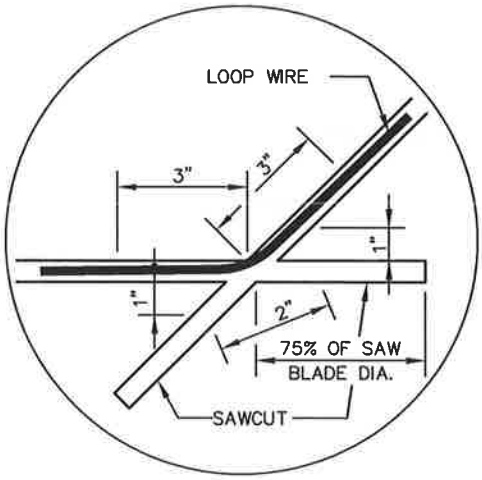
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD DETECTOR LOOP SPACING DETAIL	STANDARD DRAWING NO. SD-1101



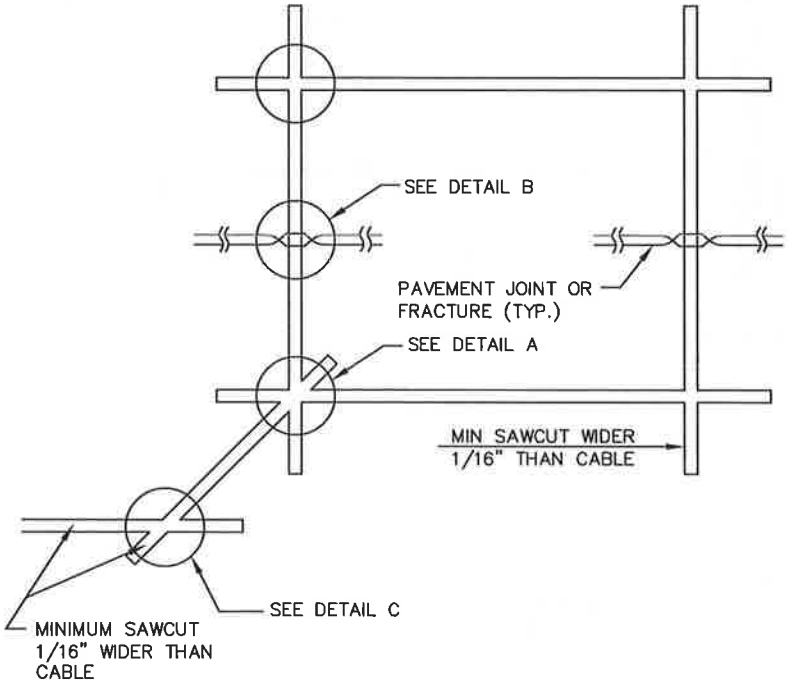
DETAIL A
(JOINT OR FACTURE)



DETAIL B
(JOINT OR FRACTURE)



DETAIL C
(HOMERUN)



NOTES:

(A) DEPTH OF SAWCUT SHALL BE 2.5" UNLESS SPECIFIED OTHERWISE (2.75" AT PAVEMENT JOINTS).

(B) ALL AREAS WHERE LOOP WIRES ARE TO PLACED SHALL HAVE A UNIFORM DEPTH AND SMOOTHNESS.

(C) LOOP SEALANT SHALL BE CRAFCO MSI, OR APPROVED EQUAL. MEETING ASTM D312, TYPE IV APPLY PER MANUFACTURERS RECOMMENDATIONS.

(D) IF REQUIRED, LOOP WIRE HOLD DOWN SHALL USE SHORT (1" TYP.) PIECE OF FLEXIBLE RUBBER OR PLASTIC TUBING OR ROUND FORM SEALER STRIPS TO HOLD DOWN LOOP WIRES IN PLACE UNTIL LOOP SEALER SETS. DO NOT USE SHARP OBJECTS TO HOLD DOWN WIRE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD DETECTOR LOOP SLOT DETAIL	STANDARD DRAWING NO. SD-1102

12/C CABLE DESIGNATIONS SIGNAL CABLE IMSA #14 19-1	
RED	THRU RED LIGHT
ORANGE	THRU AMBER LIGHT
GREEN	THRU GREEN LIGHT
BLACK	SPARE
WHITE	COMMON
BLUE	SPARE
RED/TRACER	LEFT RED LIGHT
ORANGE/TRACER	LEFT AMBER LIGHT
GREEN/TRACER	LEFT GREEN LIGHT
BLACK/TRACER	SPARE
WHITE/TRACER	COMMON
BLUE/TRACER	SPARE
PEDESTRIAN CABLE	
RED	DON'T WALK (E-W)
ORANGE	PPB (E-W)
GREEN	PPB RETURN (E-W)
BLACK	SPARE
WHITE	COMMON
BLUE	WALK (E-W)
RED/TRACER	DON'T WALK (N-S)
ORANGE/TRACER	PPB (N-S)
GREEN/TRACER	PPB RETURN (N-S)
BLACK/TRACER	SPARE
WHITE/TRACER	COMMON
BLUE/TRACER	WALK (N-S)

7/C CABLE DESIGNATIONS PROTECTIVE/PERMISSIVE IMSA #14 19-1	
RED	THRU RED LIGHT
ORANGE	THRU AMBER LIGHT
GREEN	THRU GREEN LIGHT
BLACK	LEFT AMBER LIGHT
WHITE	COMMON
BLUE	LEFT GREEN LIGHT
BLACK/TRACER	COMMON

5/C CABLE DESIGNATIONS THRU OR LEFT VEHICLE HEAD IMSA #14 19-1	
RED	RED LIGHT
ORANGE	AMBER LIGHT
GREEN	GREEN LIGHT
BLACK	SPARE
WHITE	COMMON

3/C CABLE DESIGNATIONS PEDESTRIAN SIGNAL HEAD IMSA #14 19-1	
RED	DON'T WALK
BLACK	WALK
WHITE	COMMON

1P CABLE DESIGNATIONS PEDESTRIAN PUSH BUTTON IMSA #16 50-2	
BLACK	HOT
WHITE	COMMON

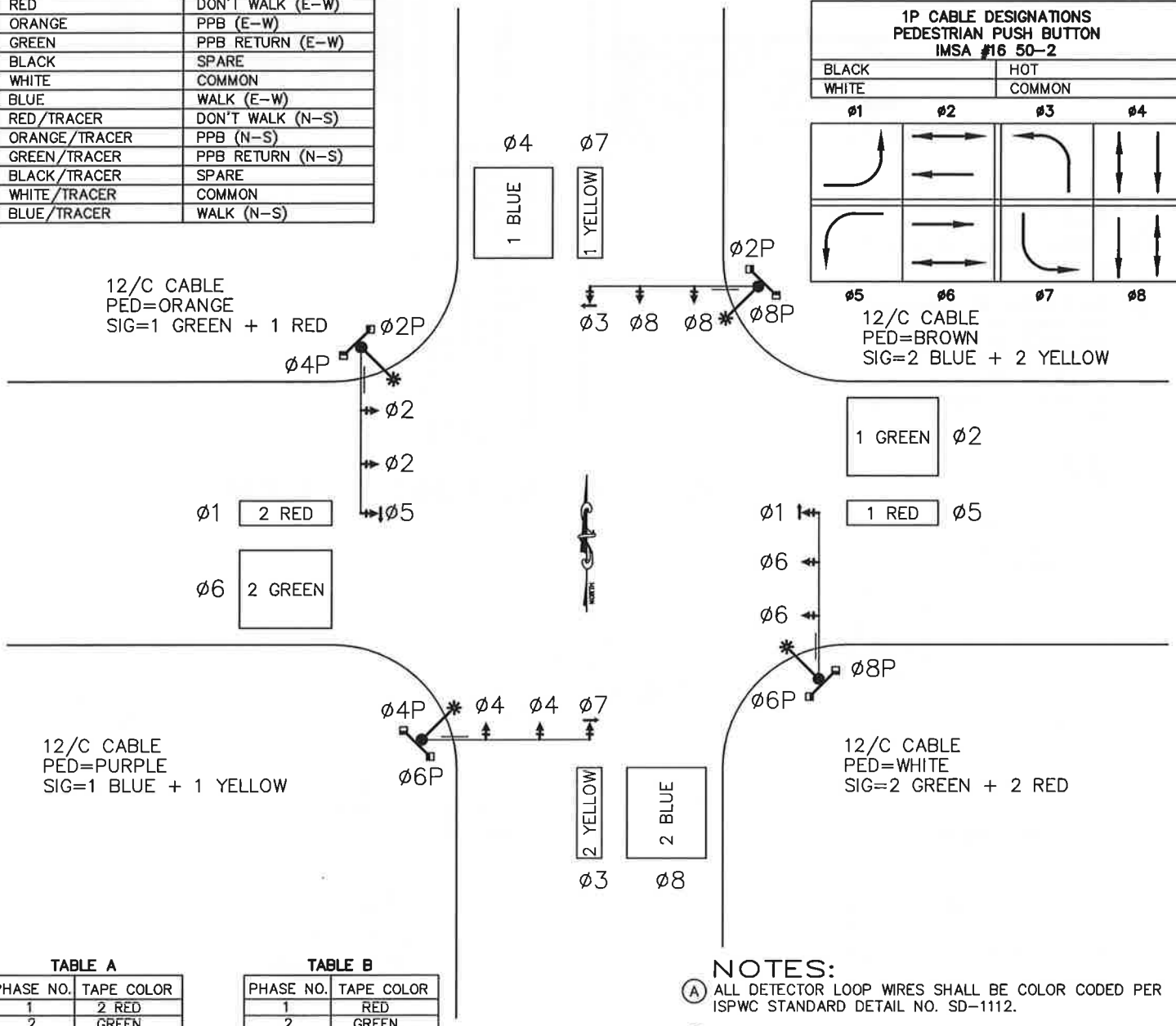


TABLE A

PHASE NO.	TAPE COLOR
1	2 RED
2	GREEN
3	2 YELLOW
4	BLUE
5	RED
6	2 GREEN
7	YELLOW
8	2 BLUE

TABLE B

PHASE NO.	TAPE COLOR
1	RED
2	GREEN
3	YELLOW
4	BLUE
5	RED
6	GREEN
7	YELLOW
8	BLUE

2015

NOTES:

(A) ALL DETECTOR LOOP WIRES SHALL BE COLOR CODED PER ISPWC STANDARD DETAIL NO. SD-1112.

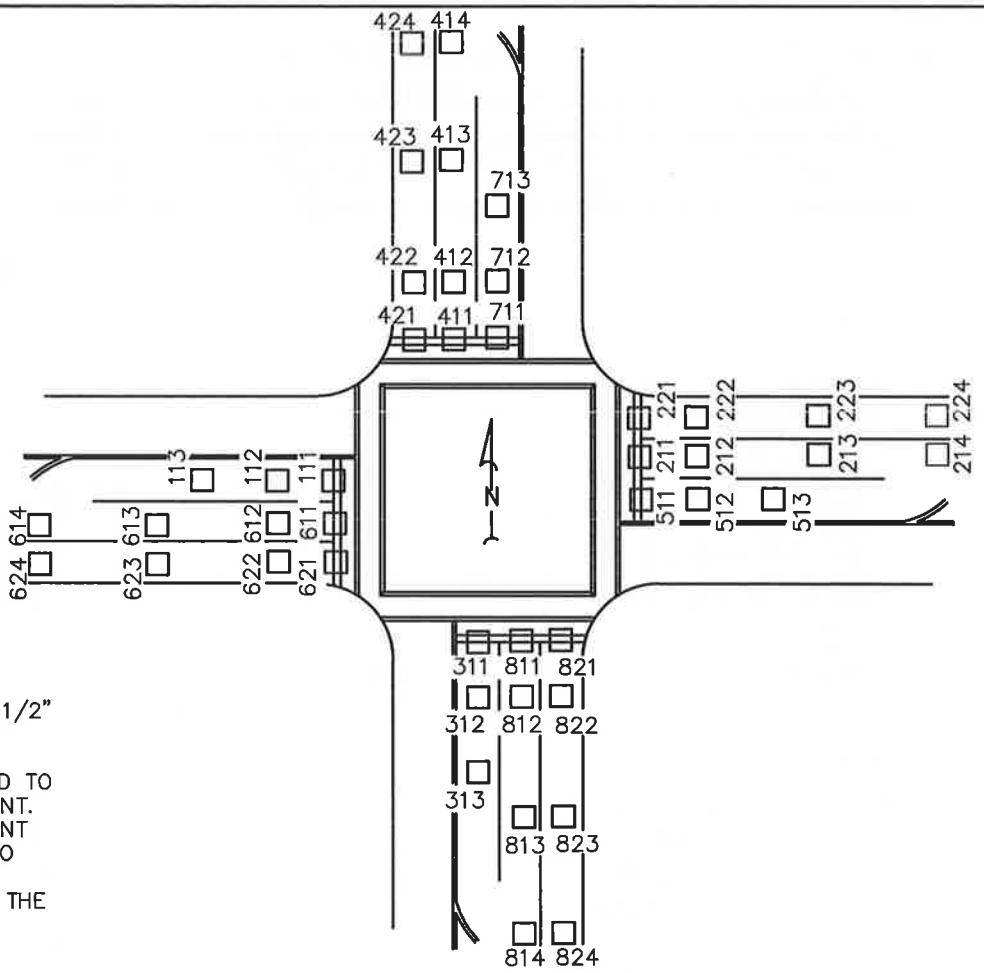
(B) ALL DETECTOR LOOP LEAD-IN CABLES SHALL BE COLOR CODED BY PHASE. SEE "TABLE A" ON THIS SHEET. DETECTOR LEAD-IN CABLE FOR COUNT LOOPS SHALL ALSO HAVE TWO WRAPS OF BLACK.

(C) ALL 7/C, 5/C, 3/C AND 1P CABLES IN THE SIGNAL POLE SHALL BE COLOR CODED BY PHASE. SEE "TABLE B" ON THIS SHEET.

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

STANDARD CABLE COLOR DESIGNATION DETAIL

STANDARD DRAWING NO. SD-1103



LOOP NUMBERING SYSTEM

NOTE:

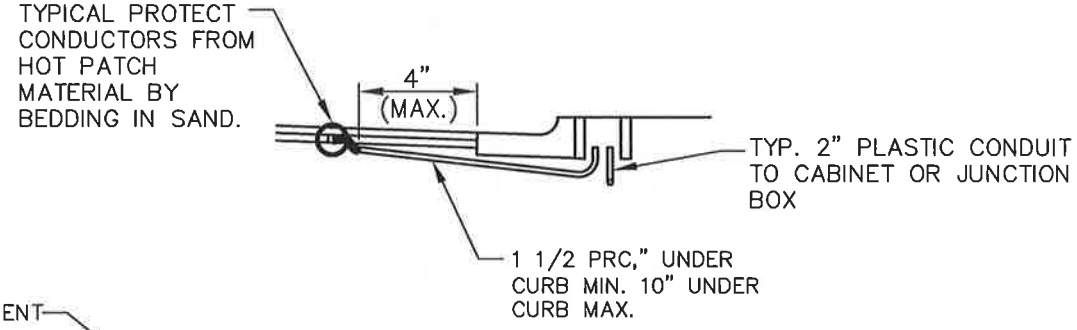
(A) CONDUIT SHALL BE 1 1/2" DIAMETER, MINIMUM.

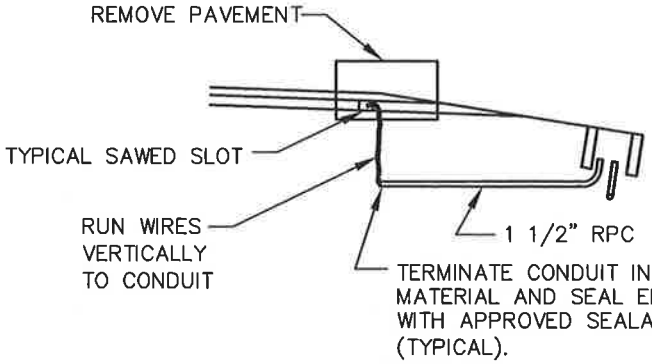
(B) SLOT SHALL BE SAWED TO THE EDGE OF PAVEMENT. THE EDGE OF PAVEMENT SHALL BE REMOVED TO ALLOW WIRES TO GO VERTICALLY DOWN TO THE CONDUIT.

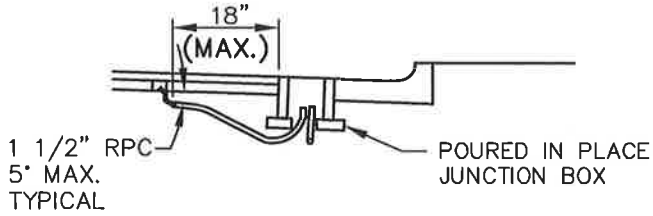
(C) CODE.

823

- 8 — PHASE
- 2 — LANE NO.
- 3 — LOOP NO.





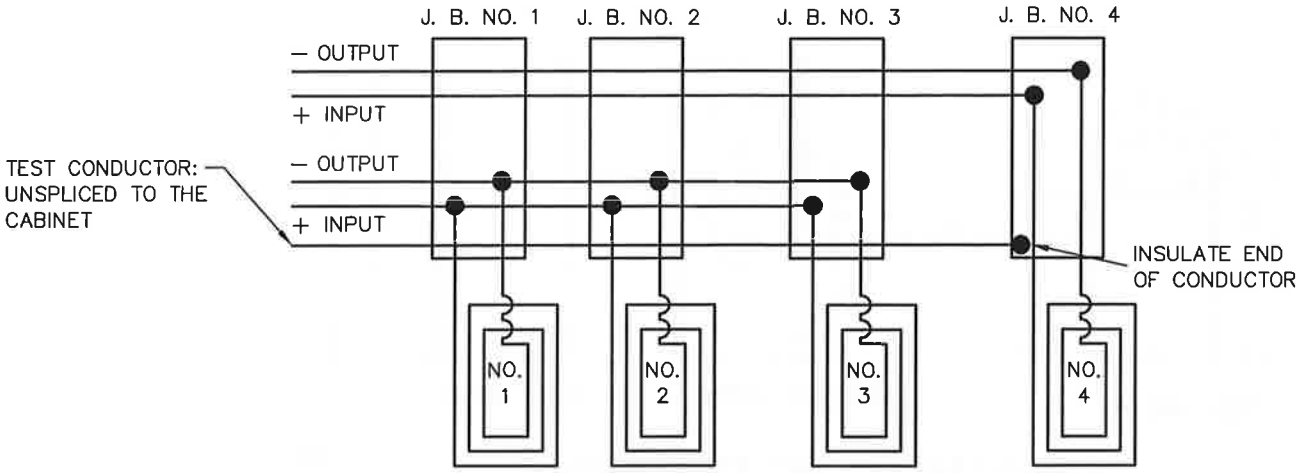


USE ONLY WHEN PLACEMENT BEHIND THE CURB IS NOT POSSIBLE

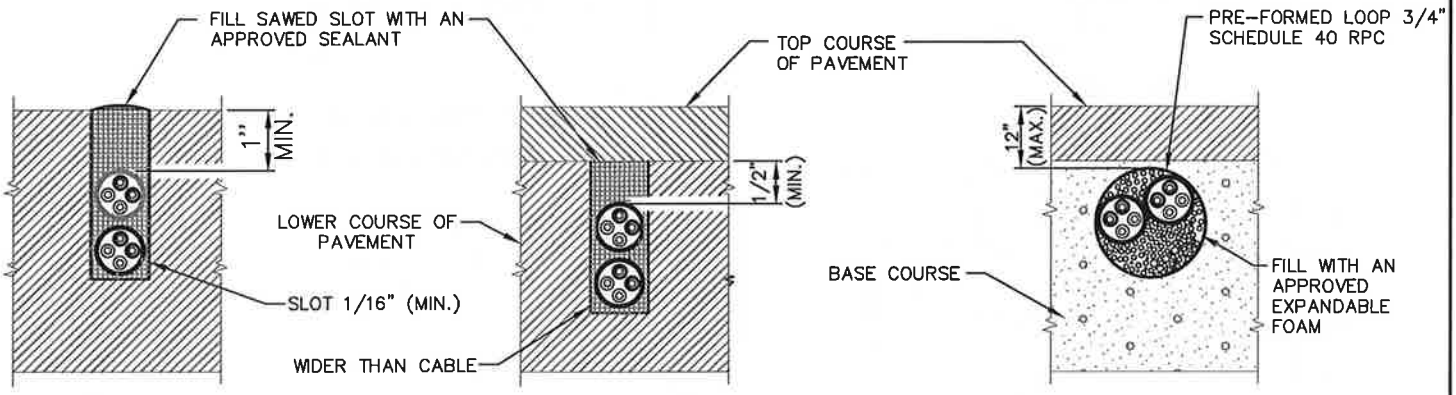
2015

JUNCTION BOX AND CONDUIT LOCATION

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	JUNCTION BOX AND DETECTOR DETAIL	STANDARD DRAWING NO. SD-1104



LOOP SYSTEM AND JUNCTION BOX WIRING DIAGRAM



METHOD A (EXISTING PAVEMENT)

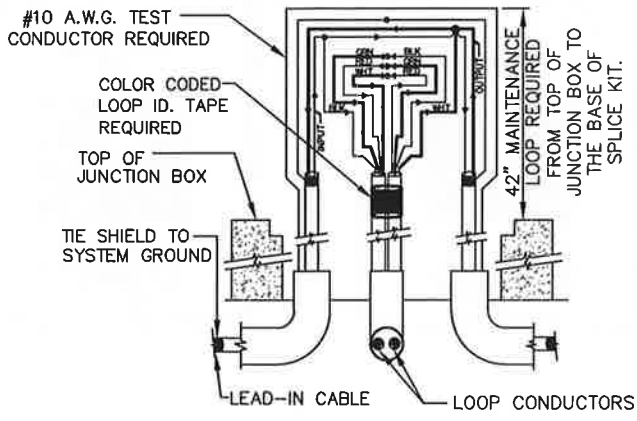
METHOD B (NEW CONSTRUCTION MULTIPLE COURSES OR OVERLAY EXISTING SINGLE COURSE)

METHOD C (NEW CONSTRUCTION SINGLE COURSE)

LOOP CONDUCTOR INSTALLATION

NOTES:

ALL CONDUCTOR SPLICES SHALL BE SOLDERED AND WATERPROOFED WITH AN APPROVED SPLICE KIT. THE LEAD-IN SHIELD SPLICE SHALL BE SOLDERED AND INSULATED TO PREVENT GROUNDING AT THE JCT. BOX.



LOOP SPLICE DETAIL AT JUNCTION BOX

NOTES:

(A) HYDRO CLEAN AND AIR DRY SLOT.

(B) BED LOOP CONDUCTORS IN SEALANT FOR TOTAL ENCAPSULATION.

(C) SEAT LOOP CONDUCTORS IN SLOT WITH A BLUNT INSTRUMENT.

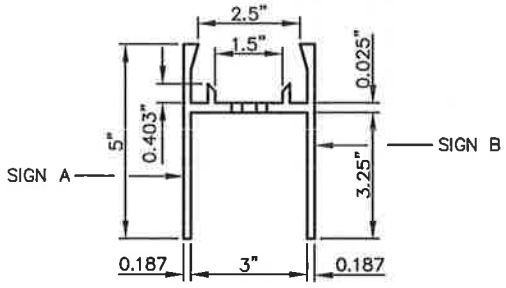
(D) SPLICING OF MULTIPLE LOOP CONDUCTORS TO THE LEAD-IN ALLOWED IN JUNCTION BOX ONLY.

(E) ALL LOOPS REQUIRE TWO TURNS OF FOUR CONDUCTOR CABLE.

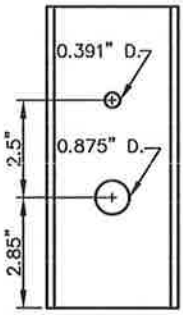
(F) THE LOOPS IN EACH LANE SHALL BE WOUND IN A COUNTER CLOCKWISE DIRECTION.

2015

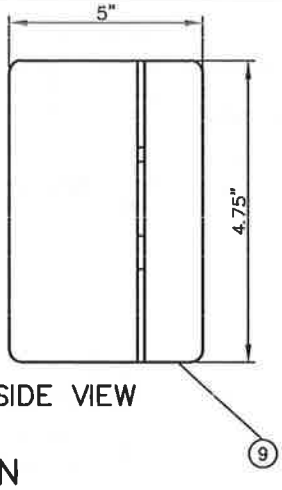
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD LOOP DETECTOR DETAIL	STANDARD DRAWING NO. SD-1105



TOP VIEW

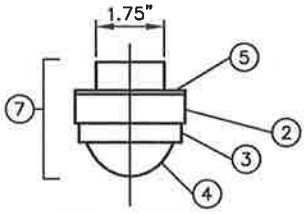


FRONT VIEW

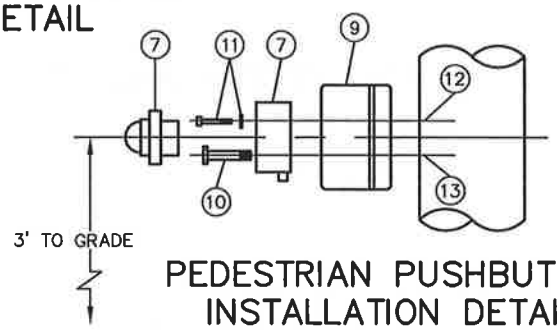


SIDE VIEW

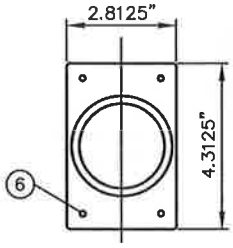
ALUMINUM "H" EXTRUSION DRILLING DETAIL



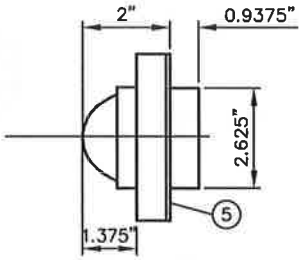
TOP VIEW



PEDESTRIAN PUSHBUTTON INSTALLATION DETAIL

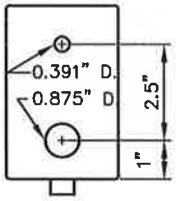


FRONT VIEW

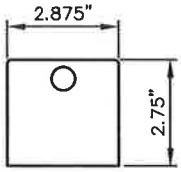


SIDE VIEW

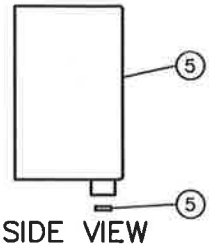
PUSHBUTTON



FRONT VIEW

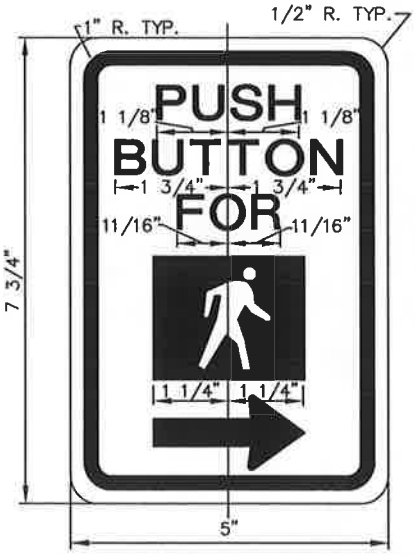


TOP VIEW



SIDE VIEW

CONDULET DRILLING DETAIL



SIGN A

SIGN B

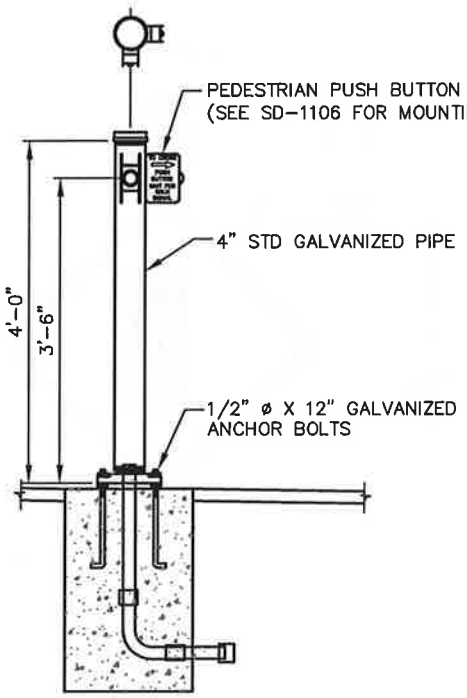
SIGN R10-4b

NOTES:

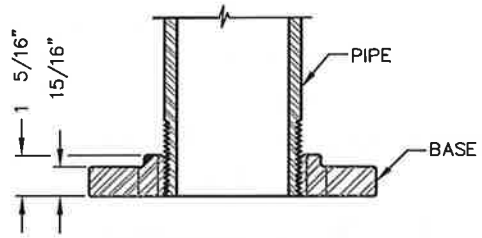
1. PUSH-BUTTON SWITCH ASSEMBLY.
2. CAST METAL HOUSING.
3. PROTECTIVE COLLAR.
4. 2-1/4" DIA. CHROME MUSHROOM PUSHBUTTON SWITCH WITH MOMENTARY CONTACTS.
5. GASKET.
6. STAINLESS STEEL FASTENER (TYP).
7. CAST ALUMINUM CONDULET.
8. ALUMINUM PLUG WITH #30 DRILLED WEEP HOLE. REMOVE TO PROVIDE WIRE ENTRANCE ON TIMBER POLE INSTALLATION.
9. ALUMINUM "H" EXTRUSION.
10. CHASE NIPPLE – 7/8" HEX HEAD X 1/2" PIPE THREAD X 2 1/2" LONG.
11. 3/8"-16 BY 2-1/2" STAINLESS STEEL BOLT WITH WASHER.
12. DRILL AND TAP SHAFT FOR 3/8"-16 BOLT.
13. DRILL AND TAP SHAFT FOR 1/2" NIPPLE.

2015

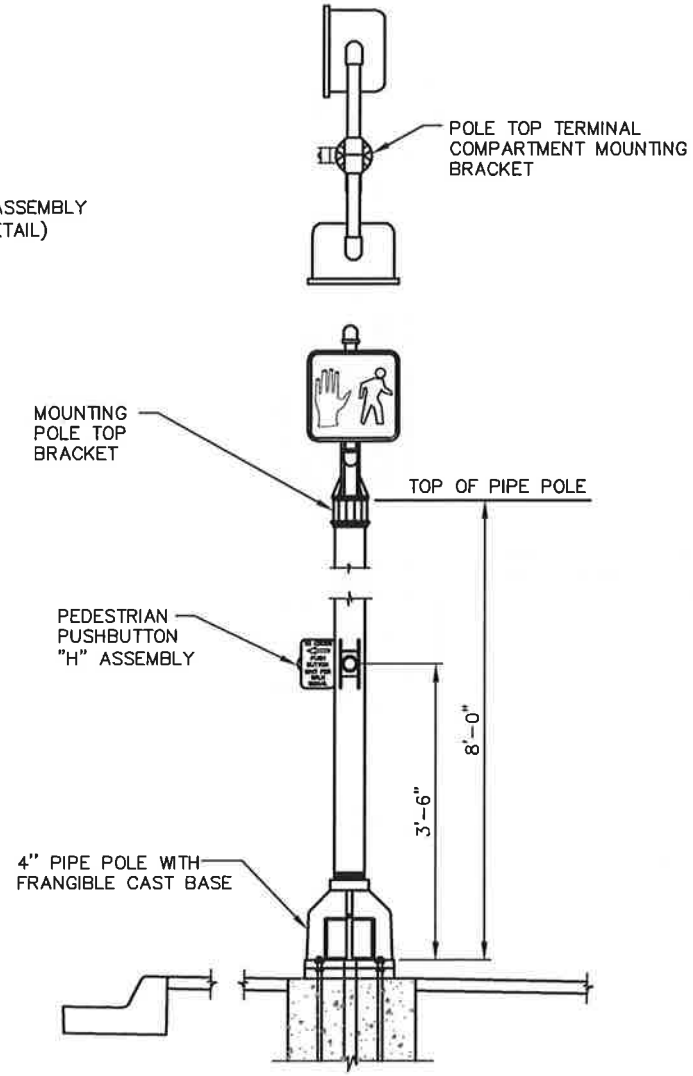
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD PEDESTRIAN PUSH BUTTON DETAIL	STANDARD DRAWING NO. SD-1106



PEDESTRIAN PUSHBUTTON POLE



SECTION A-A



PEDESTRIAN SIGNAL

NOTES:

(A) THIS DRAWING SHOWS TYPICAL INSTALLATION DETAILS ONLY. SEE PLAN SHEETS FOR QUANTITY AND LOCATION OF SIGNAL AND LIGHTING COMPONENTS TO BE INSTALLED.

(B) ORIENTATION OF SIGNAL COMPONENTS SHALL BE AS SHOWN UNLESS OTHERWISE SPECIFIED ON THE PLAN SHEETS.

(C) SEE ISPWC SD-1109 FOR FOUNDATION DETAILS.

(D) ALL SIGNAL COMPONENTS SHALL BE LEVELED AFTER THE POLE HAS BEEN PLUMBED.

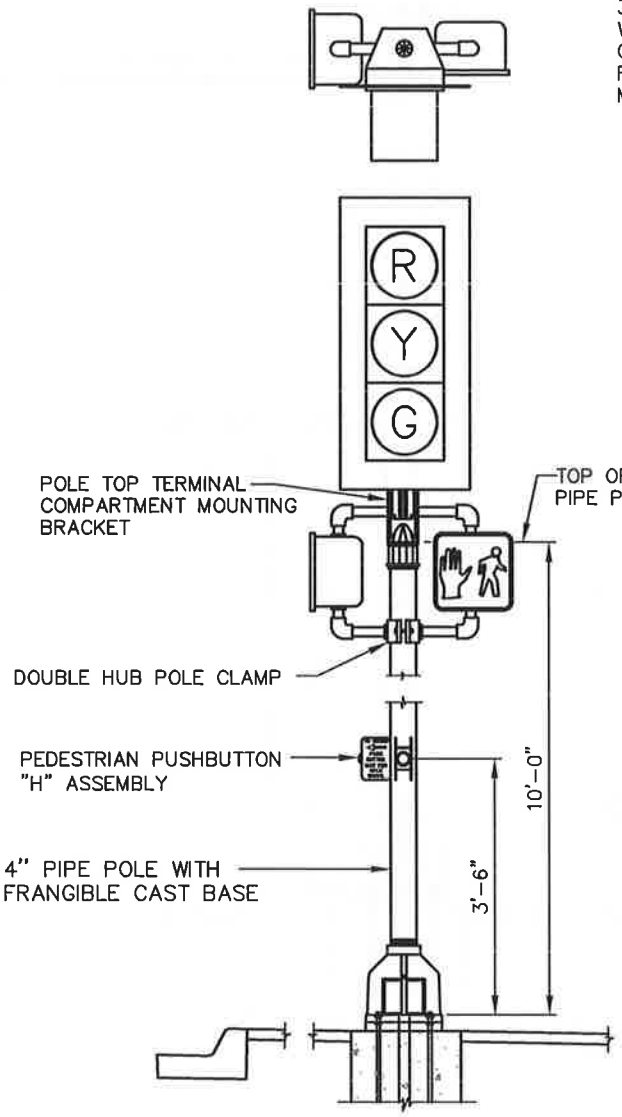
(E) SPECIFIC LOCATION OF EACH POLE INSTALLATION SHALL BE AS INDICATED ON THE PROJECT PLAN SHEETS.

(F) ALL CONDUIT ELBOWS USED IN CONCRETE BASES SHALL BE RIGID PLASTIC CONDUIT (RPC).

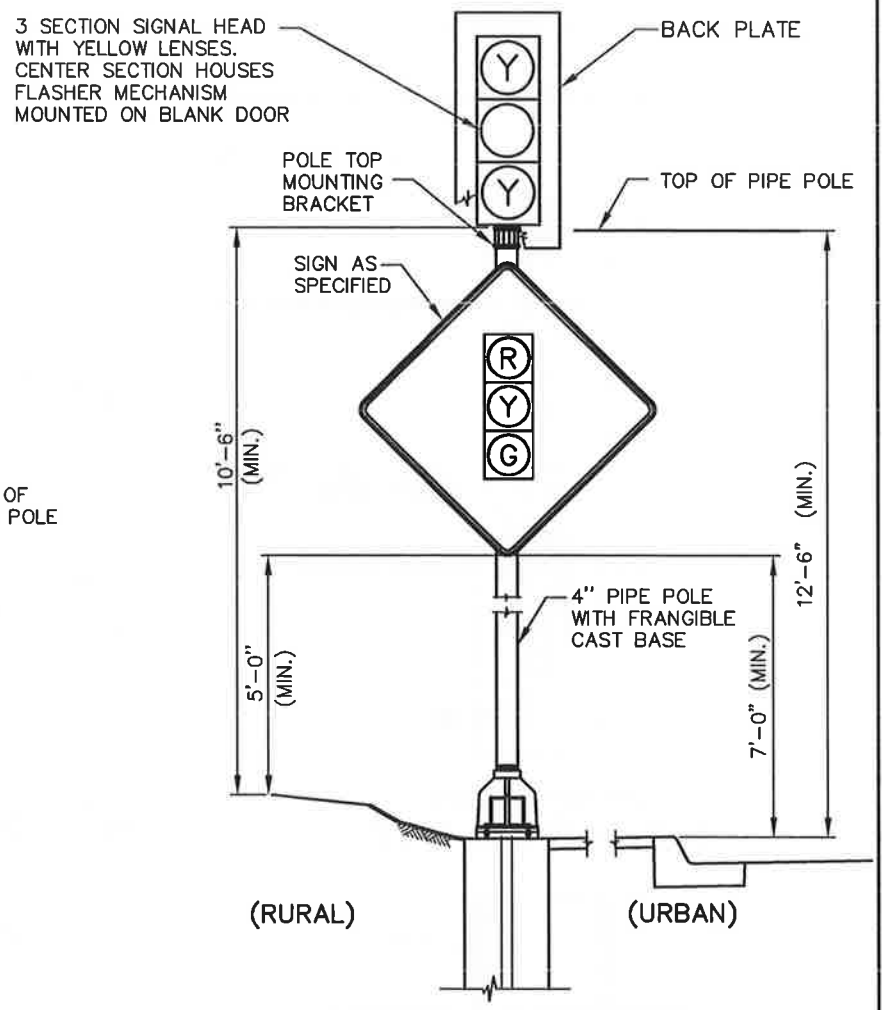
(G) STEEL CONDUIT SHALL BE USED TO EXTEND ELBOWS BEYOND FOUNDATION.

(H) SPARE STUB OUTS SHALL BE TERMINATED WITH A STEEL COUPLING AND PLASTIC PUSH PLUG AT BOTH ENDS.

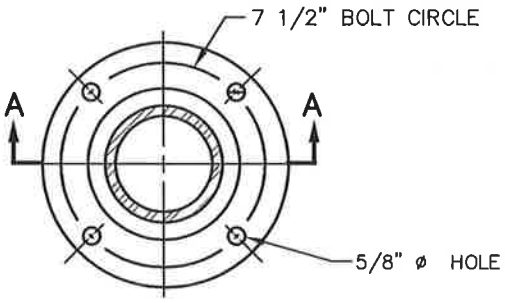
(I) SEALED CLOSURES ARE REQUIRED ON SINGLE POINT MOUNTED HEADS.



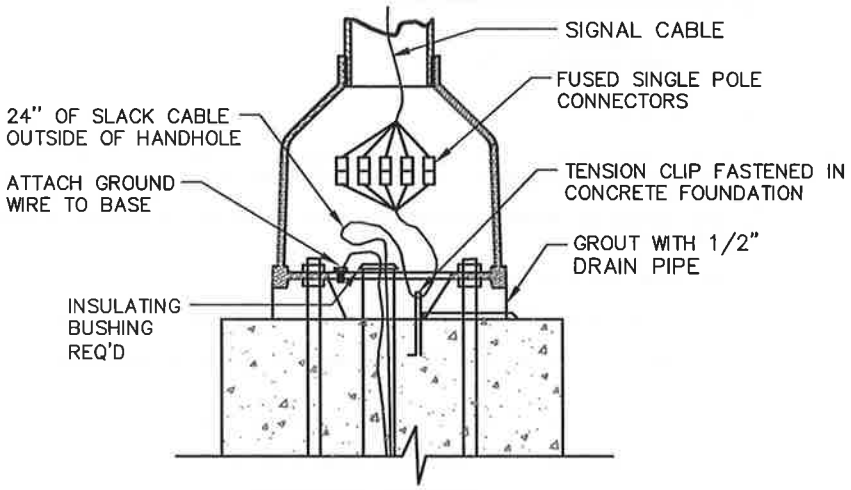
VEHICLE AND PEDESTRIAN SIGNAL



HAZARD IDENTIFICATION BEACON



FRANGIBLE CAST IRON PIPE FLANGE

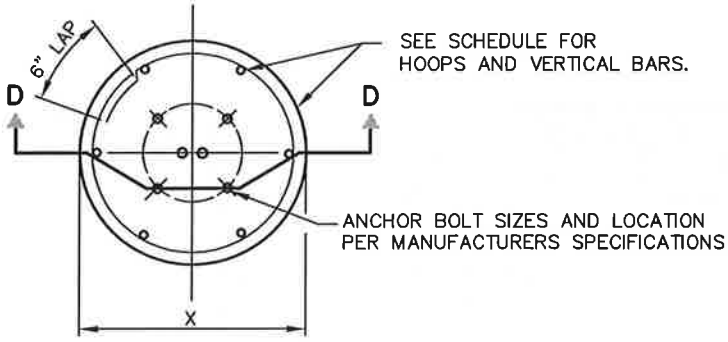


TYPICAL SIGNAL PEDESTAL CONNECTOR INSTALLATION

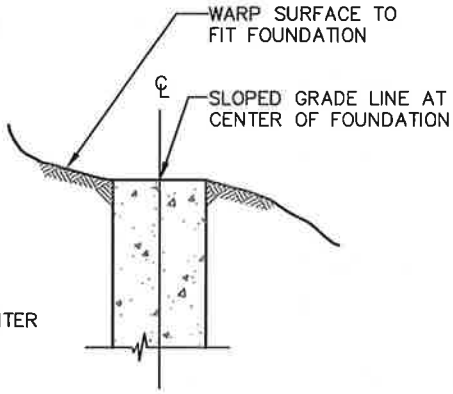
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD SIGNAL POLE PEDESTAL DETAILS	STANDARD DRAWING NO. SD-1108

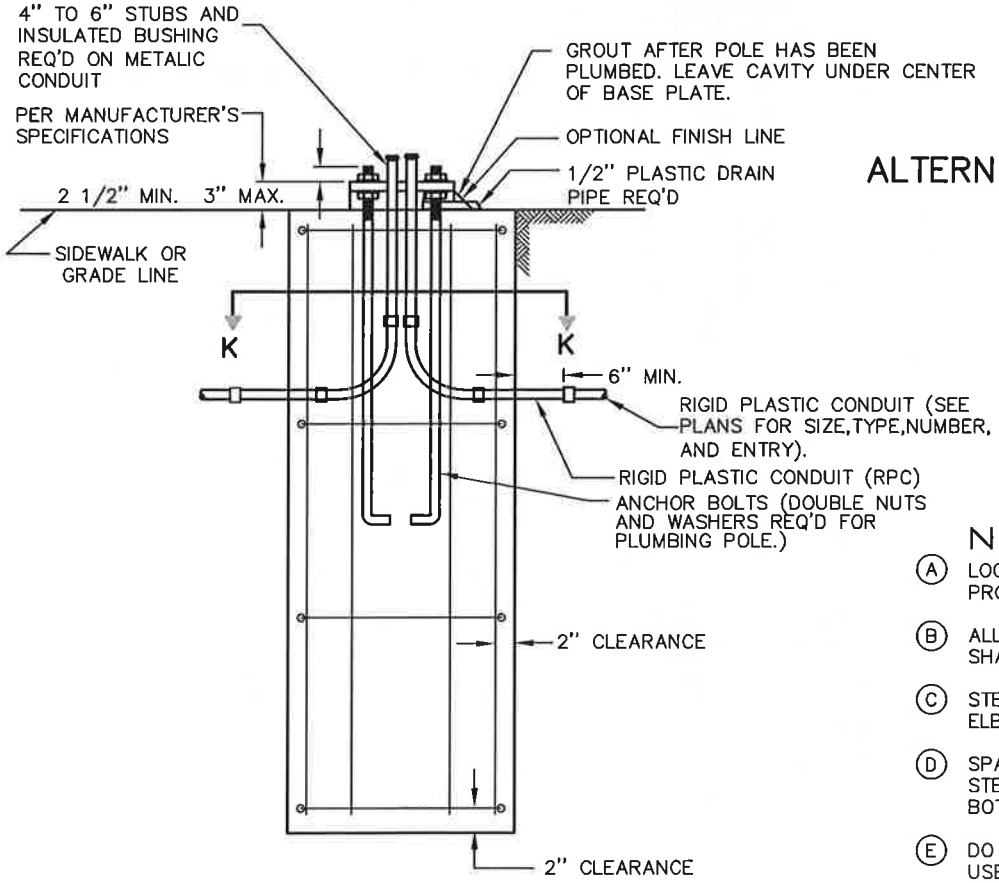
POLE FOUNDATION SCHEDULE												
POLE TYPE	MT.HT.	MASTARM LENGTH	FOUNDATION TYPE	X	Y	HOOPS			VERTICAL RODS			CU. YDS.
						NO.	SIZE	LIN. FT.	NO.	SIZE	LIN. FT.	CONCRETE
PEDESTRIAN SIGNAL POLE	10'	–	A	2'–0"	5'–0"	4	#4	23'–0"	6	#4	28'–0"	.6
LIGHT POLE	25'–30'	ALL	A	2'–0"	5'–0"	4	#4	23'–0"	6	#4	28'–0"	.6
LIGHT POLE	35'	ALL	B	2'–6"	7'–0"	4	#4	29'–4"	6	#6	40'–0"	1.3
LIGHT POLE	40'–50'	ALL	C	3'–0"	8'–0"	5	#4	44'–2"	8	#6	61'–4"	2.1
SIGNAL POLE	–	20' – 45'	D	3'–0"	9'–0"	5	#4	44'–2"	8	#6	69'–4"	2.4
PED. PUSHBUTTON POLE	4'–0"	–	E	1'–6"	2'–6"	–	–	–	–	–	–	.2
DUAL MASTARM SIGNAL POLE	–	ALL	F	3'–0"	12'–0"	8	#5	70'–8"	12	#6	140'	3.1
SIGNAL POLE	–	50' – 55'	F	3'–0"	12'–0"	8	#5	70'–8"	12	#6	140'	3.1
SIGNAL POLE	–	60' – 65'	G	3'–6"	14'–0"	9	#5	78'–10"	12	#6	166'	3.7



SECTION K–K



ALTERNATE SLOPED GRADE SECTION



TYPICAL POLE FOUNDATION
SECTION D–D

NOTES:

(A) LOCATE FOUNDATIONS AS INDICATED ON THE PROJECT PLAN SHEETS.

(B) ALL CONDUIT ELBOWS USED IN CONCRETE BASES SHALL BE RPC.

(C) STEEL CONDUIT SHALL BE USED TO EXTEND ELBOWS BEYOND FOUNDATION.

(D) SPARE STUBOUTS SHALL BE TERMINATED WITH A STEEL COUPLING AND PLASTIC PUSH PLUG AT BOTH ENDS.

(E) DO NOT GROUT IF BREAKAWAY DEVICES ARE USED.

2015

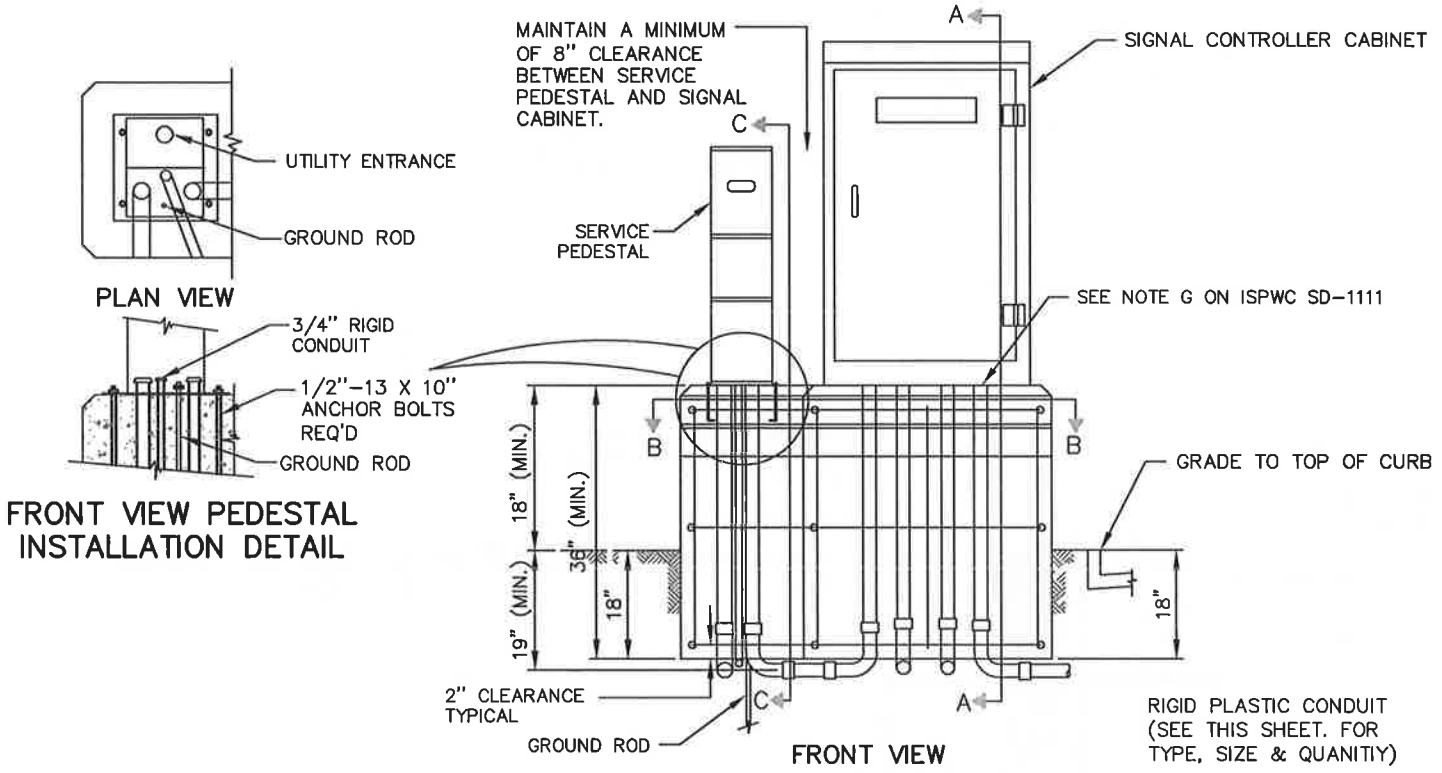
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

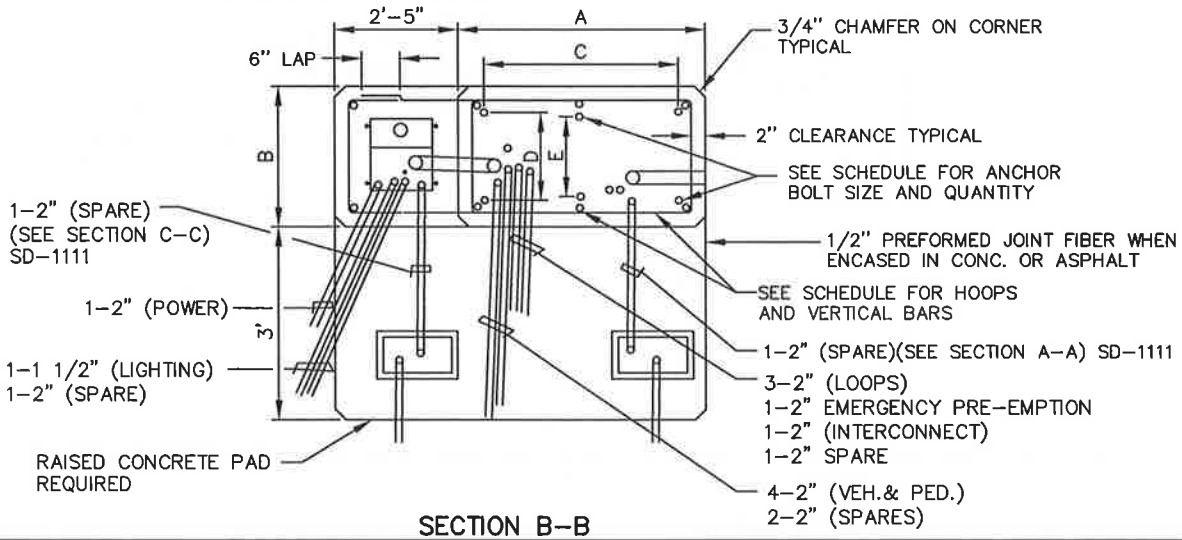
STANDARD SIGNAL POLE FOUNDATION DETAIL

STANDARD DRAWING NO. SD–1109

FOUNDATION SCHEDULE														
							CABINET ONLY							
CABINET TYPE	FOUNDATION TYPE	A	B	C	D	E	HOOPS			VERTICAL RODS			CU. YDS. CONC.	
							NO.	SIZE	LIN. FT.	NO.	SIZE	LIN. FT.	FOUNDATION	PAD
SIGNAL	M	2'-9"	1'-8"	—	—	1'-0"	3	#4	24'0"	6	#4	13'0"	.5	.1
	P	3'-11"	2'-5"	3'-4 3/4"	1'-6 1/2"	—	3	#4	35'6"	6	#4	13'0"	.9	.1

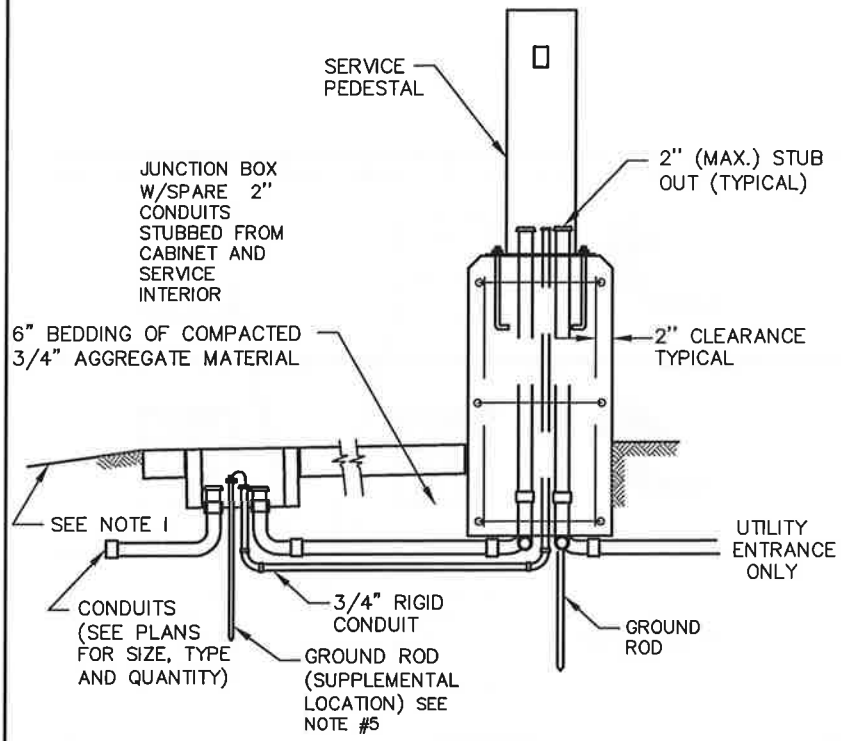
FOUNDATION SCHEDULE (CONT.)									
CABINET AND SERVICE PEDESTALS									
HOOPS			VERTICAL RODS			CU. YDS. CONC.		ANCHOR BOLT	
NO.	SIZE	LIN. FT.	NO.	SIZE	LIN. FT.	FOUNDATION	PAD	QNTY.	SIZE
3	#4	38'6"	8	#4	17'4"	.8	.2	2	1/2" X 12"X 3"
3	#4	50'0"	8	#4	17'4"	1.4	.2	4	3/4" X 18"X 4"



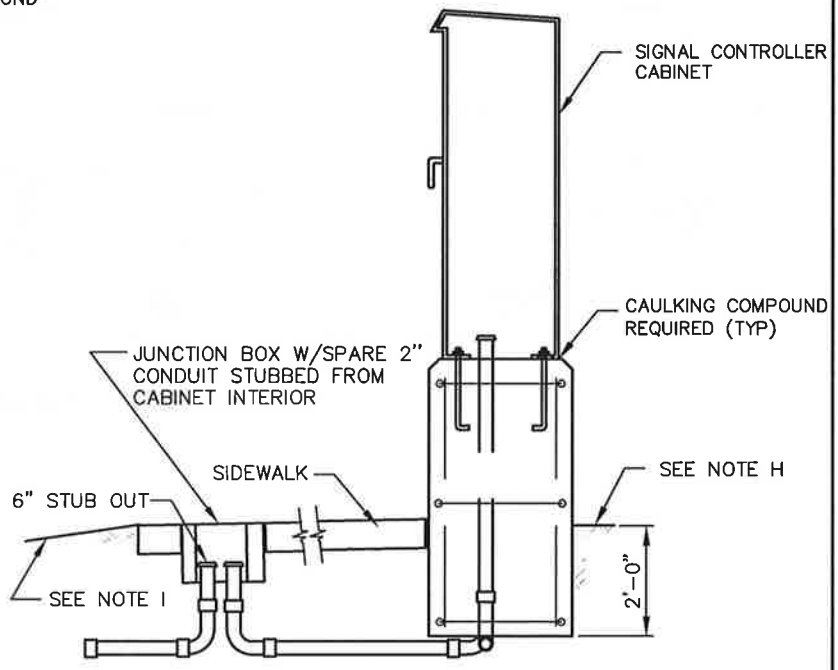


2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD CABINET FOUNDATION – DETAIL A	STANDARD DRAWING NO. SD-1110



SECTION C–C



SECTION A–A

NOTES:

(A) THE FOUNDATION SHALL BE LOCATED AS INDICATED ON THE PROJECT PLAN SHEETS.

(B) ALL CONDUITS, ELBOWS AND COUPLINGS WITHIN AND PROTRUDING FROM THE FOUNDATION, SHALL BE RIGID PVC. THE REMAINING CONDUITS SHALL BE AS SHOWN ON THE PLANS.

(C) PLASTIC PUSH PLUG REQ'D AT BOTH ENDS OF SPARE CONDUITS.

(D) USE DIMENSION "A" (SD–1110) FOR THE CABINET FOUNDATION PAD WHEN THE SERVICE PEDESTAL IS NOT REQUIRED.

(E) FOUNDATION AND PAD WHEN THE SERVICE PEDESTAL IS NOT REQUIRED.

(F) GROUND IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (N.E.C.).

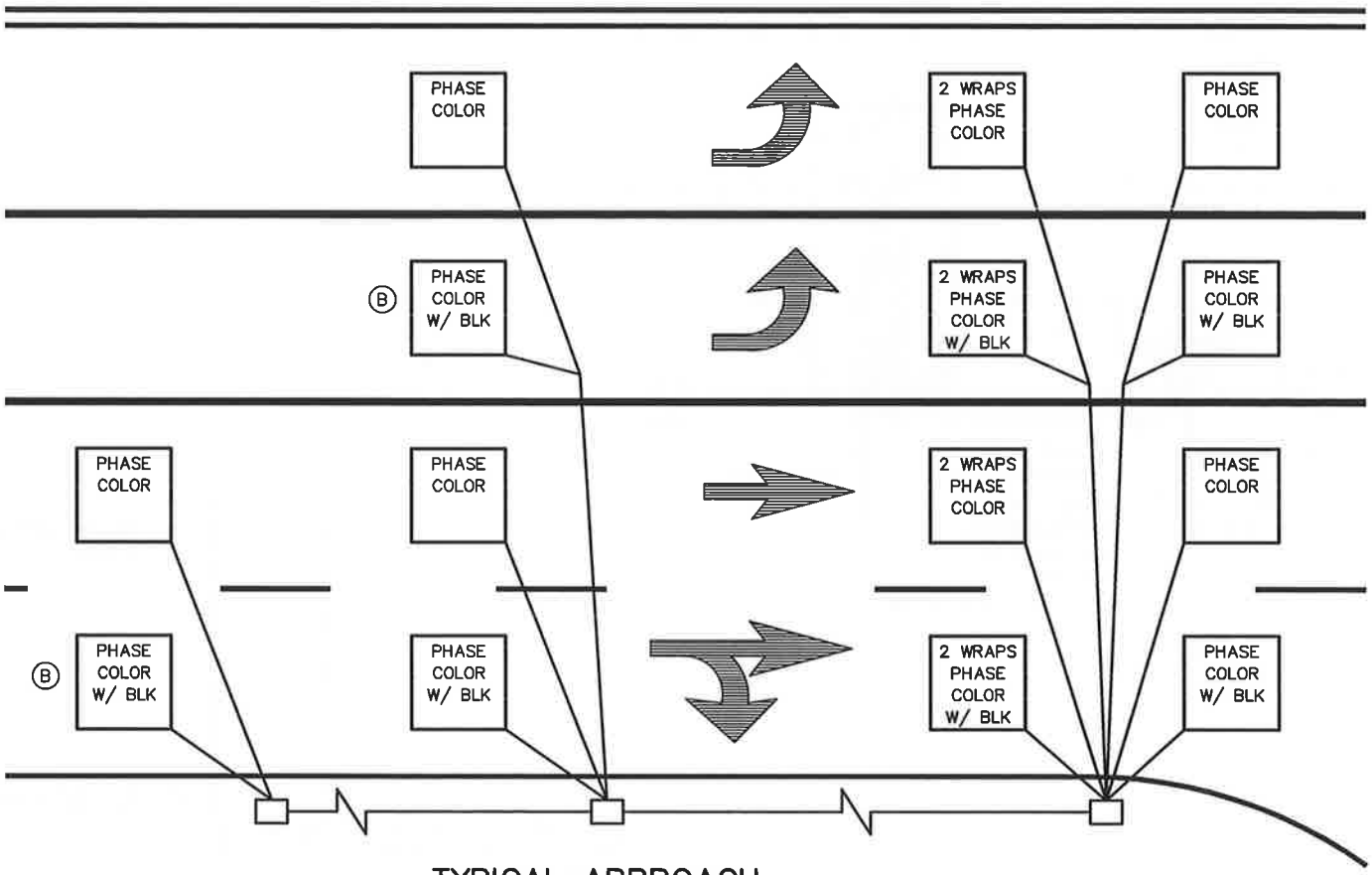
(G) CONDUIT SHALL BE INSTALLED IN SUCH A MANNER AS TO NOT CAUSE MODIFICATION OF THE CABINET.

(H) GRADE TO PROVIDE DRAINAGE AWAY FROM CABINET FOUNDATION.

(I) 6" WIDE ELECTRICAL HAZARD TAPE INSTALLED 1'–0" ABOVE CONDUIT (TYPICAL OF ALL CONDUIT).

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD CABINET FOUNDATION – DETAIL B	STANDARD DRAWING NO. SD–1111



TYPICAL APPROACH

LOOP PHASE COLOR CHART	
PHASE NO.	TAPE COLOR
1	RED
2	GREEN
3	YELLOW
4	BLUE
5	RED
6	GREEN
7	YELLOW
8	BLUE

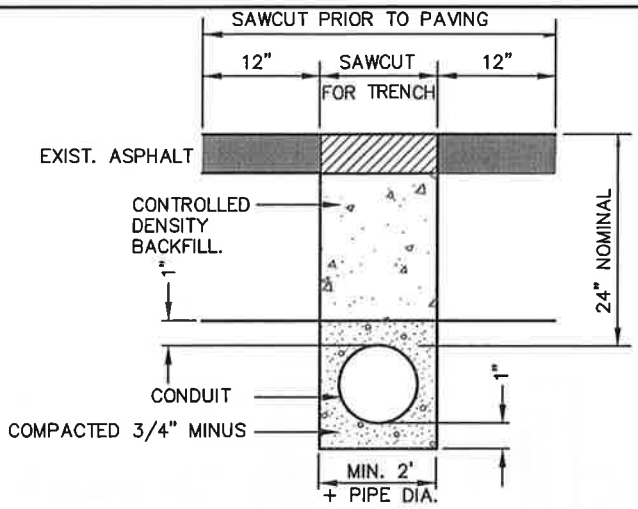
NOTE:

Ⓐ DETECTOR LOOP LEAD-IN CABLES SHALL BE COLOR CODED ACCORDING TO PHASE. SEE "TABLE A" ON ISPWC STANDARD DETAIL NO. SD-1103.

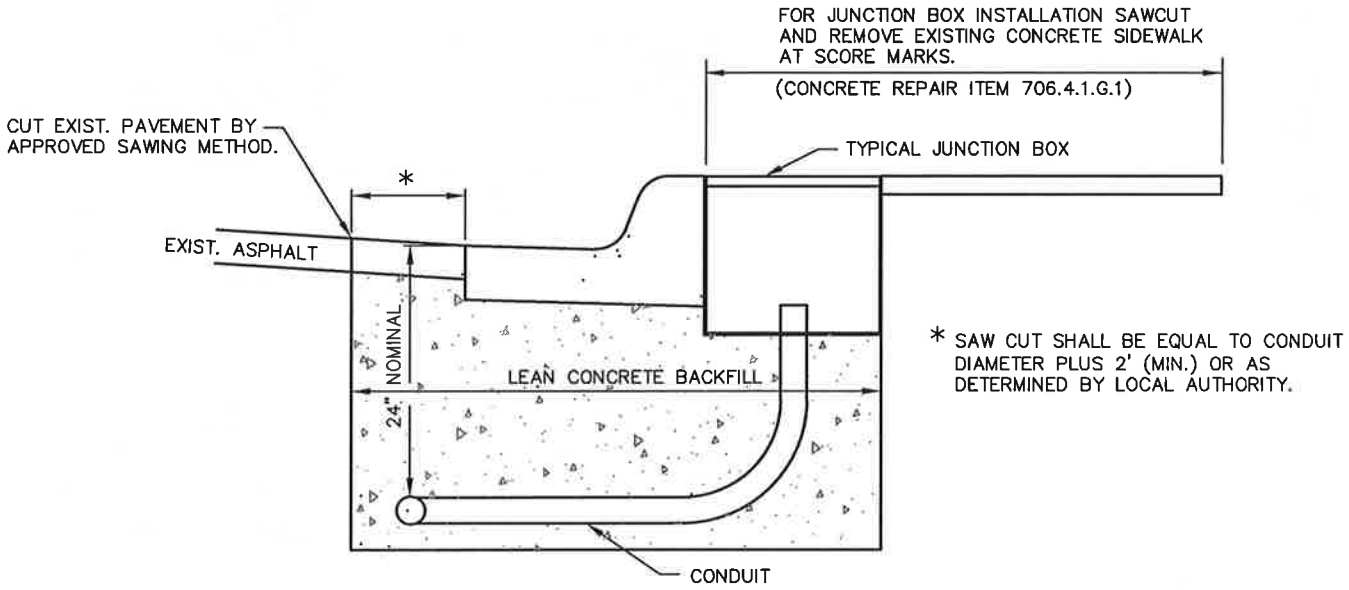
Ⓑ FOR SINGLE LANE PHASE MOVEMENT, DELETE COLOR CODING WITH BLACK WRAP. FOR MORE THAN ONE LANE PHASE MOVEMENT, ADD ONE BLACK WRAP PER PER ADDITIONAL LANE.

2015

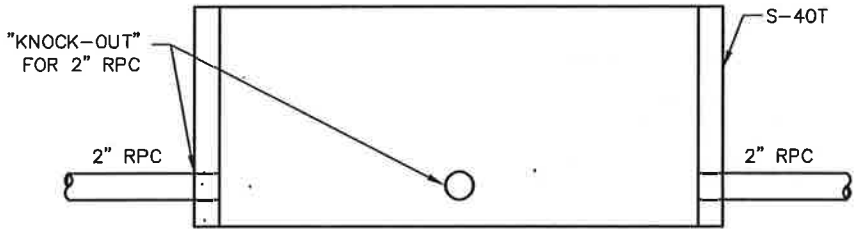
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD DETECTOR LOOP WIRE COLOR SCHEME DETAIL	STANDARD DRAWING NO. SD-1112



TYPICAL TRENCH AND CONDUIT INSTALLATION
(UNDER EXISTING PAVEMENT)



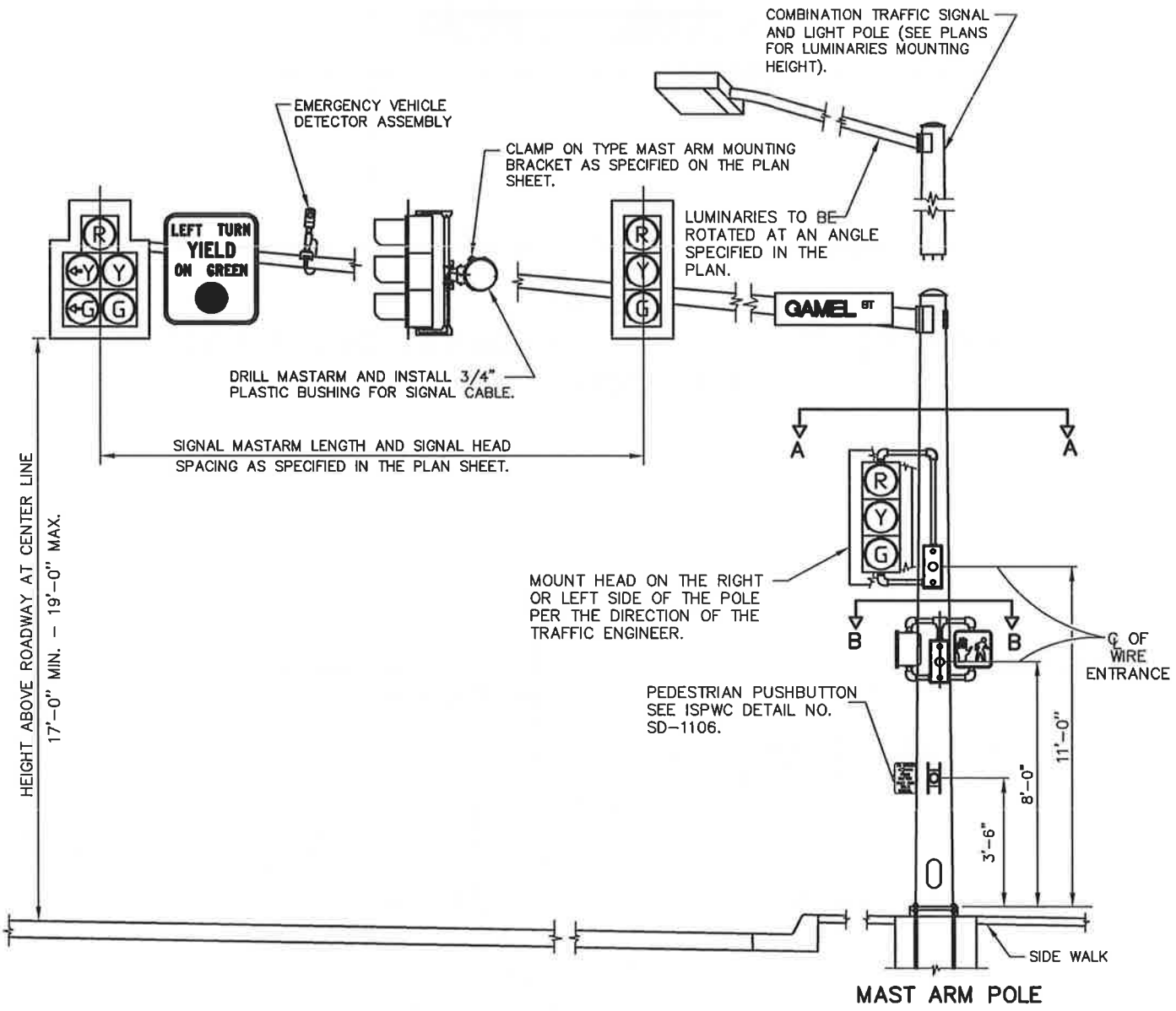
TYPICAL JUNCTION BOX INSTALLATION
(UNDER EXISTING CURB)



TYPICAL JUNCTION BOX INSTALLATION
DETAIL FOR INTERCONNECT

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TYPICAL JUNCTION BOX AND TRENCH DETAIL	STANDARD DRAWING NO. SD-1113



MAST ARM POLE

NOTES:

(A) THIS DRAWING SHOWS TYPICAL INSTALLATION DETAILS ONLY. SEE PLAN SHEETS FOR QUANTITY OF SIGNAL AND LIGHTING COMPONENTS TO BE INSTALLED.

(B) ORIENTATION OF SIGNAL COMPONENTS SHALL BE AS SHOWN UNLESS OTHERWISE SPECIFIED ON THE PLAN SHEETS.

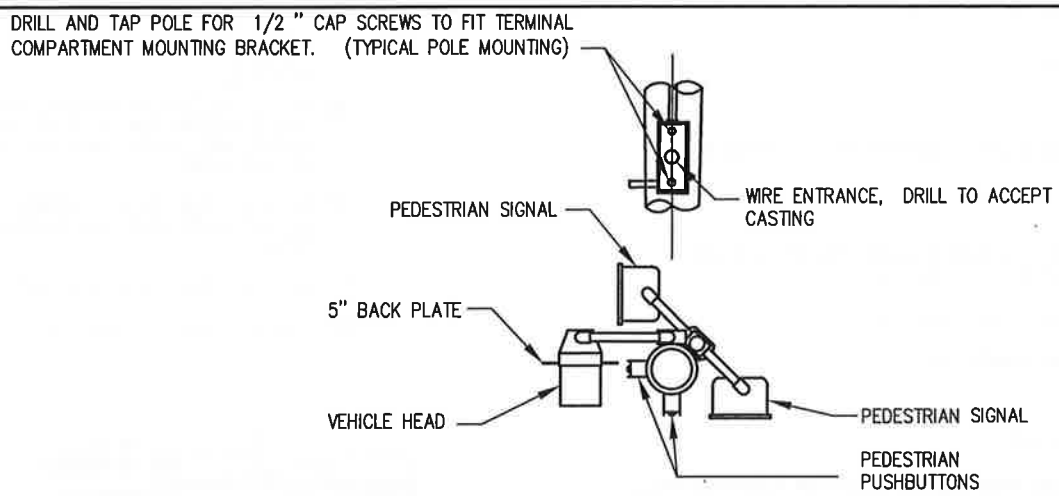
(C) SEE ISPWC SD-1109 FOR FOUNDATION DETAILS.

(D) ALL SIGNAL COMPONENTS SHALL BE LEVELED AFTER THE POLE HAS BEEN PLUMBED.

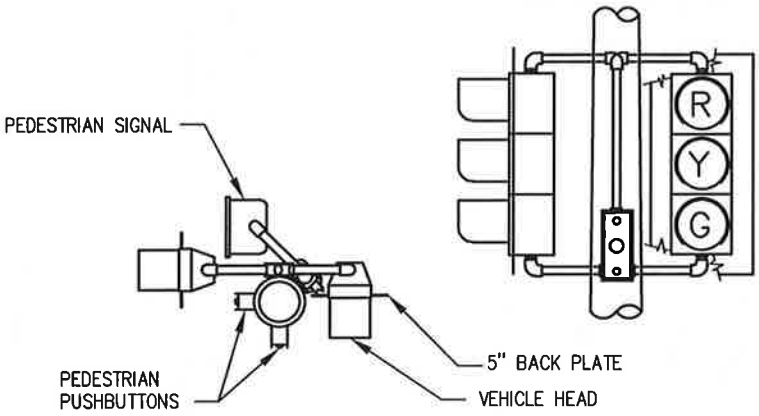
(E) SPECIFIC LOCATION OF EACH POLE INSTALLATION SHALL BE AS INDICATED ON THE PROJECT PLAN SHEETS.

2015

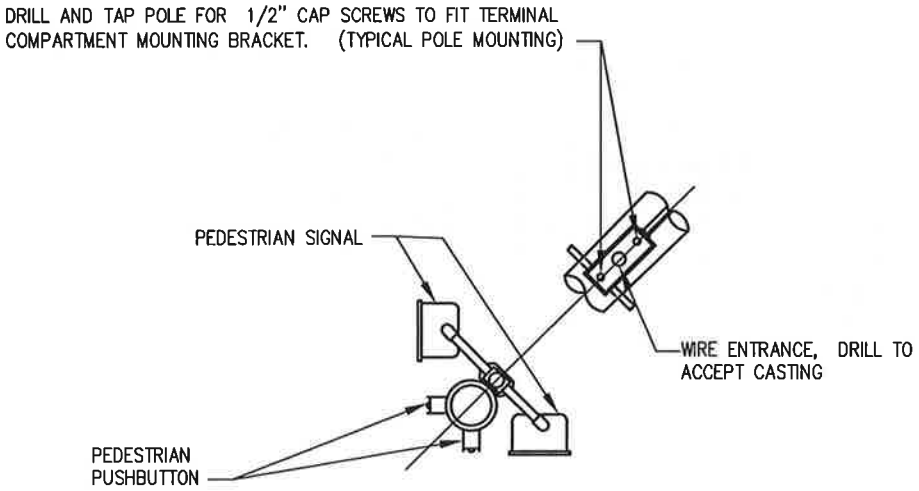
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD TRAFFICK SIGNAL MAST ARM AND POLE-DETAIL A	STANDARD DRAWING NO. SD-1114



VIEW A–A
(SD–1114)



POLE MOUNTED HEADS FOR
DUAL MASTARM INSTALLATION



VIEW B–B
(SD–1114)

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD TRAFFIC SIGNAL MAST ARM AND POLE–DETAIL B	STANDARD DRAWING NO. SD–1115

LEGEND

1. 6–#4 VERTICAL REBAR.
2. 6" LAP.
3. ANCHOR BOLT SIZES AND LOCATIONS PER MANUFACTURER'S SPECIFICATIONS.
4. 4" TO 6" STUBS.
5. INSULATED BUSHING REQUIRED WHEN CONDUIT IS USED. PER MANUFACTURE'S SPECIFICATIONS.
6. PER MANUFACTURE'S SPECIFICATIONS.
7. SIDEWALK LINE OR GRADE LINE
8. J–BOX.
9. 1" MINIMUM DIAMETER.
10. (4) ANCHOR BOLTS WITH DOUBLE NUTS FOR PLUMBING POLE, GALVANIZED, WITH (3) GALVANIZED NUTS AND (2) GALVANIZED WASHERS PER BOLT.
11. 4–#4 REBAR HOOPS.
12. C–3000 CONCRETE AS PER SECTION 700 ISPWC.
13. SEE STANDARD SPECIFICATIONS FOR REQUIRED FIXTURES.
14. GENERAL ELECTRIC ALUMINUM SEAMLESS SHAFT NO. C89H235 OR UNION METAL DESIGN 203 OR APPROVED EQUAL.
15. FUSE LOCATION.
16. WATER–TIGHT HANDHOLE.
17. BACKFILL TO BE COMPACTED TO 95%.

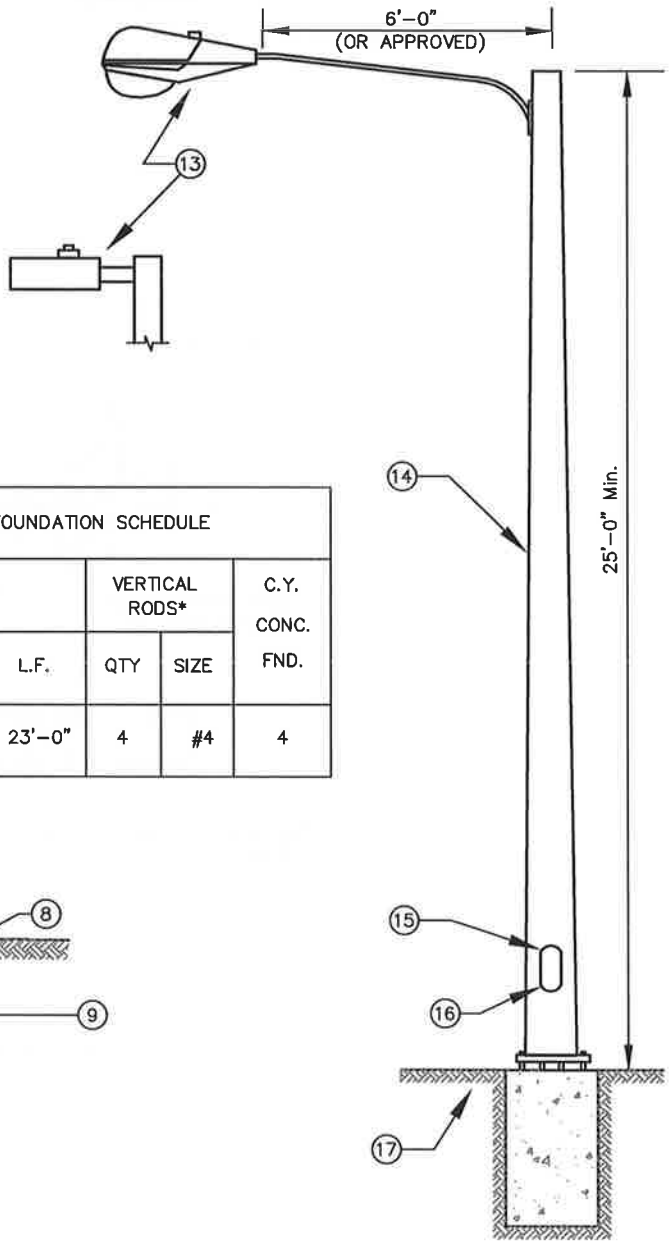
NOTE:

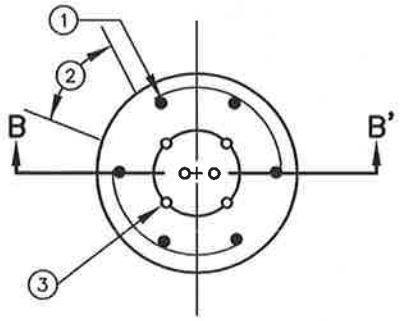
Ⓐ SEE ISPWC FOR EXCAVATION, BACKFILLING AND CONSTRUCTION OF POLE FOUNDATION, WIRING, AND ACCEPTANCE OR REJECTION OF THE WORK.

Ⓑ GROUND POLE TO THE SERVICE POINT VIA #6 AWG BARE WIRE PER NATIONAL ELECTRICAL CODE.

Ⓒ #10 AWG WIRE FROM LUMINAIRE TO FUSE.

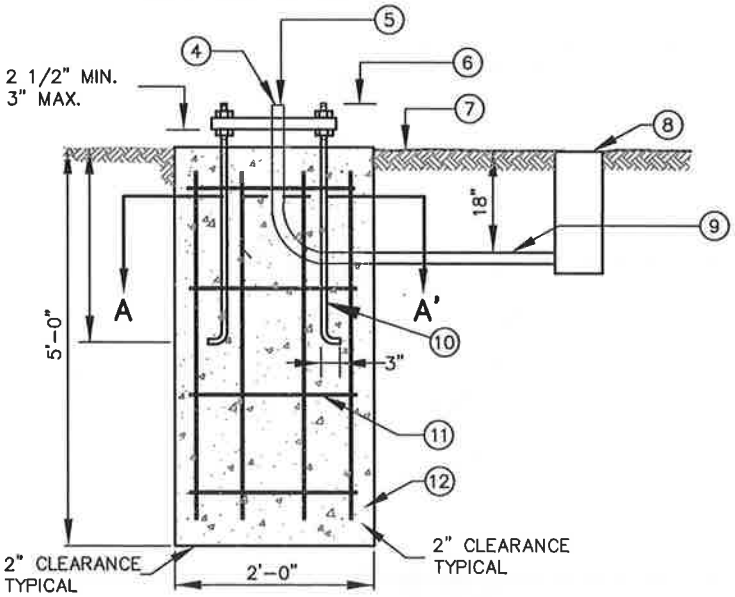
Ⓓ FOR GROUNDING DETAILS SEE SD–1121.





SECTION A–A'

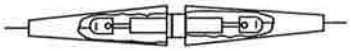
POLE FOUNDATION SCHEDULE					
HOOPS*			VERTICAL RODS*		C.Y. CONC. FND.
QTY.	SIZE	L.F.	QTY	SIZE	
4	#4	23'–0"	4	#4	4



TYPICAL POLE FOUNDATION
SECTION B–B'

2015

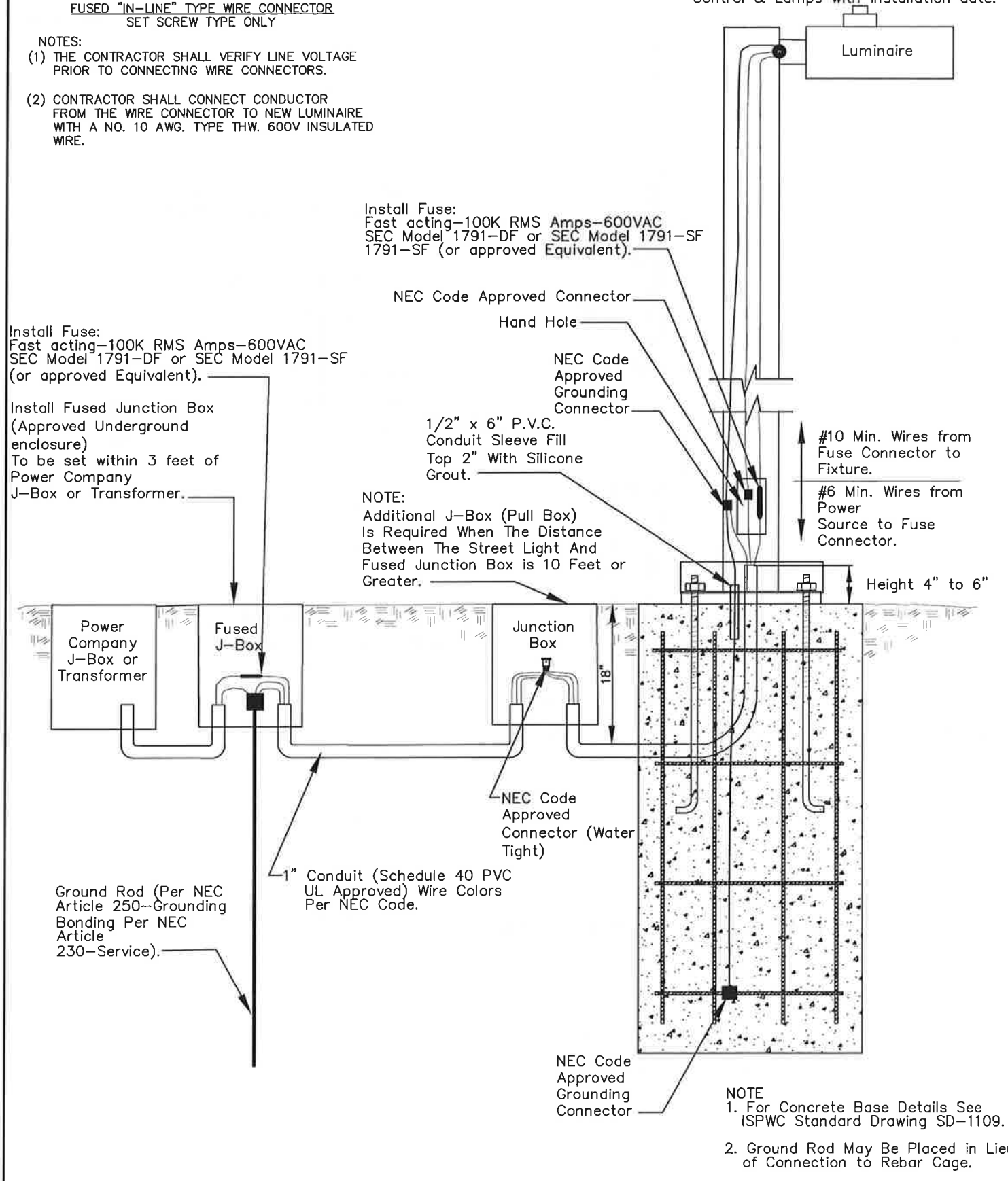
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	25' STANDARD METAL/FIBERGLASS STREETLIGHT WITH MAST ARM GREATER THAN 6'	STANDARD DRAWING NO. SD–1116



FUSED "IN-LINE" TYPE WIRE CONNECTOR
SET SCREW TYPE ONLY

NOTES:
(1) THE CONTRACTOR SHALL VERIFY LINE VOLTAGE PRIOR TO CONNECTING WIRE CONNECTORS.

(2) CONTRACTOR SHALL CONNECT CONDUCTOR FROM THE WIRE CONNECTOR TO NEW LUMINAIRE WITH A NO. 10 AWG. TYPE THW. 600V INSULATED WIRE.

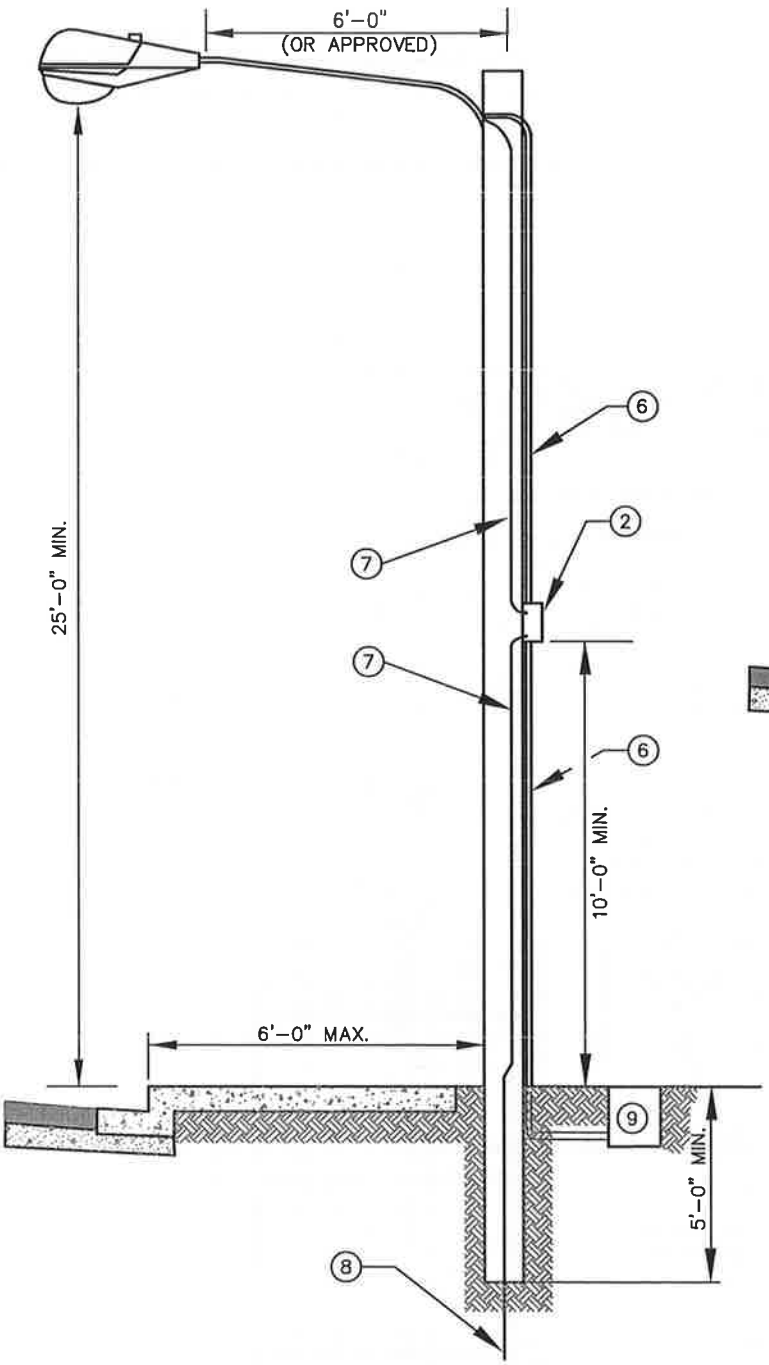


NOTE
1. For Concrete Base Details See ISPWC Standard Drawing SD-1109.

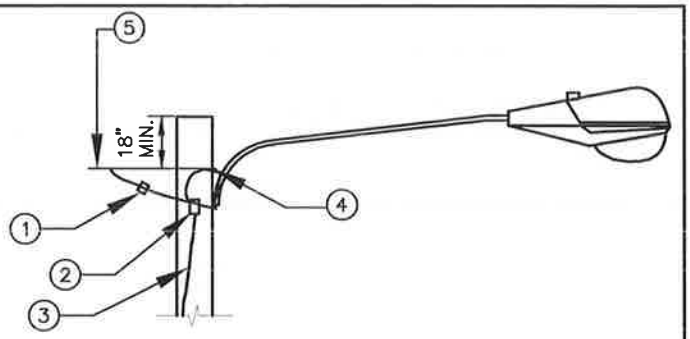
2. Ground Rod May Be Placed in Lieu of Connection to Rebar Cage.

2015

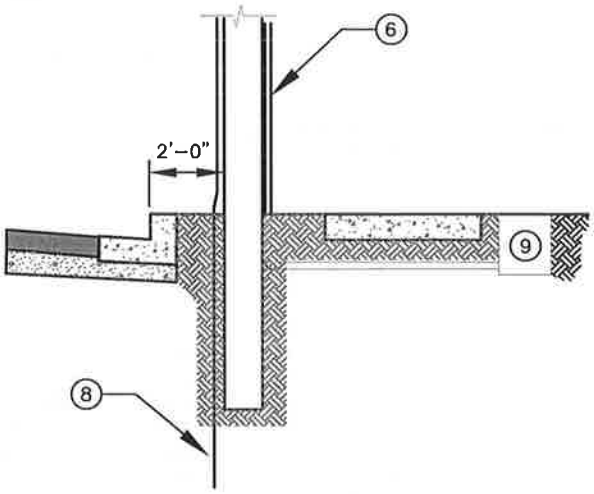
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STREET LIGHT INSTALLATION 25' STANDARD CONCRETE BASE	STANDARD DRAWING NO. SD-1117



POLE PLACED BEHIND SIDEWALK



STREET LIGHT SERVED
WITH DUPLEX CONDUCTOR



POLE PLACED BETWEEN
CURB AND SIDEWALK

LEGEND

1. PARALLEL CLAMP CONNECTOR.
2. DISCONNECT BOX.
3. GROUND WIRE.
4. BOND BRACKET TO POLE GROUND.
5. #6 AWG DUPLEX W/ASCR NEUTRAL MESSENGER FOR OVERHEAD POWER.
6. CONDUIT.
7. #6 AWG BARE GROUND WIRE FROM MASTARM TO DISCONNECT BOX TO GROUND ROD.
8. 8' LONG GROUND ROD.
9. J-BOX.

NOTES:

(A) ANY VARIANCES FROM THE ABOVE DRAWING TO BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.

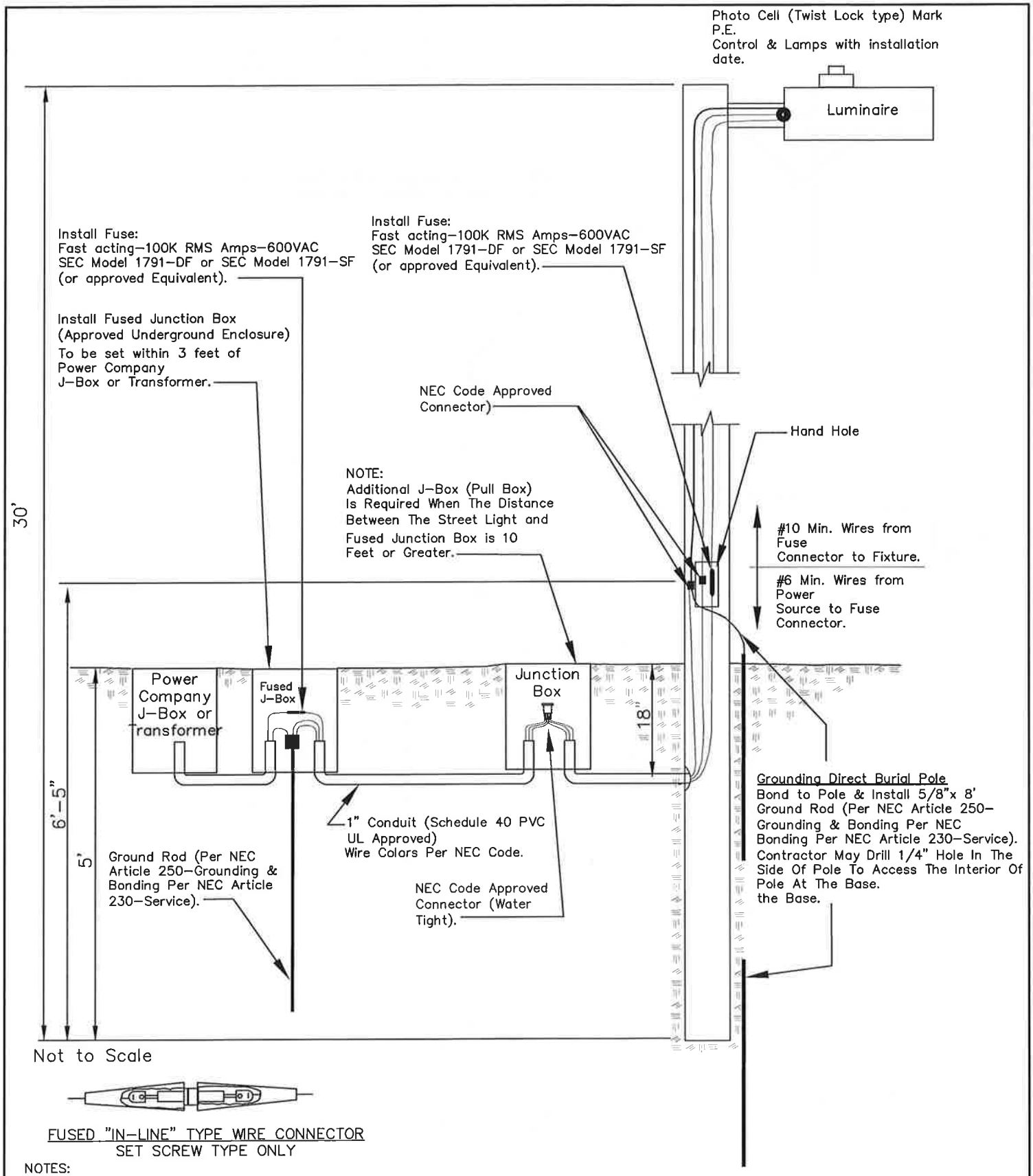
(B) BURIAL DEPTH-SEE POLE INSTALLATION DEPTH PER SECTION-1101.

(C) GROUND OR NEUTRAL CONDUCTOR INSULATION TO CONFORM TO NATIONAL ELECTRICAL CODE REQUIREMENTS.

(D) FOR GROUNDING DETAILS SEE DRAWING SD-1121.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD 25' WOOD POLE STREET LIGHT WITH 6' MAST ARM AND COBRA HEAD FIXTURE ONLY	STANDARD DRAWING NO. SD-1118



Not to Scale

FUSED "IN–LINE" TYPE WIRE CONNECTOR
SET SCREW TYPE ONLY

NOTES:

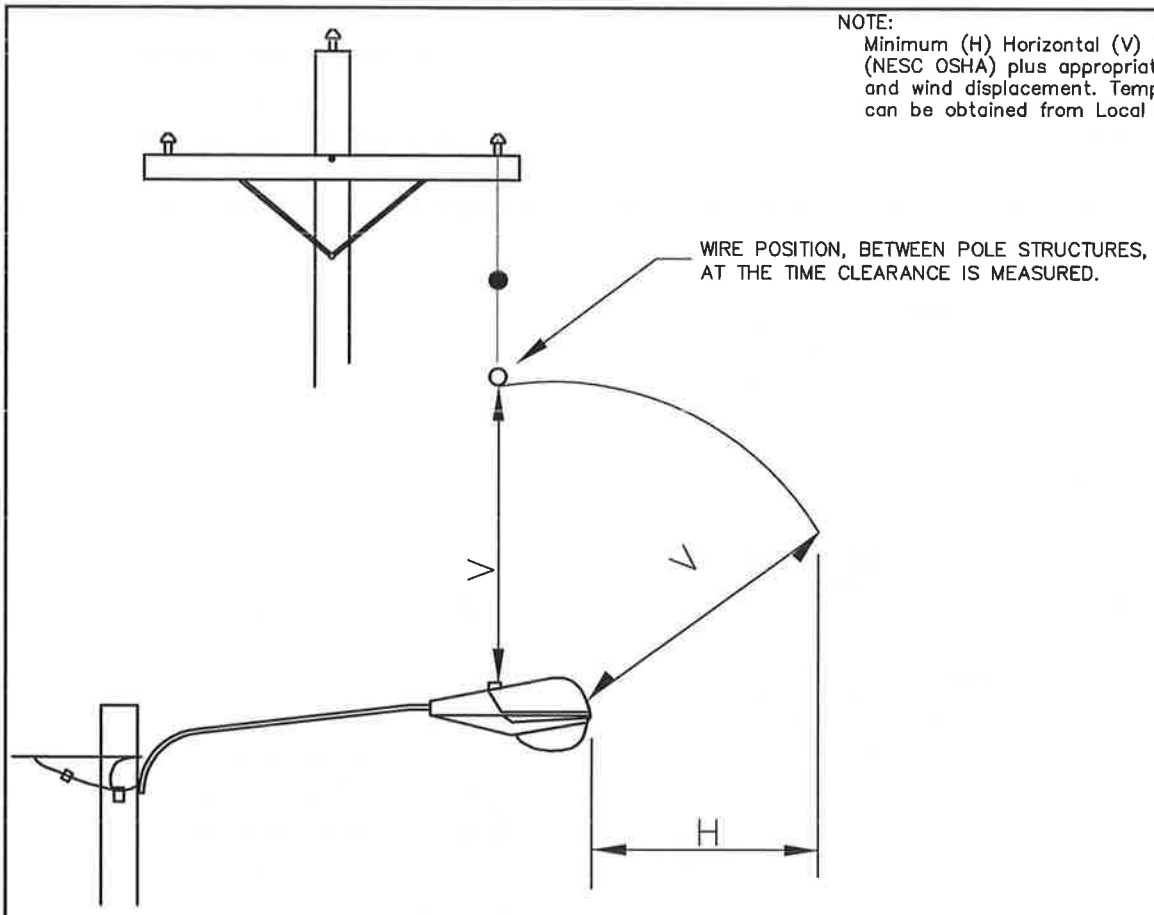
(1) THE CONTRACTOR SHALL VERIFY LINE VOLTAGE PRIOR TO CONNECTING WIRE CONNECTORS.

(2) CONTRACTOR SHALL CONNECT CONDUCTOR FROM THE WIRE CONNECTOR TO NEW LUMINAIRE WITH NO. 10 AWG. TYPE THW. 600V INSULATED WIRE.

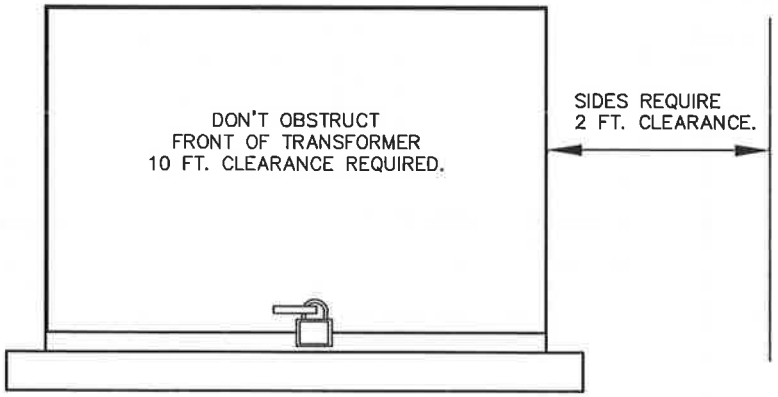
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STREET LIGHT INSTALLATION 25' STANDARD DIRECT BURIAL	STANDARD DRAWING NO. SD–1119

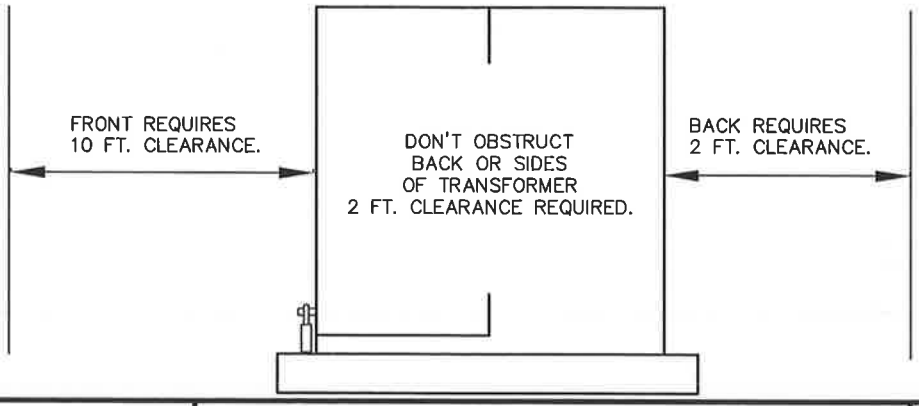
NOTE:
Minimum (H) Horizontal (V) Vertical clearances is 10 feet (NESC OSHA) plus appropriate provision for high temperature and wind displacement. Temperature and displacement data can be obtained from Local Power Company.



POWER TRANSFORMER

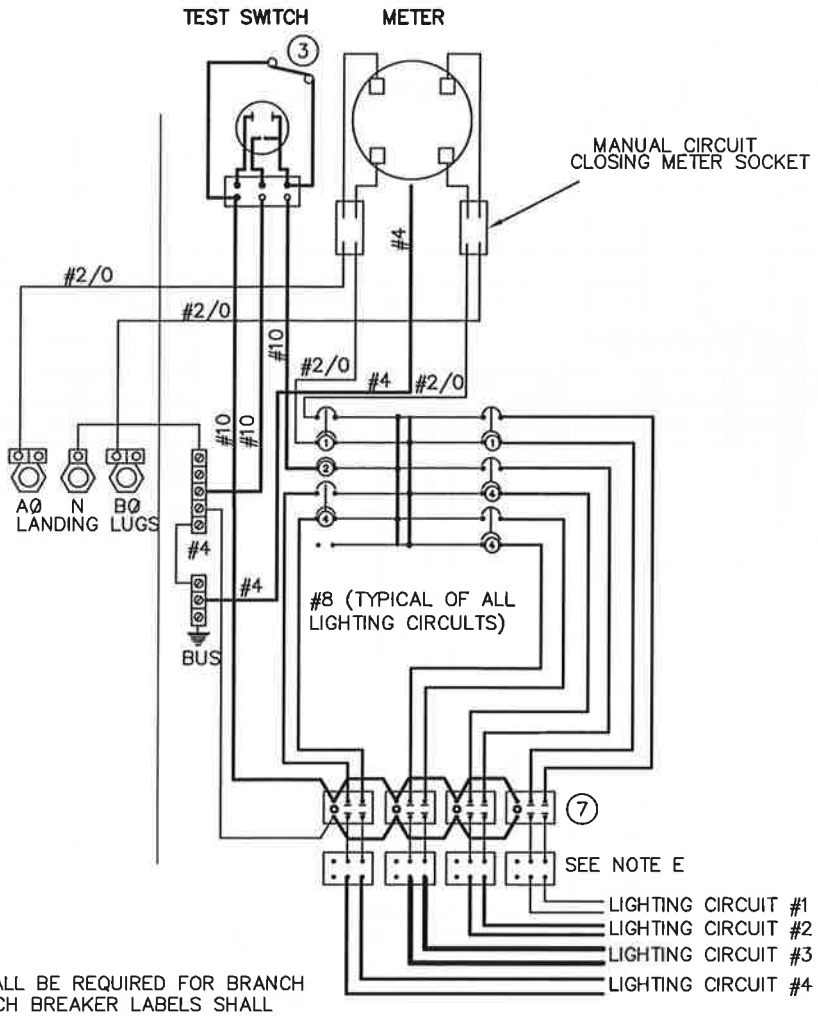


POWER TRANSFORMER



2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	REQUIRED POWER CLEARANCES	STANDARD DRAWING NO. SD-1122



NOTES:

(A) IDENTIFICATION LABELS SHALL BE REQUIRED FOR BRANCH BREAKERS. LIGHTING BRANCH BREAKER LABELS SHALL READ: "LIGHTING CIRCUIT NO. (SEE PLANS)".

(B) SERVICE CABINET TO BE NEMA TYPE 3R TO BE FURNISHED WITH A PADLOCK HASP.

(C) DEAD FRONT CONSTRUCTION IS REQUIRED ON ALL CABINETS.

(D) PLUG-IN TYPE BREAKER TO BE USED ON "B" SERVICES. MAIN BREAKERS TO BE BOLT RETAINED.

(E) PRESSURE TYPE TERMINALS TO BE REQUIRED FOR #8 THROUGH #2 AWG. WIRE.

(F) ALL SERVICES TO BE U.L. LABELED FOR MAXIMUM 200 AMP BUS RATING AND "APPROVED FOR SERVICE ENTRANCE EQUIPMENT."

(G) THE MAIN BREAKER LABEL TO BE MADE OF RED ON WHITE PLASTIC LAMINATE. THE BRANCH BREAKER LABELS TO BE MADE OF BLACK ON WHITE PLASTIC LAMINATE. THE LEGENDS TO BE ENGRAVED INTO THE STRIP SO AS PROVIDE WHITE LEGENDS ON THE REQUIRED BACKGROUND. THE LABELS TO BE PERMANENTLY ATTACHED TO THE DEAD FRONT, NEXT TO THE CORRESPONDING BREAKERS.

(H) BRANCH CIRCUIT BREAKERS, BRANCH CIRCUIT WIRE, AND PHOTOELECTRIC CONTROL TO BE SUPPLIED BY THE CONTRACTOR.

(I) ALL BUSSING TO BE 200 AMP RATED.

(J) WIRING TO BE THWN/MTW 600V 90° C RATED.

SERVICE CABINET SCHEDULE

ITEM		CLASS "B"
1	MAIN BREAKER	(SEE SCHEDULE)
2	CONTROL BREAKER	IP-15A 120/240 VOLT
3	TEST SWITCH	SPST-15A 120/240 VOLT
4	LIGHTING BRANCH BREAKER	2P-120/240 VOLT (SEE SCHEDULE)
5	SIGNAL CONTROL BREAKER	IP-120/240 VOLT (SEE SCHEDULE)
6	DRY TRANSFORMER	NONE
7	LIGHTING CONTRACTOR	8P (ANY COMBINATION)
8	FLASHER CONTROL BREAKER	

BREAKER RATING SCHEDULE

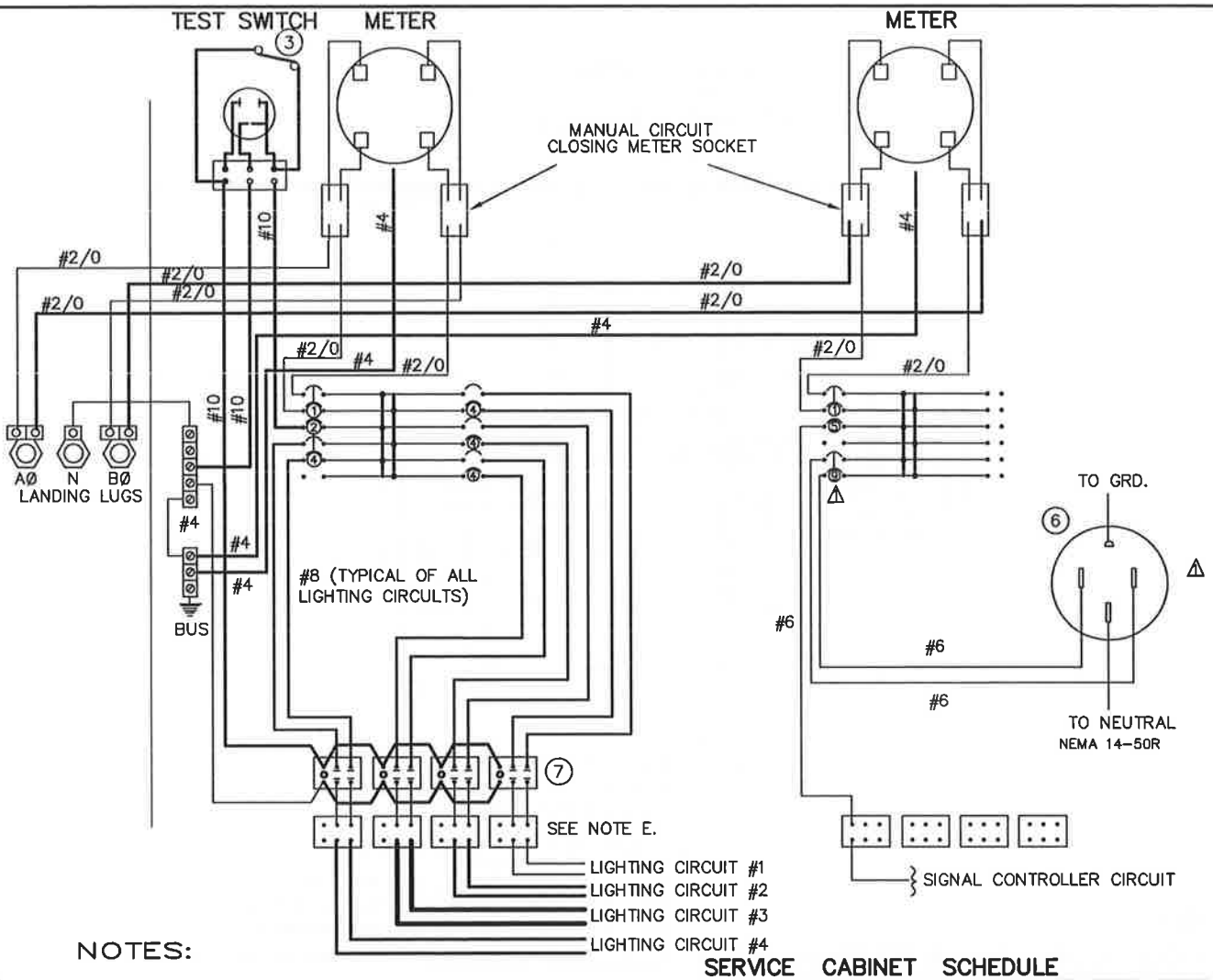
CLASS "B"	
ITEM	NO. OF LIGHTING CIRCUITS
MAIN BREAKER	100 AMP 2P
LIGHTING BRANCH BREAKER	30 AMP 2P
SIGNAL CONTROL BREAKER	
LIGHTING CONTACTOR	30 AMP 8P
SERVICE WIRE	NO.3 THWN

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

METERED ILLUMINATION ELECTRICAL SERVICE PEDESTAL

STANDARD DRAWING NO. SD-1125



NOTES:

(A) IDENTIFICATION LABELS ARE REQUIRED FOR BRANCH BREAKERS. LIGHTING BRANCH BREAKER LABELS TO READ: LIGHTING CIRCUIT NO. (SEE PLANS). "SIGNAL BRANCH BREAKER LABELS TO READ: "SIGNAL AT (IDENTIFY TWO LEGS OF THE INTERSECTION)."

(B) SERVICE CABINET TO BE NEMA TYPE 3R TO BE FURNISHED WITH A PADLOCK HASP.

(C) DEAD FRONT CONSTRUCTION IS REQUIRED ON ALL CABINETS.

(D) PLUG-IN TYPE BREAKER TO BE USED ON "B" SERVICES. MAIN BREAKERS TO BE BOLT RETAINED.

(E) PRESSURE TYPE TERMINALS TO BE REQ'D FOR #8 THROUGH #2 AWG. WIRE.

(F) ALL SERVICES TO BE U.L. LABELED FOR MAXIMUM 200 AMP BUS RATING AND "APPROVED FOR SERVICE ENTRANCE EQUIPMENT."

(G) THE MAIN BREAKER LABEL TO BE MADE OF RED ON WHITE PLASTIC LAMINATE. THE BRANCH BREAKER LABELS TO BE MADE OF BLACK ON WHITE PLASTIC LAMINATE. THE LEGENDS TO BE ENGRAVED INTO THE STRIP SO AS PROVIDE WHITE LEGENDS ON THE REQUIRED BACKGROUND. THE LABELS TO BE PERMANENTLY ATTACHED TO THE DEAD FRONT, NEXT TO THE CORRESPONDING BREAKERS.

(H) BRANCH CIRCUIT BREAKERS, BRANCH CIRCUIT WIRE, AND PHOTOELECTRIC CONTROL TO BE SUPPED BY THE CONTRACTOR.

(I) ALL BUSSING TO BE 200 AMP RATED.

(J) WIRING TO BE THWN/MTW 600V 90° C RATED.

SERVICE CABINET SCHEDULE

	ITEM	CLASS "B"
(1)	MAIN BREAKER	(SEE SCHEDULE)
(2)	CONTROL BREAKER	IP-15A 120/240 VOLT
(3)	TEST SWITCH	SPST-15A 120/240 VOLT
(4)	LIGHTING BRANCH BREAKER	2P-120/240 VOLT (SEE SCHEDULE)
(5)	SIGNAL CONTROL BREAKER	IP-120/240 VOLT (SEE SCHEDULE)
(6)	NEMA 14-50R	120/240 VOLT
(7)	LIGHTING CONTRACTOR	8P (ANY COMBINATION)
(8)	FLASHER CONTROL BREAKER	1P-120/240 VOLT (SEE SCHEDULE)
(9)	RECEPTILE BRANCH BKR.	2P-120/240 VOLT (SEE SCHEDULE)

BREAKER RATING SCHEDULE

CLASS "B"	
ITEM	NO. OF LIGHTING CIRCUITS
MAIN BREAKER (METERED SIG. STATION)	100 AMP 2P
MAIN BREAKER (METERED LTG. SECTION)	100 AMP 2P
LIGHTING BRANCH BREAKER	30 AMP 2P
SIGNAL CONTROL BREAKER	60 AMP 1P
LIGHTING CONTRACTOR	30 AMP 4P
RECEPTICLE BRANCH BREAKER	50 AMP 2P
FLASHER CONTROL BREAKER	
SERVICE WIRE	NO.3 THWN

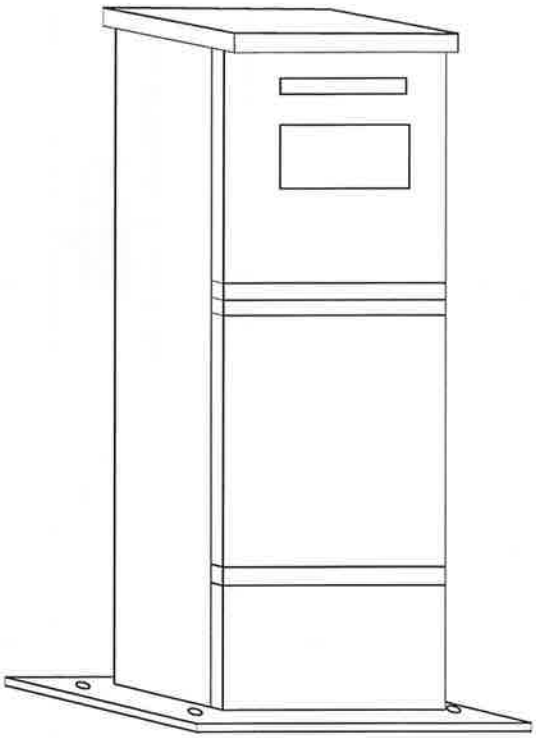
2015

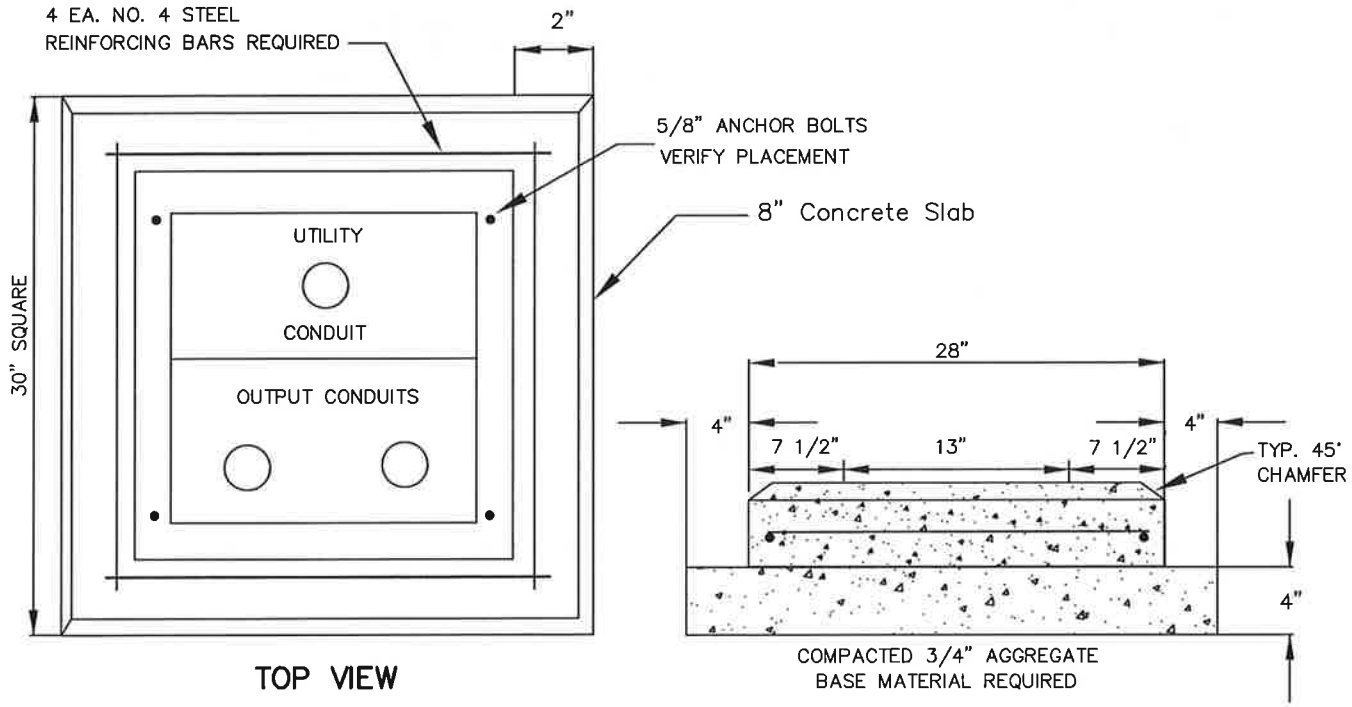
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION

METERED ILLUMINATION AND METERED SIGNALIZATION ELECTRICAL SERVICE PEDESTAL

STANDARD DRAWING NO. SD-1126

TYPICAL SERVICE PEDESTAL



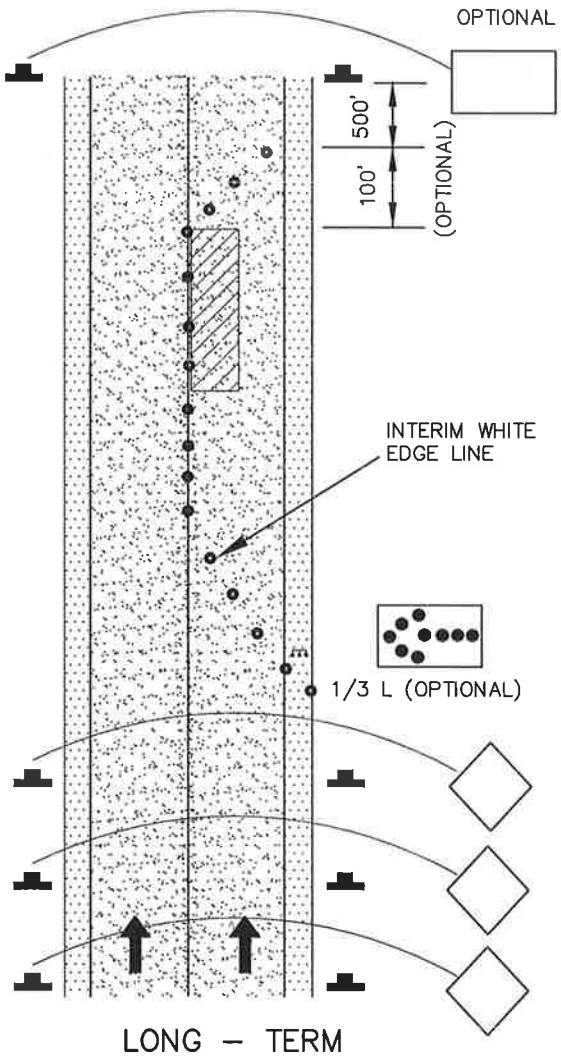


TOP VIEW

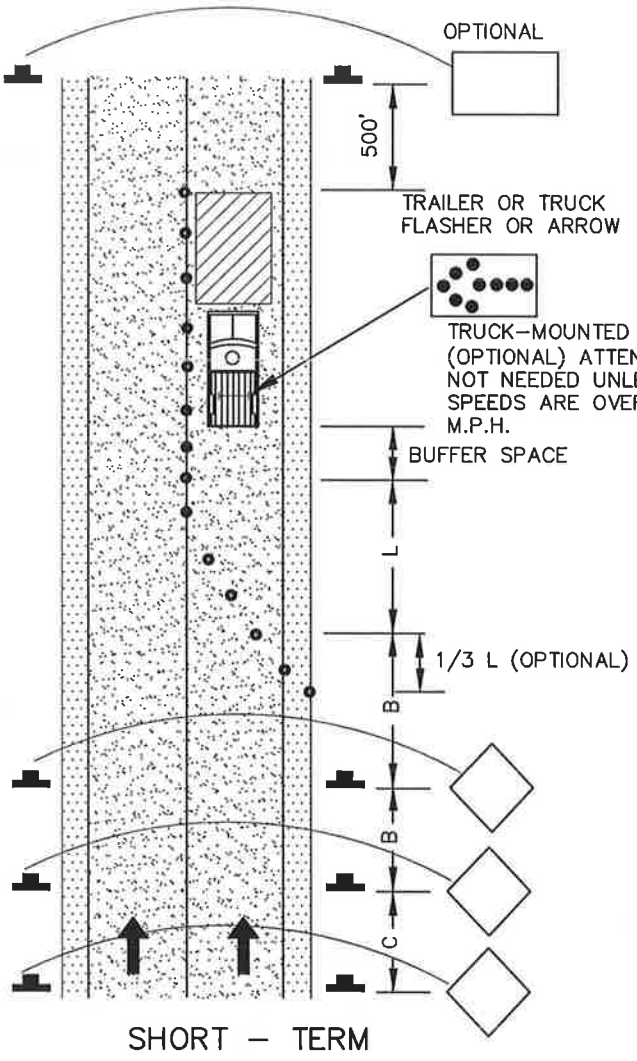
PROFILE

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STREET LIGHT SERVICE PEDESTAL BASE	STANDARD DRAWING NO. SD-1127



LONG – TERM



SHORT – TERM

ROAD TYPE	DISTANCE BETWEEN SIGNS		
	A	B	C
URBAN (LOW SPEED*)	200	200	200
URBAN (HIGH SPEED*)	350	350	350
RURAL	500	500	500
EXPRESSWAY / FREEWAY	1,000	1,600	2,600

FORMULAS FOR L**

SPEED	FORMULA
40 MPH OR LESS	$L = \frac{WS^2}{40}$
45 MPH OR GREATER	$L = \frac{WS^2}{45}$

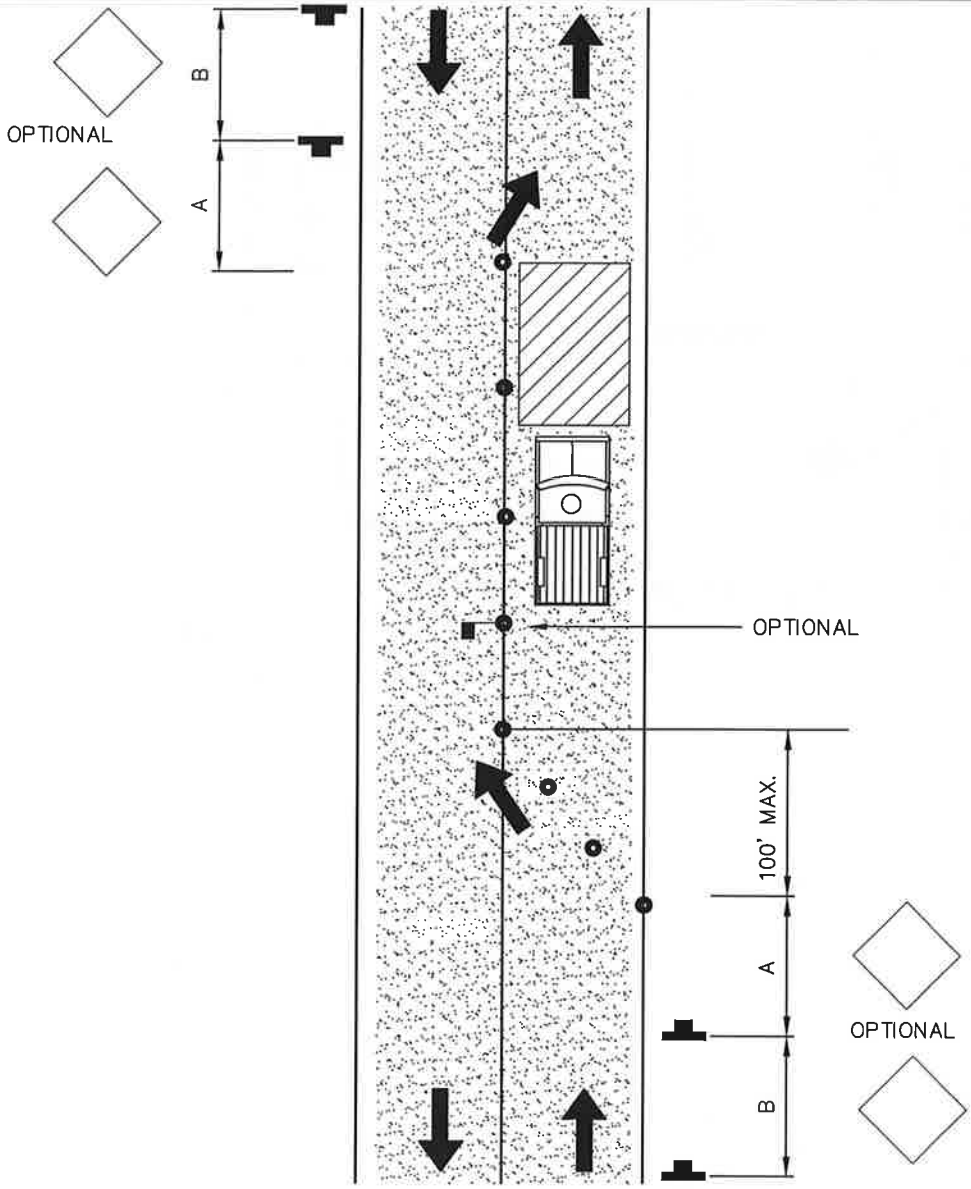
* SPEED CATEGORY TO BE DETERMINED BY STATE HIGHWAY AGENCY IN COOPERATION WITH LOCAL JURISDICTIONS.

** L = TAPER LENGTH IN FEET.
W = WIDTH OF OFFSET IN FEET.
S = POSTED SPEED, THE OFF–PECK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.

PLACING WORK ZONE TRAFFIC CONTROL DEVICES (ONE WAY STREET ONLY)

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONSTRUCTION TRAFFIC CONTROL	STANDARD DRAWING NO. SD–1128



ROAD TYPE	DISTANCE BETWEEN SIGNS		
	A	B	C
URBAN (LOW SPEED*)	200	200	200
URBAN (HIGH SPEED*)	350	350	350
RURAL	500	500	500
EXPRESSWAY/FREEWAY	1,000	1,600	2,600

FORMULAS FOR L**

SPEED	FORMULA
40 MPH OR LESS	$L = \frac{WS^2}{40}$
45 MPH OR GREATER	$L = \frac{WS^2}{45}$

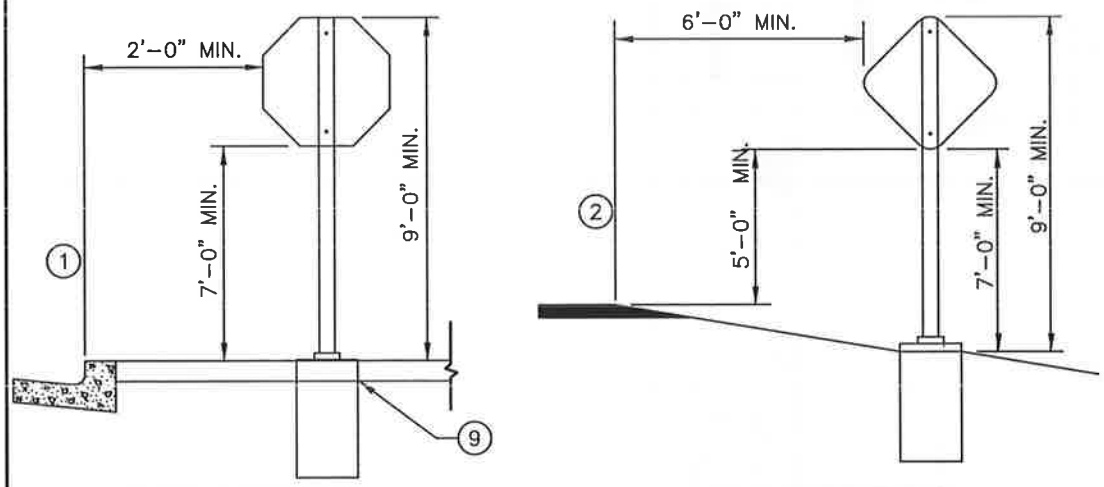
* SPEED CATEGORY TO BE DETERMINED BY STATE HIGHWAY AGENCY IN COOPERATION WITH LOCAL JURISDICTIONS.

** L = TAPER LENGTH IN FEET.
W = WIDTH OF OFFSET IN FEET.
S = POSTED SPEED, THE OFF-PECK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.

2015

LANE CLOSURE ON MINOR STREET

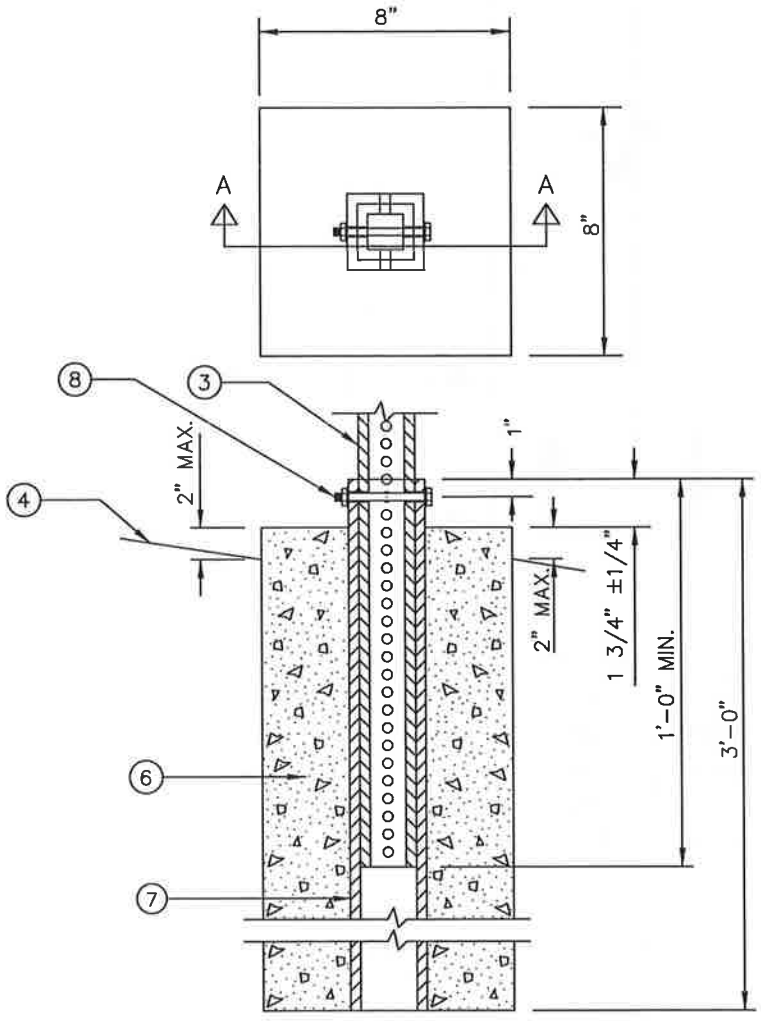
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONSTRUCTION TRAFFIC CONTROL	STANDARD DRAWING NO. SD-1129



URBAN LOCATIONS
WITH CURB AND GUTTER

RURAL LOCATIONS

TYPICAL INSTALLATION FOR SIGNS



SECTION AA

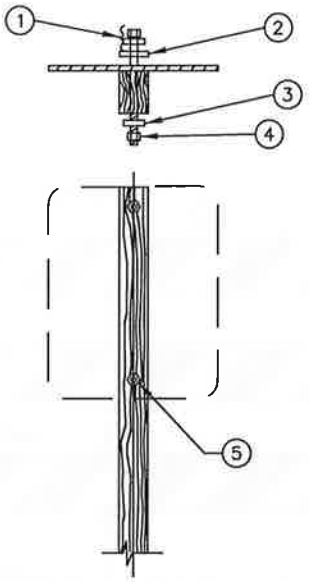
LEGEND

1. FACE OF CURB.
2. NORMAL SHOULDER LOCATION.
3. TYPE E-1 SIGN POST.
   2" x 2" PERFORATED SQUARE TUBING.
   12 GAUGE (0.105" WALL THICKNESS).
   2.416 LB./FT. WEIGHT.
4. GROUND LINE.
5. 3/8" x 3" HEX HEAD BOLT
   W/LOCKNUT & 2 FLAT WASHERS.
6. CLASS 3000 psi CONCRETE.
7. TYPE E-1 ANCHOR POST.
   2 1/2" x 2 1/2" SQUARE TUBING.
   3/16" WALL THICKNESS
   NO PERFORATIONS.
   5.59 LB./FT. WEIGHT.
8. 12" DIA. CIRCULAR CONCRETE FOUNDATION x 3'-0" DEPTH MAY BE USED IN LIEU OF 8"x8" SQUARE FOUNDATION.
9. INSTALL ½" JOINT MATERIAL AROUND FOUNDATIONS PERIMETER.

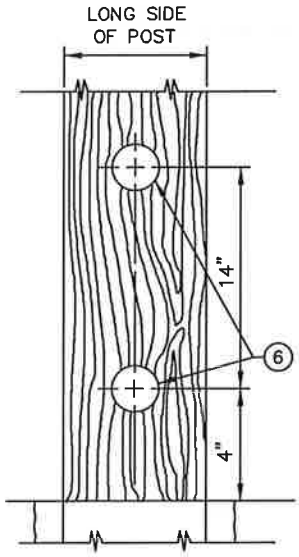
TYPE E-1
SIGN POST INSTALLATION DETAILS
WITH ONE PIECE ANCHOR POST

2015

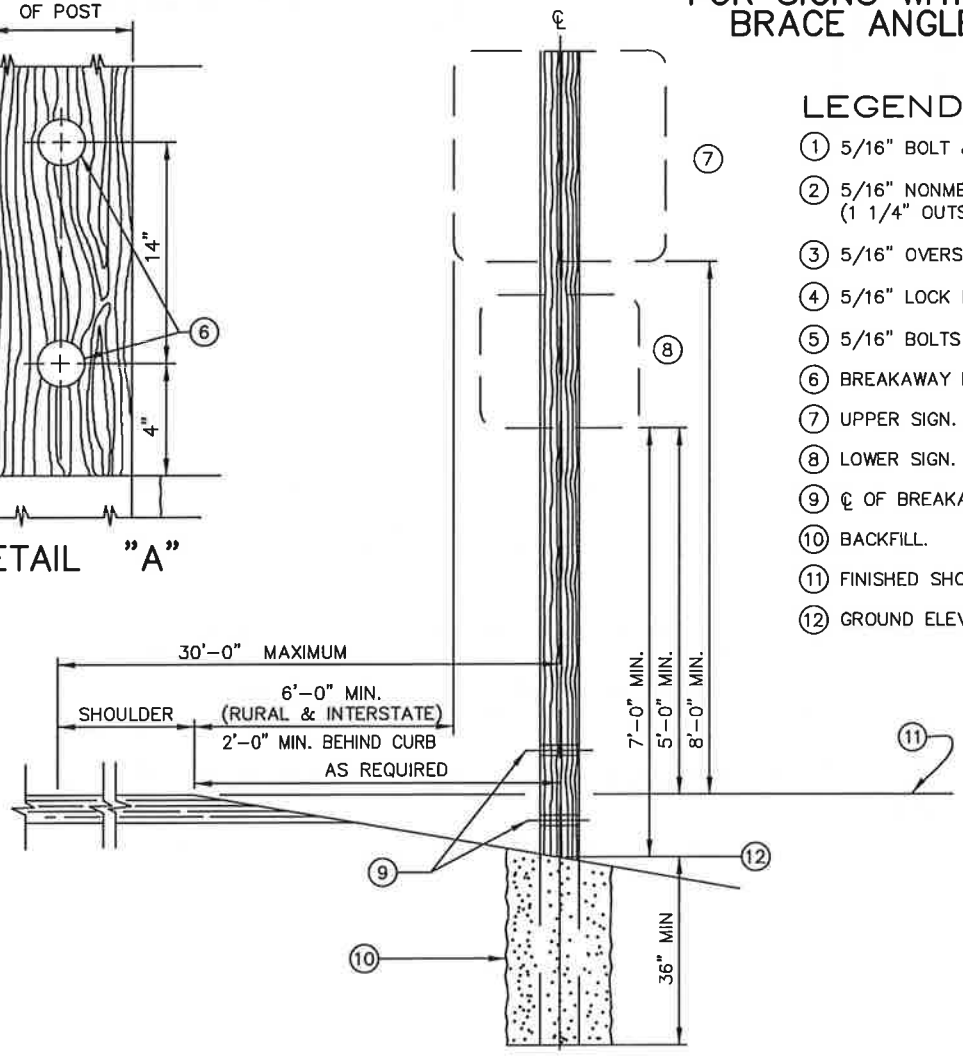
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	SIGN INSTALLATION	STANDARD DRAWING NO. SD-1130



TYPICAL MOUNTING
FOR SIGNS WITHOUT
BRACE ANGLES



DETAIL "A"



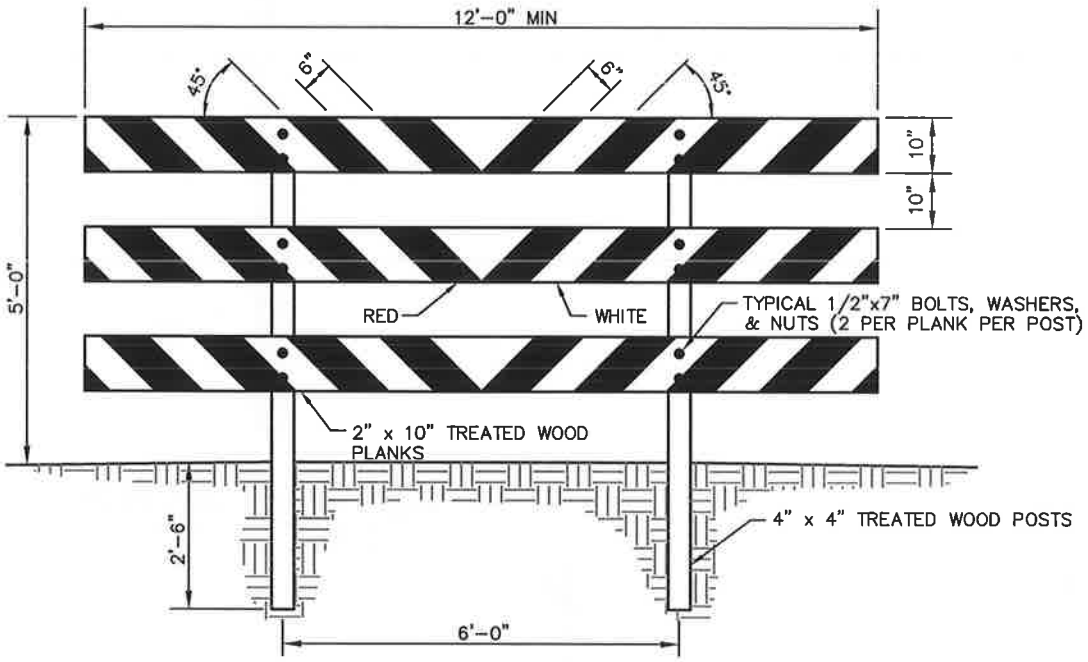
LEGEND

1. 5/16" BOLT & METAL FLAT WASHER.
2. 5/16" NONMETALLIC OVERSIZED WASHER (1 1/4" OUTSIDE DIA.).
3. 5/16" OVERSIZED WASHER.
4. 5/16" LOCK NUT.
5. 5/16" BOLTS THRU THE POST.
6. BREAKAWAY HOLES. SEE TABLE FOR SIZE.
7. UPPER SIGN.
8. LOWER SIGN.
9. ℄ OF BREAKAWY HOLES
10. BACKFILL.
11. FINISHED SHOULDER ELEV. OR ELEV. TOP OF CURB.
12. GROUND ELEV.

INSTALLATION DETAIL

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	SIGN INSTALLATION	STANDARD DRAWING NO. SD–1131



N.T.S.

NOTES:

(A) THE ABOVE BARRICADE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR WHERE CALLED FOR ON THE PLANS.

(B) MARKINGS FOR BARRICADE RAILS SHALL BE RED AND WHITE STRIPES (SLOPING DOWNWARD AT AN ANGLE OF 45° IN THE DIRECTION TRAFFIC IS TO PASS).

(C) WHERE BARRICADE EXTENDS ENTIRELY ACROSS ROADWAY, IT IS DESIRABLE THAT THE STRIPES SLOPE DOWNWARD IN THE DIRECTION WHICH TRAFFIC MUST TURN IN DETOURING. WHERE BOTH RIGHT AND LEFT TURNS ARE PROVIDED FOR, THE CHEVRON STRIPPING MAY SLOPE DOWNWARD IN BOTH DIRECTIONS FROM THE CENTER OF THE BARRICADE.

(D) THE ENTIRE AREA OF RED AND WHITE STRIPES SHALL BE REFLECTORIZED SO AS TO BE VISIBLE UNDER NORMAL ATMOSPHERIC CONDITIONS FROM A MINIMUM DISTANCE OF 1,000 FEET WHEN ILLUMINATED BY THE LOW BEAMS OF STANDARD AUTOMOBILE HEADLIGHTS.

(E) FREE STANDING BARRICADES SHALL BE BUILT SIMILAR, BUT 4"x4" POSTS SHALL BE 5'-0" LONG AND SHALL HAVE 2" x 6" x 4'-0" LONG SUPPORTS SET 90°TO AND CENTERED ON POST FOR SUPPORT AND ATTACHED WITH 2-1/2"x7" BOLTS WITH WASHERS AND NUTS.

(F) ALL SURFACES SHALL BE PAINTED WITH MINIMUM TWO COATS OF WHITE OIL BASE PAINT. ALL PAINTS SHALL BE REFLECTORIZED.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	TERMINUS BARRICADE	STANDARD DRAWING NO. SD-1132

ISPWC – DIVISION 2000

Miscellaneous

Section 2010 – Mobilization
Section 2020 – Survey Monuments
Section 2030 – Utility Adjustments
Section 2040 – Fencing
Section 2050 – Construction Geotextiles

SECTION 2010

MOBILIZATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of preparatory work including but not limited to:

1. Movement of personnel.

2. Movement of equipment.

3. Project site supplies and incidentals.

4. Establishment of project offices, buildings and other facilities.

5. All work and operations which must be performed or costs incurred before beginning work on the various contract items.

6. Work signs.

PART 2 MATERIALS

2.1 GENERAL

A. When directed, install work signs per Standard Drawings SD-2010 A - Installation of Informational Signs, SD-2010 B-Owner Informational Signs and SD-2010 C-Utility Informational Signs.

PART 3 WORKMANSHIP

3.1 PROJECT INFORMATIONAL SIGNS

A. Furnish, install and subsequently remove informational signs at each end of the Project. Informational signs shall be in accordance with Standard Drawings SD-2010A, SD-2010B and SD-2010C in the ISPWC. Furnish and place the information signs at the time they place their other construction signs, barricades and traffic control devices, and shall remove the signs upon completion of the work. Two sizes of signs are designated. One size designation is for projects that are one month or longer in duration. All costs incurred for signs, barricades and traffic control devices shall be included under Item 2010.4.1.A.1 in the Bid Schedule.

3.2 SANITARY FACILITIES

A. When included in the Bid Schedule, provide and maintain enclosed portable restroom facilities for the use of Project personnel. Provide at least one restroom for each ten (10) full-time employees. Maintain the restroom facilities in a neat and sanitary condition and, as a minimum, clean and service the facilities on a weekly basis.

B. Place the facilities in a location which is in reasonable walking access distance for the Contractor's employees. This may necessitate periodic relocation for moving operations. Place the facilities in a location which minimizes the visual impact on adjacent property owners and in a location and placement method which minimizes the possibility of vandalism. On some projects, this may require placing the restroom facilities on trailers to allow for daily removal from the site and storage during non-working hours in a secure location.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following lump sum Bid Item as indicated in the Bid Schedule. Includes all labor, material and equipment required to perform the work as specified. All mobilization costs for subcontractors is considered incidental to this bid item. If not listed in the Bid Schedule, mobilization is incidental to other Bid Items.

A. Mobilization: By the lump sum. Allowable amounts for partial payment of mobilization are as follows: 1) 60% of the contract unit price or 6% of the total contract amount, whichever is less, will be paid on the first monthly progress estimate. 2) 40% of the contract unit price or 4% of the total contract amount, whichever is less, will be paid on the second monthly progress estimate providing that productive work on the project has been initiated. 3) Upon completion of all work on the project, payment of any amount bid for mobilization in excess of 10% of the total original contract amount will be paid.

Total contract amount is defined as the original total of all bid items plus the cost of items paid for at invoice as shown on the original bid schedule.

1. Bid Schedule Payment Reference: 2010.4.1.A.1.
2. Bid Schedule Description: Mobilization…lump sum (LS).

B. Sanitary Facilities: By the lump sum for providing and servicing the restroom facilities.

Payment for providing and servicing the restroom facilities will be base upon the Contract lump sum price. For projects that entail more than one pay estimate, the Contractor shall be paid based upon a pro-ration of the Contract price base upon the period of time for payment versus the total length of the Contract.

1. Bid Schedule Payment Reference: 2010.4.1.B.1.
2. Bid Schedule Description: Sanitary Facilities…lump sum (LS).

END OF SECTION

SECTION 2020

SURVEY MONUMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of resetting survey monuments, cast iron frames and covers, which have been covered over, damaged or otherwise rendered useless during construction. The work may consist of constructing monuments, adjusting monuments to proper line and grade, and furnishing and placing materials and related work, in accordance with these specifications and Idaho law.

1.2 RELATED SECTIONS

A. Section 2030 – Utility Adjustments.

1.3 REFERENCES

A. AASHTO T 99: Moisture-Density Relations of Soils Using a 5.5 pound Rammer and a 12-inch Drop.

B. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

C. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

D. ASTM A 48: Grey Iron Castings.

E. Idaho Code for Replacement of Survey Monuments.

F. Idaho Transportation Department Field Test Manual, Part I: Sampling and Testing Methods.

G. Idaho Transportation Department Field Test Manual, Part II: Quality Control.

H. Idaho Transportation Department Materials Manual.

1.4 PROFESSIONAL LAND SURVEYOR

A. All monuments must be set by or under the direct supervision of a Professional Licensed Surveyor licensed in the State of Idaho. Provide written verification from Licensed Surveyor when completed.

PART 2 MATERIALS

2.1 GENERAL

A. Monuments, cast iron frames and covers, bronze marker plugs, precast concrete monuments, poured monuments, or other types of monuments to be of the quality, material, and dimensions shown on the Standard Drawings SD-2020 A-Poured Monument in Place Type “A”, SD-2020 B-Poured Monument in Place Type “B”, SD-2020 C-Precast Concrete Monument, SD-2020 D-Special Installation of Monument for Concrete Pavement, SD-2020 E-Monument Frame and Cover, the Contract Documents, and the Special Provisions.

B. Frame and cover castings to conform to the requirements of ASTM A 48 Class 25 ksi, and to be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects which would impair serviceability. Tyler Series 6855, Item 462-A may be used if preapproved by the Engineer, or equal.

C. Repair of defects by welding or by the use of “smooth-on” or similar material is not permitted.

D. Provide manufacturer’s certification that the product conforms to the requirements of these specifications.

E. Provide manufacturer test bars as per ASTM A 48 for all orders of 200 or more units.

F. When painting is required, a bituminous coating equal or exceeding that specified in the Contract Documents to be applied to all faces.

G. Make all units available for inspection prior to and after painting.

H. Monument cast iron frames and covers to be machine finished or ground on seating surfaces so as to assure non-rocking fit in any position and interchangeability.

I. Be prepared to provide from the foundry, standard frames and standard covers for use in testing fit and seating.

J. Rebar monuments to be 5/8” diameter.

PART 3 WORKMANSHIP

3.1 REFERENCE POINTS

A. Survey monuments which have been found, as well as those which have not been found, but are monuments of record, have been shown on the plans. Perform a search for the monuments, whether they are visible or not, that are anticipated to be disturbed during construction and ensure that all

monuments, which may be disturbed during construction, have been referenced. Protect all reference points during construction.

B. Furnish materials and install required monuments and castings in accordance with the Contract Documents and as directed.

C. Hire a Licensed Surveyor to reference and reset all monuments removed or disturbed during construction.

3.2 PRECAST CONCRETE MONUMENTS

A. Furnish and set monuments to proper line and grade on a sound, well-compacted base. Backfill and compact to at least 95% of maximum theoretical density per AASHTO T99. An approved compaction plan may be substituted for compaction testing.

3.3 POURED MONUMENTS

A. Construct monument by driving a 5/8" rebar concrete, pouring, and then inserting a bronze marker plug to the required line and grade.

B. Unless otherwise specified in the Contract Documents, the Owner will furnish bronze marker plugs.

C. Poured monuments will be specified in the Contract Documents as either Type A or B as depicted in the Standard Drawings.

D. Monuments on Portland Cement Concrete Paving projects.

1. Block out forms where necessary to provide for placement of monuments in a subsequent adjacent placement. This work is considered incidental to this item.

2. Use precast monuments, conforming to the standard drawings, when specified in the Contract Documents.

3. Construct the monuments at locations called for in the Contract Documents. All labor, tools and materials required to construct monuments in place are considered incidental to this item.

E. Furnishing and placing monument frame and cover.

1. Furnish and install castings to the lines and grades established.

F. Adjustment of existing monument frame and cover to grade.

1. Adjust to the established grade.

3.4 STANDARD REBAR MONUMENT

A. Install only where provided by Idaho Code.

B. Use 5/8" rebar driven to a minimum of 30" depth or refusal. Place surveyor's cap securely on end of rebar.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit prices as designated in the Bid Schedule. Includes all labor, materials and equipment required to perform the work as specified. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Precast Concrete Monument: Measured by each monument complete in place.

1. Bid Schedule Payment Reference: 2020.4.1.A.1.
2. Bid Schedule Description: Precast Concrete Monument…each (EA).

B. Cast-in-Place Monuments: Measured by each monument complete in place.

1. Bid Schedule Payment Reference: 2020.4.1.B.1.
2. Bid Schedule Description: Cast-in-Place Monument – Type _____…each (EA).

C. Furnishing and Placing Monument Frame and Cover: Measured by each frame and cover complete and in place.

1. Bid Schedule Payment Reference: 2020.4.1.C.1.
2. Bid Schedule Description: Furnishing and Placing Monument Frame and Cover…each (EA).

D. Adjust Existing Monument to Grade: Measured by each monument adjusted. Includes all materials, labor and equipment to adjust monument to grade.

1. Bid Schedule Payment Reference: 2020.4.1.D.1.
2. Bid Schedule Description: Adjusting Existing Monument to Grade…each (EA).

E. Reference and Reset Monuments: Measured on a lump sum basis for all materials, equipment, tools and labor for all monuments, complete in place, within the Project limits.

1. Bid Schedule Payment Reference: 2020.4.1.E.1.
2. Bid Schedule Description: Reference and Reset Monuments…lump sum (LS).

F. Reference and Reset Monuments: Measured on a per-each basis for all materials, equipment, tools and labor for each monument complete in place.

1. Bid Schedule Payment Reference: 2020.4.1.F.1.
2. Bid Schedule Description: Reference and Reset Monuments…per each (EA).

G. Standard Rebar Monument. Measured on a per-each basis for all materials, equipment, tools and labor for each monument complete in place.

1. Bid Schedule Payment Reference: 2020.4.1.G.1.
2. Bid Schedule Description: Standard Rebar Monument…per each (EA).

END OF SECTION

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SECTION 2030

UTILITY ADJUSTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This work consists of adjusting to finish grade all existing privately and publicly owned utilities encountered within the project limits, in accordance with these specifications and in reasonably close conformity with the lines shown on the Contract Documents or as established by the Engineer.

1.2 RELATED SECTIONS

A. Section 306 – Trench Backfill.

B. Section 402 – Hydraulic Valves.

C. Section 502 – Manholes.

D. Section 503 – Clean-outs.

E. Section 602 – Stormwater Inlets, Catch Basins, Manholes, and Gravity Irrigation Structures.

F. Section 902 – Pressure Irrigation Valves.

G. Section 2020 – Survey Monuments.

1.3 REFERENCES

A. AASHTO T 99: Moisture-Density Relations of Soils Using a 5.5 pound Rammer and a 12-inch Drop.

B. AASHTO T 310: In-Place Density and Moisture Content of Soil and Soil Aggregate by Nuclear Methods.

C. AASHTO Standard Specifications for Transportation and Methods of Sampling and Testing.

D. Idaho Transportation Department Field Test Manual, Part I: Sampling and Testing Methods.

E. Idaho Transportation Department Field Test Manual, Part II: Quality Control.

F. Idaho Transportation Department Materials Manual.

1.4 UTILITY RELOCATION

A. Adjustment and/or relocation of utilities will be performed by the agencies owning the facilities unless specified for Contractor relocation in the plans or contract documents.

B. Schedule work and cooperate to the fullest extent possible with agencies performing their own utility adjustments and relocations.

C. Perform all pavement patching necessary after utility adjustments.

1. Cost of patching pavement for Contractor adjusted utilities will be incidental to this item.

2. Cost of patching pavement for utility adjusted utilities will be at the expense of the facility owner and will not be a part of the Contract Documents. The utility company may negotiate the cost directly.

PART 2 MATERIALS

2.1 GENERAL

A. All material such as concrete, brick, concrete rings, cone sections, barrel sections, valve box extensions and mortar to meet the requirements of their respective sections. Material, which is approved for use and is not in these specifications, will be equal to or better than the existing structure.

PART 3 WORKMANSHIP

3.1 MANHOLES, STORM DRAINS, AND VALVE BOXES

A. When lowering manholes, or storm drain structures, take care in removing the top portion of masonry on the manhole or pipe. The top of the masonry on the manhole, lamp hole or inlet must be true to grade before replacing the ring and cover.

B. Construct lowered manholes, storm drain structures, or valve boxes to the new grade elevation per Standard Drawing – SD 2030 A – Adjust Standard Manhole Type A to Grade.

C. Do not cut cone sections on the upper end resulting in a poor foundation for the manhole and storm drain rim.

D. When raising manholes, storm mains and catch basins to grade, use no more than 21 inches of riser rings, otherwise, construct additional barrel or precast sections.

E. Replace all rings, covers and other material damaged during removal. These repairs are considered incidental to this item of work.

F. Adjust manholes, storm drains, and valve boxes to final grade and place concrete collar after paving is completed and before chip sealing.

G. Preliminary adjustment may be necessary to allow placing of base course and paving over the storm drain, manhole, or valve box.

H. Extend or cut valve boxes as required to meet finished grade and seal to form a continuous watertight sleeve.

I. Adjust monuments per Section 2020 – Survey Monuments.

3.2 RAISE MANHOLE TO GRADE

A. If top of cone less than 21 inches below finish grade, remove frame and cover and install grade rings and followed by reinstallation of frame and cover in accordance with Section 502 – Manholes to height such that rim is at desired finish grade. Perform surface restoration as necessary to restore affected area.

B. If top of cone greater than 21 inches below finish grade, remove cone and install additional barrel section of such height that top of cone to be less than 21 inches below finish grade. Reinstall cone, frame and cover in accordance with Section 502 – Manholes. Perform surface restoration as necessary to restore affected area.

3.3 BACKFILLING STRUCTURES

A. Backfill per Section 306 – Trench Backfill.

B. Compact backfill material to 95% of maximum theoretical density per AASHTO T99.

C. Unless authorized, do not place any backfill material against newly constructed masonry or concrete structures for 7 days.

D. Backfill and compact uniformly around structure so as to bring the material up evenly on all sides to prevent distortion or damage to the structure.

3.4 TRAFFIC

A. Do not allow traffic on new cast-in-place structures for 7 days when Type II cement is used or for 4 days when Type III cement is used.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one of the following unit prices as indicated in the Bid Schedule. Includes all equipment, labor and materials required to adjust the utility to grade for the type indicated in the Contract Documents. If not specifically listed in the Bid Schedule, utility adjustment is considered incidental to other Bid Items.

A. Manhole, Adjust to Grade: Measured by each manhole adjusted, which includes: removing the cast iron frame and cover; removing necessary pavement; cutting the existing structure, as necessary; furnishing and placing a temporary wood cover; rebuilding the manhole; resetting the existing cast iron frame and cover to proper grade; backfilling around the structure to grade; installing a concrete collar; and installing the structure throat extension; and any other items necessary for the proper completion of this work.

1. Bid Schedule Payment Reference: 2030.4.1.A.1.
2. Bid Schedule Description: Manhole, Type _____, Adjust to Grade…each (EA).

B. Storm Drain Structure, Adjust to Grade: Measured by each structure adjusted, which includes: removing pavements; casting upper portion of inlet (whether cast iron, concrete or blocks); reconstructing the inlet or storm water structure to the new and proper grade; utilizing and reinstalling the existing frame and cover; backfilling around the structure, compacted to grade; and any other items necessary for the proper completion of this work.

1. Bid Schedule Payment Reference: 2030.4.1.B.1.
2. Bid Schedule Description: Storm Water Structure, Type _____, Adjust to Grade…each (EA).

C. Valve Boxes, Adjust to Grade: Measured by each valve box adjusted, which includes: removing necessary pavement; resetting the casting to proper grade; backfilling around the structure, compacted to grade; and any other items necessary for the proper completion of this work.

1. Bid Schedule Payment Reference: 2030.4.1.C.1.
2. Bid Schedule Description: Valve Box, Type _____ Adjust to Grade…each (EA).

D. Miscellaneous Utility, Adjust to Grade: Measured per each, for the type of utility described in the Bid Schedule. Work includes all labor, material and equipment required to adjust the utility to grade.

1. Bid Schedule Payment Reference: 2030.4.1.D.1.
2. Bid Schedule Description: Miscellaneous Utility, Adjust to Grade, Type_____…each (EA).

END OF SECTION

SECTION 2040

FENCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fencing Wire and Fabric.

B. Fencing Hardware.

C. Post Materials.

D. Gate Materials.

E. Preservation Treatments.

F. Construction Requirements.

1.2 RELATED SECTIONS

A. Section 201 – Clearing and Grubbing.

1.3 REFERENCES

A. ASTM A 123: Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM A 116: Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.

C. ASTM A 120: Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

D. ASTM A 121: Zinc-Coated (Galvanized) Steel Barbed Wire.

E. ASTM A 153: Zinc Coating (Hot Dip) Iron and Steel Hardware.

F. ASTM C 94: Ready-mixed Concrete.

G. FS RR-F-191: Fencing, Wire and Post Metal and Gates, Chain Link Fence Fabric, and Accessories.

H. ASTM A 27: Specifications for Steel Castings, Carbon, for General Applications.

I. AASHTO M 181: Standard Specification for Chain-Link Fence.

J. AASHTO M 280: Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.

1.4 SYSTEM DESCRIPTION

A. Type, height, post spacing and gates as shown in the Standard Drawings, SD-2040A through SD-2040H.

PART 2 MATERIALS

2.1 FENCING WIRE AND FABRIC

A. Barb wire conforming to AASHTO M 280.

B. Woven wire conforming to AASHTO M 279 and ASTM A 116 modified as follows:

1. If standard strength wire is used, galvanizing is to be Class 1; top and bottom strands are to be 10 gage; intermediate and vertical strands to be 12.5 gage.

2. If high strength wire (minimum tensile strength 125 ksi is used, top and bottom strands to be 10 gage Class 1 galvanizing or 12.5 gage Class 3 galvanizing; intermediate and vertical strands to be 12.5 gage Class 1 galvanizing or 14.5 gage Class 3 galvanizing.

C. Chain Link Fabric.

1. Chain link fabric to be a 2-inch diamond mesh woven from coated wire 11 gage. The weight of coating for galvanized fabric to be 1.2 ounce/square foot.

2.2 FENCING HARDWARE

A. Hardware for Woven and Barbed Wire Fence: Staples to be 9 gage with a minimum length of 1-1/2 inches, except that 1-inch staples may be used in locust posts. Stay wire to be 9.5 gage, brace wire 9 gage, and tie wire and wire clamps 12.5 gage. Stay wire, brace wire, tie wire and wire clamps to conform to ASTM A 116. The wire to be galvanized; no coating class is specified.

B. Chain Link: Tension wire to be 7 gage in diameter and 2 ounce/square foot zinc coating. All fencing, fittings, and hardware, unless otherwise specified, must meet the requirements of AASHTO M 181.

2.3 POSTS

A. Wood Posts for Barbed or Woven Wire:

1. Wood posts to be pressure treated and may be Douglas Fir, Western Larch, Cedar or Pine of any species.

2. Line posts to have a minimum post circumference of 10 inches and a minimum distance between opposite faces or between any face and an opposite corner of 3 inches. Posts for corner, terminal, or braces to have a minimum circumference of 17.5 inches and a minimum distance between opposite faces or between any face and an opposite corner of 4 inches.

B. Metal Posts for Barbed or Woven Wire: Painted or galvanized metal fence posts must meet the requirements of ASTM A 27. Punched lug-type posts will not be accepted.

C. Metal Posts for Chain Link:

1. Line Posts.

	Pipe Section Size	Weight/foot
Class 1:	1.90 inches O.D.	2.72 pound
Class 2:	1.90 inches O.D.	2.28 pound

	H-Beam Section Size	Weight/foot
Class 1:	2.25x1.70 in	3.43 lb.

2. Corner and End Posts.

	Pipe Section Size	Weight/foot
Class 1:	2.375 inches O.D.	3.65 pound
Class 2:	2.375 inches O.D.	3.11 pound

3. Braces.

	Pipe Section Size	Weight/foot
Class 1:	1.660 inches O.D.	2.27 pound
Class 2:	1.660 inches O.D.	1.82 pound

4. Class 1: Pipe sections must conform to ASTM A 120, Schedule 40 Standard Weights. Pipe and H-Beam sections to have 1.8 ounce/square foot zinc coating.

5. Class 2: Pipe sections other than Schedule 40 to meet the outside dimensions of Schedule 40 and have minimum yield strength of 50 ksi. Class 2 pipe to be hot dipped zinc-coated with 0.9 ounce/square foot of exterior surface and is to be over-coated with a clear acrylic. The internal surface of pipe must have a protective coating of hot dipped zinc or zinc rich paint with a minimum thickness of 0.3 mils.

2.4 GATES

A. Type as designated in the Bid Schedule and as shown in the Standard Drawings.

B. Wire or wire fabric corresponding with the type used in adjacent fence line.

C. Hang gates on standard metal or wood brace posts corresponding with the type of posts used in adjacent line fence.

2.5 PRESERVATIVE TREATMENT

A. Before preservative treatment, season Douglas Fir and West Coast Hemlock posts and blocks to a moisture content of not more than 25% as measured at the midpoint of the post in the outer 1 inch, using a Lignomat Mini-Ligno moisture meter, or approved substitution.

B. Treated posts and blocks will be subject to inspection and rejection by the Engineer after arrival at the site.

C. Furnish certified treating reports for all treated timber products to be shipped. Furnish a certificate of compliance stating the species of the material and that it conforms to the specified grading rules.

D. Conform to the requirements of AWPA Standard M4 handling and care of pressure treated timber products.

E. The treating plant must imprint legible symbols in the end of all timber products treated indicating the name of the treating company and the type and year of treatment in accordance with AWPA Standard M1 and M6.

F. At the time of delivery to the job site, all treated posts and blocks to have a moisture content of not more than 25% when tested as described above. The posts and blocks to conform in all respects to the specified grading requirements at the time of delivery.

PART 3 WORKMANSHIP

3.1 DESCRIPTION

A. This work consists of furnishing and erecting wire fence and gates in accordance with these specifications and in reasonably close conformity with the lines shown on the Contract Documents or as directed.

3.2 CONSTRUCTION REQUIREMENTS

A. Remove trees, brush and other obstacles along the fence line. Dispose of material so removed in accordance with the requirements of Section 201 – Clearing and Grubbing.

B. Set posts plumb to the spacing and depth shown on the Contract Documents backfilled, and firmly tamped. Set posts for chain link fence in concrete. After the posts are set, stretch the wire fencing and fastened to wooden posts with staples or to steel posts with wire clamps.

C. Concrete for post and brace bases to be Class 3000 psi concrete with the tops crowned to drain.

D. Changes in line where the angle of deflection 30^{o} or more are considered corners, and a corner brace must be installed. Terminate intersecting fences as shown on the Contract Documents.

E. When drilling into rock is required to set a post, posts may be shortened, provided a minimum length of 12 inches of post is grouted in the rock.

F. At grade depressions where the change in grade within two adjacent spans of fence is 20% or more, install sag bracing. If it is necessary to cut and splice woven wire fence to accommodate the grade change, make the splice at a line post or install an additional post at the splice.

G. Consider air temperature when stretching wire; in very hot weather, stretch the wire just tightly enough to eliminate sags. In cold weather, stretch the wire very tightly. Do not stretch woven wire so tightly that the preformed kinks in the horizontal wires are straightened.

H. Brace intersecting fences at the intersection of the new fence with a terminal brace as shown on the Contract Documents.

I. Horizontal and inclined braces are to be 4 x 4 inches No. 2 Common Douglas Fir or Larch. Posts must be dapped to receive the braces, and the ends of the brace anchored with 3 – 16d nails or a 3/8 x 4-inch steel dowel. Daps on the posts and the ends of the braces are to be given a coat of pentachlorophenol solution before assembly. Brace wires are to consist of two loops of 9 gage wire placed as shown on the Contract Documents and twisted to form a taut cable. Lightly notch the posts to position the wire, and drive three staples at each notch to secure the wire.

J. Braces for barbed or woven wire. No fence is to extend more than 660 feet between adjacent corner braces, gate braces, terminal braces, or line braces. Install line braces at reasonably uniform intervals so the distance between any two braces is 660 feet or less. Use two staples at each wire on wood braces, or wrap the fence wires around the post and tie off.

On metal braces, securely splice the tie wires to the fence on both sides of the posts in such a manner that there are two loops behind the post and one loop in front, or wrap the fence wires around the post and tie off. Locate the concrete blocks for the angle braces at a minimum of 6 inch if the angle brace is embedded in the concrete.

K. Braces for chain link fence. No fence is to extend more than 300 feet between adjacent braces. Install line braces at reasonably uniform intervals so the distance between any two braces is 300 feet or less.

L. Grounding chain link fence. Bond posts for chain link fence to a ground located at the bottom of the concrete foundation at locations where the chain link fence passes under a power line. Ground line posts for chain link fence built parallel to a power line not less than every 300 feet at each brace.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use the following unit price as designated in the Bid Schedule for fence. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Fence, Type _____: By the linear foot for the type measured along the horizontal centerline of the fence through all braces and gates. Include full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 2040.4.1.A.1.
Bid Schedule Description: Fence, Type _____...linear foot (LF).

B. Gates, Type _____: By the each regardless of length. Include full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 2040.4.1.B.1.
Bid Schedule Description: Gates, Type _____...each (EA).

C. Braces: By the each. Include full compensation for all materials, labor and equipment necessary for completing the work and all appurtenances not itemized on the Bid Schedule.

1. Bid Schedule Payment References: 2040.4.1.C.1.
Bid Schedule Description: Braces...each (EA).

END OF SECTION

SECTION 2050

CONSTRUCTION GEOTEXTILES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Drainage Geotextiles

B. Riprap/Erosion Control Geotextiles

C. Subgrade Separation Geotextiles

D. Pavement Overlay Geotextiles

E. Temporary Silt Fence Geotextiles

1.2 RELATED SECTIONS

A. Section 202 – Excavation and Embankment

B. Section 206 – Permanent Erosion Control

C. Section 307 – Street Cuts and Surface Repairs

D. Division 1000 – Construction Stormwater Best Management Practices

1.3 REFERENCES

A. ASTM D 4355 – Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)

B. ASTM D 4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity

C. ASTM D 4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles

D. ASTM D 4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

E. ASTM D 4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile

F. ASTM D 4833 – Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

1.4 GENERAL REQUIREMENTS

A. The geotextile shall be composed only of long chain polymeric filaments or yarns oriented into a stable network, which retains its relative structure, including selvedges, during handling, placement, and design service life. At least 85% by weight of the long chain polymers shall be polyolephins, polyesters, or polyamides. The geotextile shall be free from defects or tears.

B. Geotextiles may be rejected by the Engineer if dimensional stability or resistance to ambient temperatures, acid or alkaline conditions, and micro-organisms/insects do not appear to be satisfactory for the intended purpose.

C. The geotextile shall conform to the properties as indicated in Part 2 - Materials as appropriate for each specified use.

D. The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.

1.5 SUBMITTALS

A. The Geotextile will be accepted by certification. The Contractor shall furnish the geotextile manufacturer's certified test results attesting that the geotextile and all factory seams meet the requirements stated in these specifications for the intended application. The certification shall state that the named product conforms to the requirements listed in Part 2 - Materials or as modified in the Contract Documents and that representative samples thereof have been sampled and tested as specified.

The certification shall include the following information about each geotextile to be used:

1. Manufacturer's name and current address,

2. Full product name,

3. Geotextile roll number,

4. Proposed geotextile use(s), and

5. Certified test results.

    a. The certification shall give the name and address of the testing agency and the date of tests; and shall set forth the means of identification, including lot number, which will permit field determination of the product delivered to the project as being the product covered by the certification.

    b. The certified copy of the test results shall include each test result, each mean roll value, the calculated standard deviation for each lot, and the manufacturer's coefficient of variation for all test results.

c. The certification shall be in duplicate with one copy to be sent with the shipment of the covered product to the Engineer, and one to be kept on file at the jobsite.

1.6 PROJECT RECORD DOCUMENTS

A. Maintain records of certified test results and field sampling and testing for each type of geotextile installed. Provide these records to the Engineer upon request.

B. Record location and quantity of each type of geotextile installed and provide copies to the Engineer upon request.

1.7 DELIVERY STORAGE AND HANDLING

A. During periods of shipment and storage, place the geotextile in a dry place off the ground and protect from damage and maintain in an opaque, heavy-duty protective covering.

B. Deliver, store and handle geotextile in strict accordance with manufacturer's recommendations.

PART 2 MATERIALS

2.1 DRAINAGE GEOTEXTILES

A. Nonwoven or monofilament woven geotextiles are acceptable. Slit film or slit tape geotextiles will not be permitted for drainage applications:

Geotextile Property	**Test Method**	**Minimum Average Roll Values (in either principal direction)**	
		Type I (1)	Type II (1)
Grab Tensile Strength – lb	ASTM D 4632	80	180
Grab Elongation (%)	ASTM D 4632	NA	NA
Puncture Strength – lb	ASTM D 4833	35	80
Apparent Opening Size (AOS) (Std. Sieve)	ASTM D 4751	#70 or finer	
Permittivity (sec-1)	ASTM D 4491	0.7	0.7

(1) Type I refers to protected conditions. Type II refers to unprotected conditions. Protected conditions include: trench depth 10 ft., rounded aggregate or crushed aggregate less than 4 in. size, and relatively smooth trench walls. All other conditions are unprotected.

Note: Strength properties of drainage geotextiles placed on level or near level surfaces such as under drain blankets or on subgrade shall meet those specified in Subsection 2.3.

2.2 RIPRAP/EROSION CONTROL GEOTEXTILES

Geotextile Property	Test Method	Minimum Average Roll Values (in either principal direction)	
		Type I (1)	Type II (1)
Grab Tensile Strength – lb	ASTM D 4632	130	200
Grab Elongation (%)	ASTM D 4632	15	15
Puncture Strength – lb	ASTM D 4833	60	80
Trapezoidal Tear – lb	ASTM D 4533	40	50
Apparent Opening Size (AOS)(Std Sieve)	ASTM D 4751	#50 or finer	
Permittivity (sec^{-1})	ASTM D 4491	0.5	0.5
Ultraviolet (UV) Radiation Stability	ASTM D 4355	70% Retained Strength @150 hrs.	

(1) Low to moderate survivability geotextiles (Type I) may be used behind gabions less than 10 ft. high without an aggregate cushion. In severe conditions, where stones will be larger than 240 lb, or drop heights cannot be practically reduced, a higher survivability fabric (Type II) will be necessary.

2.3 SUBGRADE SEPARATION GEOTEXTILE PROPERTY REQUIREMENTS

A. Nonwoven or woven geotextiles are acceptable, except that only non-woven geotextile can be used for Type III.

Geotextile Property	Test Method	Minimum Average Roll Values (in either principal direction)		
		Type I (1)	Type II (1)	Type III (1)
Grab Tensile Strength– lb (2)	ASTM D 4632	180/115	270/180	270/180
Grab Elongation (%) (2)	ASTM D 4632	<50%/≥50%	<50%/≥50%	<50%/≥50%
Puncture Strength – lb (2)	ASTM D 4833	70/40	100/75	100/75
Trapezoidal Tear Strength – lb (2)	ASTM D 4533	70/40	100/75	100/75
Apparent Opening Size (AOS) (3) (Standard Sieve)	ASTM D 4751 COE CW-002215	#30 or finer		#70 or finer
Permittivity (sec^{-1}) (3)	ASTM D 4491	0.02	0.02	0.7

(1) Type I, refers to moderate survivability conditions; Type II and Type III to high survivability conditions. Moderate survivability is low to moderate ground pressure equipment, ≤ 40 psi, with 12 in. to 18 in. initial lift thickness or high ground pressure equipment, > 40 psi, with more than 18 in. initial lift thickness. High survivability is low to moderate ground pressure equipment with 6 in. to 12 in. initial lift thickness or high ground pressure equipment with 12 in. to 18 in. initial lift thickness. Subgrade condition is assumed cleared of rocks, stumps & large limbs, and graded reasonably smooth. If subgrade preparation or clearing is not in accordance with the above, or cover material is angular shot rock, even higher survivability geotextiles may be necessary. Type III is used when subgrade separation geotextile will also function in a drainage application.

(2) The dual values for each geotextile Type are related to the grab elongation. For geotextiles with elongation which is less than 50%, the first strength values are applied. For geotextiles with elongation which is equal to or greater than 50%, the second strength values are applied. Higher strength is required for geotextiles with lower elongation.

2.4 PAVEMENT OVERLAY GEOTEXTILE PROPERTY REQUIREMENTS

A. Only nonwoven geotextiles are acceptable.

Geotextile Property	Test Method	Minimum Average Roll Values (in either principal direction)
Grab Tensile Strength – lb	ASTM D 4632	80
Grab Tensile Elongation (%)	ASTM D 4632	50
Trapezoidal Tear Strength – lb	ASTM D 4533	40
Asphalt Retention – gal/yd2		0.20

2.5 TEMPORARY SILT FENCE GEOTEXTILE PROPERTY REQUIREMENTS

A. Geotextiles meeting the following are acceptable:

Geotextile Property	Test Method	Minimum Average Roll Values (in either principal direction)
Grab Tensile Strength – lb	ASTM D 4632	90
Grab Elongation (%) At 50% of minimum Tensile Strength 45 lb	ASTM D 4632	50 max (1)
Permittivity (sec $^{-1}$)	ASTM D 4491	0.05
Apparent Opening Size	ASTM D 4751 COE CW-002215	#20 or finer
Ultraviolet (UV) Radiation Stability Retained	ASTM D 4355	70% Strength Retained @ 150 hrs

(1) For wire fence supported geotextile, elongation requirements are not applicable.

PART 3 INSTALLATION

3.1 EXAMINATIONS

A. Verify that surfaces upon which the geotextile is to be installed are graded to a smooth, uniform condition free of obstructions, depressions, and debris**.**

B. Examine geotextile for defects or damage.

C. Verify geotextile delivered to the site meets the requirements of the Contract Documents.

D. Verify surface grading and other improvements prior to beginning work. Notify the Engineer if field conditions are different from the Contract Documents.

3.2 GENERAL PLACEMENT REQUIREMENTS

A. Spread geotextile immediately ahead of the covering operation. Do not drag the geotextile on the ground or mishandle in any way. Place the geotextile loosely

and without wrinkles so that placement of the overlying material will not tear the geotextile. Lap or sew the geotextile, as specified, at the ends and sides of adjoining sheets.

B. Place the cover material on the geotextile in such a manner that a minimum of 6 in. to 18 in. of material, depending on the survivability of the geotextile and the weight of the construction equipment, will be between the vehicle or equipment tires or tracks and the geotextile at all times.

C. Cover the geotextile with the specified cover material as soon as possible. Geotextiles which have not been ultraviolet stabilized shall not remain uncovered for longer than 7 days. Ultraviolet stabilized materials shall not remain exposed longer than 30 days.

3.3 PLACEMENT IN SOFT GROUND

A. Where geotextiles will be placed over soft ground, construction vehicles shall not drive directly on the geotextile material. End-dumping the cover material directly on the geotextile will not be permitted.

B. Limit compaction of the first lift above the geotextile over soft ground to operation of placing and spreading equipment only. No sheep foot type equipment will be allowed on the first lift. Subsequent lifts will be closely observed during compaction. If any foundation failures occur during compaction operations, lightweight compaction equipment shall be used. Use pegs, pins, or the manufacturer's recommended methods as needed to hold the geotextile in place until the specified cover material is placed.

C. Under no circumstances shall cover material be dropped on unprotected geotextile from a height greater than 3 ft. above the surface of the geotextile.

3.4 PLACEMENT OF SEAMS

A. Sewn seams will not be required unless specified in the special provisions or shown on the plans. Seams shall consist of two parallel rows of stitching. The two rows of stitching shall be 1/2 in. apart with a tolerance of 1/4 in. and shall not cross, except for restitching. The stitching shall be a lock-type stitch. The minimum seam allowance, i.e., the minimum distance from the geotextile edge to the stitch line nearest to that edge, shall be 1-½ in if a flat or prayer seam is used. The minimum seam allowance for all other seam types shall be 1 in.

B. The seam, stitch type, and the equipment used to perform the stitching shall be as approved. Unless otherwise specified, use a "J" seam with two passes of a lock-type stitch with at least 3 stitches per 1 in. The prayer seam (flat) may be used for repair of damaged in-place geotextiles.

C. Sew seams with high strength polyolephin, polyester or kevlar thread that are as resistant to deterioration as the geotextile being sewn. The thread shall be of a contrasting color with that of the geotextile. Nylon threads will not be allowed. The strength of the seam shall be at least 90% of the minimum required tensile strength for the intended application as specified in Subsections 2.1 – 2.5. Obtain the Engineer's approval prior to the production field stitching/seaming.

3.5 REPAIRS

A. Should the geotextile be torn, punctured or the overlaps or sewn joints disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, or roadbed distortion, remove the backfill around the damaged or displaced area and repair or replace the damaged geotextile at no cost to the Owner.

B. The repair shall consist of a patch of the same type of geotextile placed over the damaged area. The patch shall overlap the existing geotextiles a minimum of two feet from the edge of the damaged area, except for pavement overlay geotextiles. Where geotextile seams are required to be sewn, any damaged sheets shall be repaired by sewing, unless otherwise indicated. Seams shall be sewn as specified in Subsection 3.3 above.

C. Remove and replace damaged pavement overlay geotextile with the same type of geotextile, and the overlaps shall be shingle-lapped in the direction of paving.

3.6 INSTALLATION

A. Underground Drainage Application.

1. Construct underdrains in accordance with the details shown on the plans. Place the geotextile to conform loosely to the shape of the trench.

2. Either overlap the geotextile a minimum of 12 in. at all longitudinal and transverse joints, or sew the geotextile joints. In trenches less than 12 in. wide, overlap shall be the width of the trench.

3. Trench installations shall be considered protected if trench walls are relatively smooth and stable, are less than 10 ft. deep and are free of sharp projections. Other conditions shall be considered unprotected.

4. Drainage geotextiles placed under or over a horizontal or sloping surface such as on a subgrade or in conjunction with drain blankets shall meet the construction survivability requirements of subgrade separation geotextiles.

B. Riprap/Erosion Control Application.

1. Construct geotextiles under riprap and rock buttresses in accordance with the details shown on the plans and the following. Either overlap the geotextile a minimum of two feet at all longitudinal and transverse joints, or sew the geotextile together at all joints at the time of manufacture to form geotextile widths as required. If overlapped, place the geotextile so that the upstream strip of geotextile will overlap the next downstream strip. Where placed on slopes, each strip shall overlap the next downhill strip.

2. Key the geotextile at the top and the toe of the slope per manufacturer's recommendations or as shown in the plans. Secure the geotextile to the slope loosely enough so that the geotextile will not tear when the riprap is

placed. The geotextile shall not be keyed at the top of the slope until the riprap is in place to the top of the slope.

3. Start placement of aggregate, riprap or both on the geotextile at the toe of the slope and proceed upwards. Demonstrate that the combination of the rock-fill drop height and the thickness of any aggregate cushion are adequate so as not to puncture or damage the geotextile when placing the riprap or rock-fill. Where an aggregate cushion is required, it shall be a minimum of 6 in. thick.

4. In addition, the following limits apply:

	Maximum Drop Height, ft	
Size of Riprap Material	**Directly onto Construction Fabric**	**Onto Aggregate Cushion Blanket**
Greater Than 200 lb Rock	0	3
200 lb. Rock or less	3	5

NOTE: A rock weighing 200 lb will typically have a volume of approximately 1.3 cu ft

5. After placement of the riprap, satisfactorily backfill all voids in the riprap face that allow the fabric to be visible so that the fabric is completely covered.

6. Grading of slopes after placement of the riprap will not be allowed if grading results in stone movement directly on the geotextile. Under no circumstances shall stone weighing more than 110 lbs be allowed to roll down slope. Stones shall not be dropped from a height of greater than 3 ft. above the geotextile surface. Lower drop heights may be required if geotextile damage from the stones is evident, as determined by the Engineer. If the geotextile is placed on slopes steeper than 2:1 (H:V), the stones shall be placed on the slope without free-fall.

C. Subgrade Separation Application.

1. Prepare the subgrade in accordance with Section 202 – Excavation and Embankment.

2. Either overlap the geotextile a minimum of two feet at all longitudinal and transverse joints, or sew the seams to form geotextile widths as required.

D. Pavement Overlay Application.

1. The use of geotextiles in pavement overlays involves four basic steps: initial surface preparation, application of a sealant, placement of the geotextile, and placement of the overlay.

2. Weather Limitations – The weather limitations for placement of sealant and geotextile shall conform to Division 800 – Aggregates and Asphalts as appropriate, except minimum air temperature for paving grade asphalt sealant placement shall be at least 50°F.

3. Surface Preparation – Prepare the pavement surface on which the sealant is to be placed as prescribed in Division 800 – Aggregates and Asphalts. In addition, clean and fill cracks exceeding 1/8 in. width with suitable bituminous crack filler. Crack filling material shall be allowed to cure prior to geotextile placement. Place leveling courses prior to placing the geotextile.

4. Asphalt Sealant – Asphalt sealant shall be of the type and grade specified in the contract. Spread the sealant material by means of a pressure distributor conforming to the requirements of Division 800 – Aggregates and Asphalts. Uniformly spray the asphalt sealant to the prepared dry pavement surface at the rate recommended by the geotextile manufacturer and approved by the Engineer. For paving grade asphalt cements, the maximum distributor tank temperature shall not exceed 320°F to avoid damage to the geotextile.

   The width of the sealant application shall be the geotextile width plus 6 in. Apply the sealant only as far in advance of geotextile installation as is appropriate to ensure a tacky surface at the time of geotextile placement. Place the geotextile on the sealant while it is hot and on the same day as the sealant. Traffic shall not be allowed on the sealant.

5. Placement of Geotextile – Protect the geotextile from moisture at all times during storage and placement. Place the geotextile into the sealant using mechanical or manual laydown equipment capable of providing a smooth installation with a minimum amount of wrinkling or folding. Wrinkles or folds in excess of 1 in. shall be laid flat. Shingle-lap all transverse joints and slit folds or wrinkles in the direction of the paving operation. Overlap shall be sufficient to ensure closure, but shall not exceed 6 in. Brooming and/or pneumatic rolling will be required to maximize geotextile contact with the pavement surface. Additional hand-placed sealant material may be required at laps. Traffic allowed on the placed geotextile shall be limited to necessary construction equipment and emergency vehicles, unless otherwise directed. Turn pavers and other vehicles gradually and minimally to avoid movement and damage to the geotextile. Avoid abrupt starts and stops.

6. Placement of Overlay – Overlay placement shall closely follow geotextile placement. Windrowing asphalt on the geotextile ahead of the paving machine will not be allowed.

E. Silt Fence Application.

1. Place per manufacturer's specifications and per Division 1000 – Construction Stormwater (BMPs).

3.7 SAMPLES

A. The Engineer will be present at the site during installation, and the Engineer reserves the right to collect samples periodically for confirmation testing.

B. As required, cut the geotextile samples from the roll with scissors, sharp knife, or by another suitable method that produces a smooth edge and does not cause ripping or tearing. The sample shall not be taken from the outer wrap of the geotextile roll nor taken from the inner wrap of the core. Each sample shall have a minimum dimension of 6 ft. by the full roll width. Submit one sample per lot.

C. Label the samples with the lot and batch number, date of sampling, project number, specifications, manufacturer, and product name. A lot shall be defined as all geotextile rolls within the same consignment or shipment, which were produced by the same manufacturer and have the same product name or designation.

D. Prior to installation, submit samples of sewn seams to the Engineer. The seam sewn for sampling shall be sewn using the same equipment and procedures as will be used to sew the production seams. If production seams will be sewn in both the machine and cross-machine directions, provide sewn seams for sampling which are oriented in both the machine and cross-machine directions. The seams sewn for sampling must be at least 6 ft. in length in each direction. If the seams are sewn in the factory, the Engineer will obtain samples of the factory seam at random from any of the rolls to be used.

3.8 TESTING

A. The Owner reserves the right to perform tests as necessary to determine that geotextile properties conform to the values specified herein for the intended application(s).

B. All geotextile property requirements stated herein are minimum average roll values. The tensile strengths shall be determined in both machine and cross-machine directions.

PART 4 MEASUREMENT AND PAYMENT

4.1 Use one or more of the following unit price options as designated on the Bid Schedule. Includes all labor, materials and equipment necessary for preparing certifications and submittals, procurement, delivery, storage and handling of the geotextiles, preparing work surfaces, installing the geotextiles including laps, seams, joints and patches, finish work, testing and appurtenances. If required and not listed in the Bid Schedule, the following Bid Items are to be considered incidental to other Bid Items.

A. Drainage Geotextile by the square yard measured by multiplying the trench length by the perimeter covered as shown in the typical trench section.

1. Bid Schedule Payment Reference: 2050.4.1.A.1.
Bid Schedule Description: Drainage Geotextile…square yard (SY).

B. Riprap/Erosion Control Geotextile by the square yard measured to the nearest unit of surface area actually covered.

1. Bid Schedule Payment Reference: 2050.4.1.B.1.
Bid Schedule Description: Riprap/Erosion Control Geotextile…square yard (SY).

C. Subgrade Separation Geotextile by the square yard measured to the nearest unit of surface area actually covered.

1. Bid Schedule Payment Reference: 2050.4.1.C.1.
Bid Schedule Description: Subgrade Separation Geotextile…square yard (SY).

D. Pavement Overlay Geotextile by the square yard measured to the nearest unit of surface area actually covered.

1. Bid Schedule Payment Reference: 2050.4.1.D.1.
Bid Schedule Description: Pavement Overlay Geotextile…square yard (SY).

END OF SECTION

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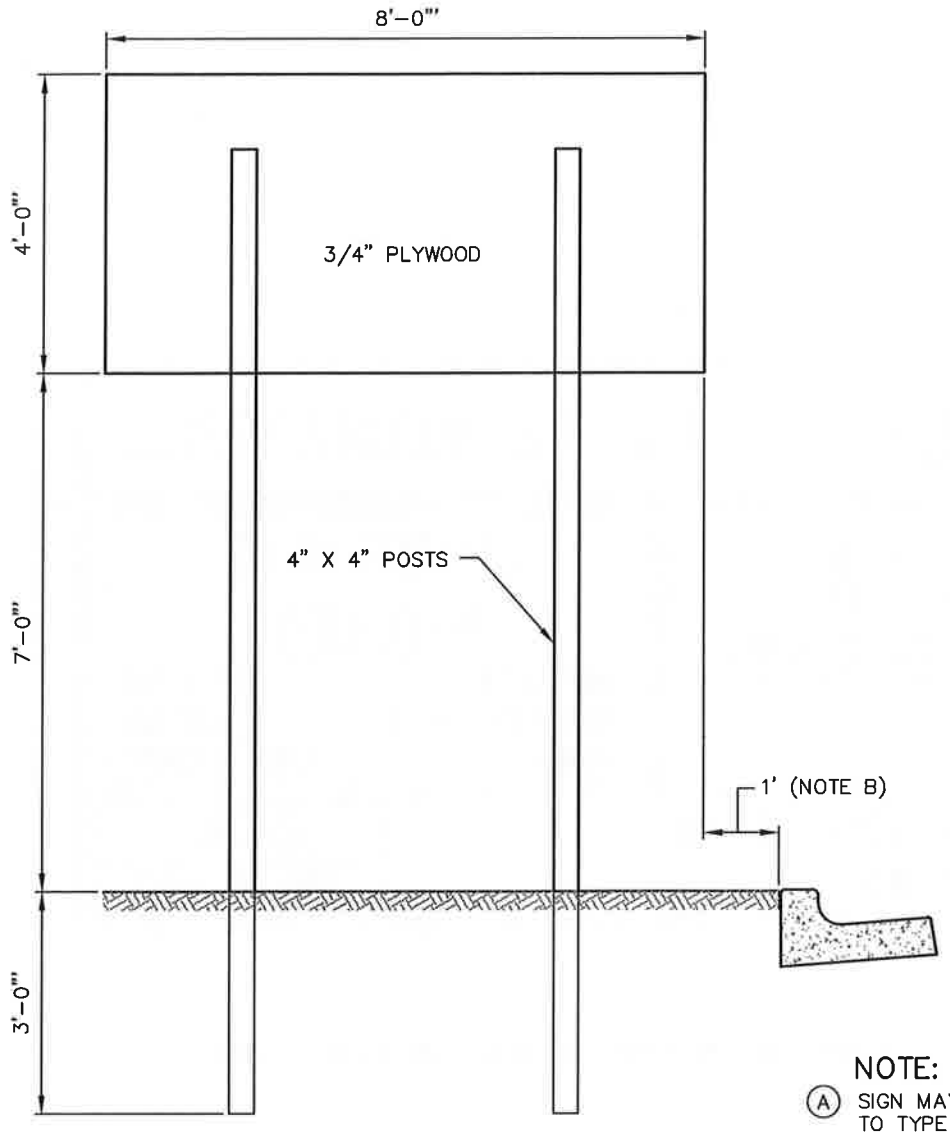
ISPWC - DIVISION 2000

Miscellaneous

Standard Drawings

SD-2010A – Installation of Informational Signs
SD-2010B – Owner Informational Signs
SD-2010C – Utility Informational Signs
SD-2020A – Poured Monument in Place Type “A”
SD-2020B – Poured Monument in Place Type “B”
SD-2020C – Precast Concrete Monument
SD-2020D – Special Installation of Monument for Concrete Pavement
SD-2020E – Monument Frame and Cover
SD-2030A – Adjust Standard Manhole Type A to Grade
SD-2030AA – Construction Traffic Control
SD-2030BA – Construction Traffic Control
SD-2040A – Standard Fence Types 1, 2 & 3
SD-2040B – Standard Fence Types 5, 6 & 11
SD-2040C – Standard Fence Types 7, 8 & 33
SD-2040D – Standard Fence Notes
SD-2040E – Standard Fence Placement
SD-2040F – Standard Fence Braces
SD-2040G – Fence Details
SD-2040H – Fence Details

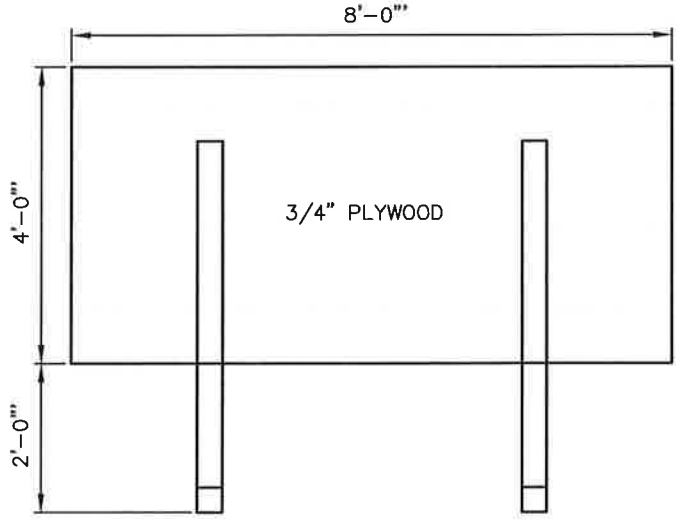


IN GROUND SIGN

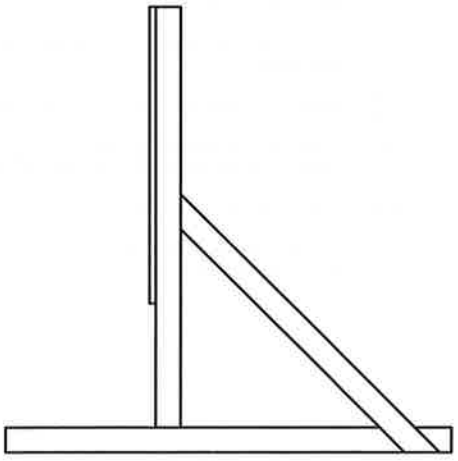
NOTE:

(A) SIGN MAY BE ATTACH TO TYPE III BARRICADE.

(B) 1' FROM BACK OF CURB OR EDGE OF SIDEWALK.



FRONT VIEW

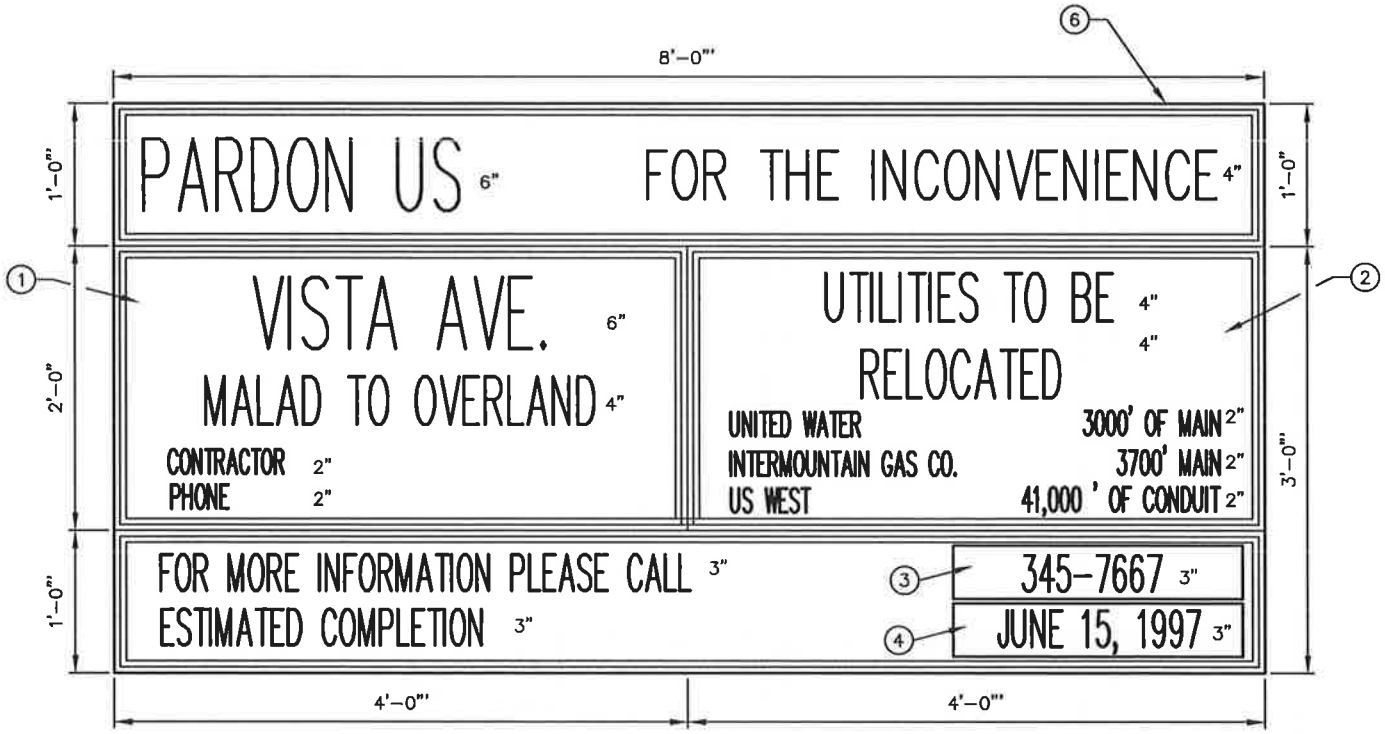


SIDE VIEW

2015

FREE STANDING SIGN

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	INSTALLATION OF INFORMATIONAL SIGNS	STANDARD DRAWING NO. SD-2010A



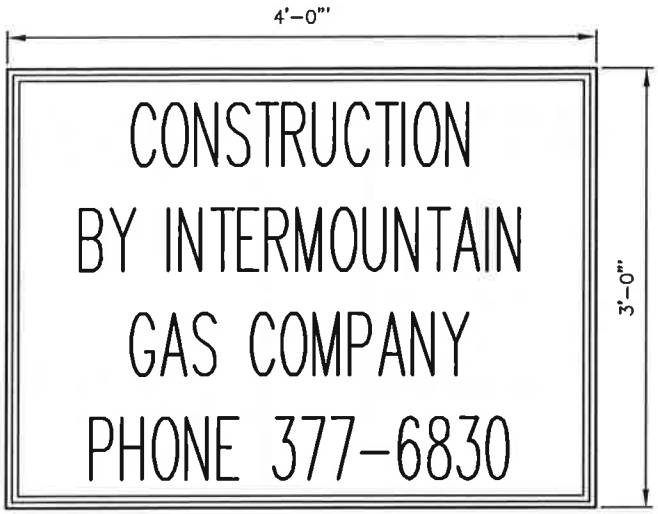
PROJECTS MORE THAN ONE MONTH IN DURATION

LEGEND:

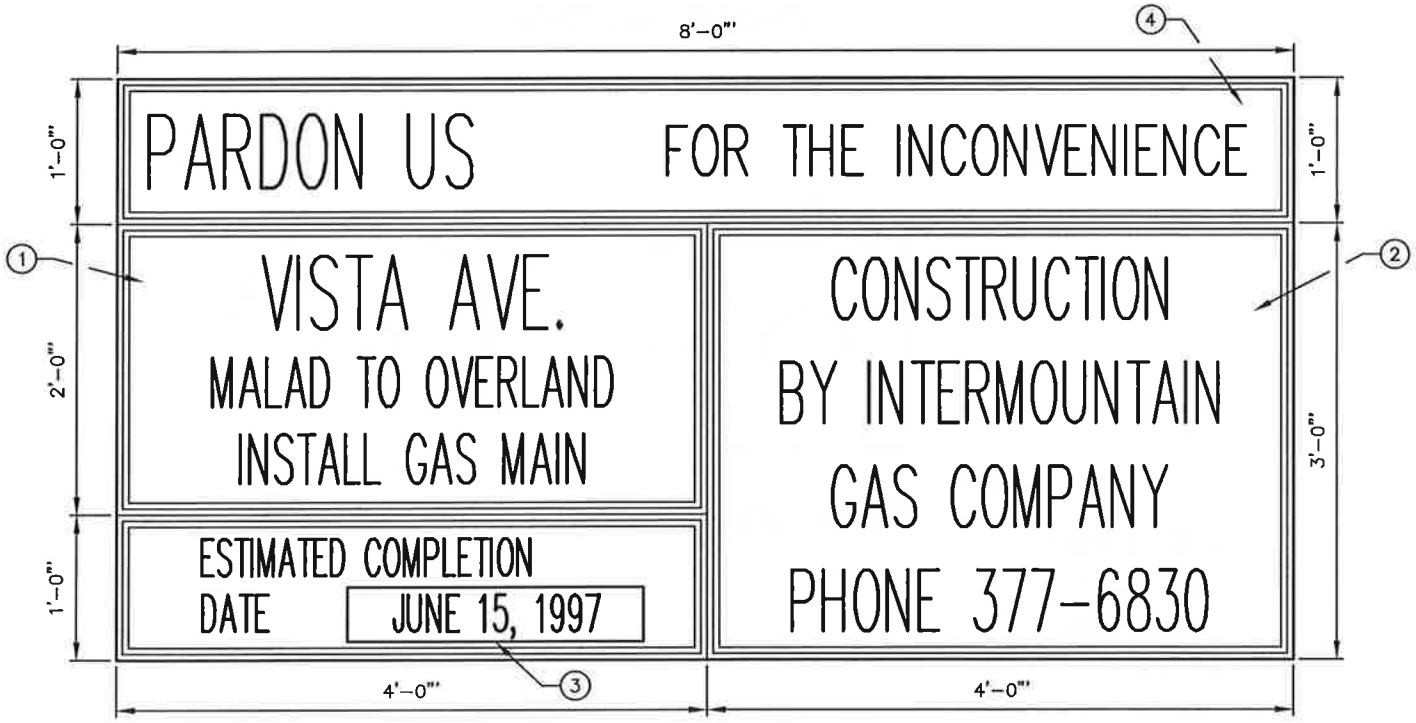
1. 2' X 4' INSERT THAT GIVES THE DESCRIPTION AND LIMITS OF THE PROJECT, WITH PRIME CONTRACTORS NAME AND PHONE NUMBER.
2. 2' X 4' INSERT THAT GIVES INVOLVED UTILITY NAMES AND APPROXIMATE QUANTITY OF WORK FOR EACH UTILITY IDENTIFIED.
3. PHONE NUMBER OF QUALITY CONTROL (4 1/2" X 24" INSERT).
4. ESTIMATED COMPLETION DATE (4 1/2" X 24" INSERT).
   1 AND 2 CAN BE A SINGLE INSERT, IF NO UTILITIES ARE INVOLVED.
5. 4' X 8' BASE SIGN FOR INSERTS TO ATTACH TO.
6. ALL LETTERING SHALL BE BLACK ON A WHITE BACKGROUND EXCEPT PARDON US WHICH SHALL BE BLUE IN COLOR WITH A WHITE BACKGROUND.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	OWNER INFORMATIONAL SIGNS	STANDARD DRAWING NO. SD-2010B



PROJECTS LESS THAN ONE MONTH IN DURATION



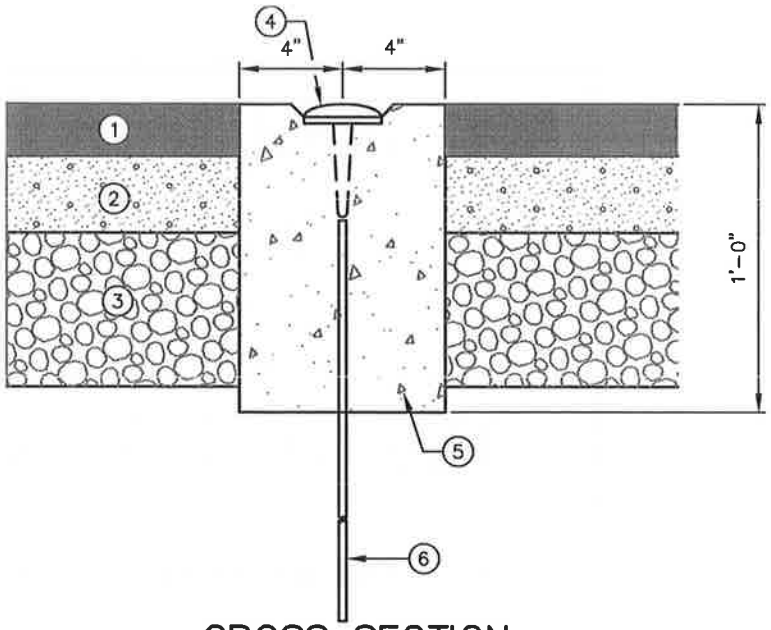
PROJECTS MORE THAN ONE MONTH IN DURATION

LEGEND:

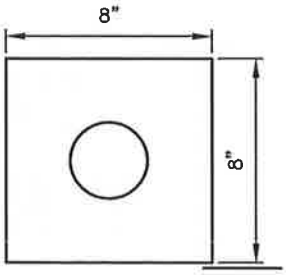
1. 2' X 4' INSERT THAT GIVES THE DESCRIPTION AND LIMITS OF THE PROJECT.
2. 3' X 4' INSERT THAT GIVES THE NAME OF THE ENTITY HAVING THE WORK DONE AND THEIR PHONE NUMBER.
3. 4 1/2" X 24" INSERT WITH ESTIMATED COMPLETION DATE.
4. 4' X 8' BASE SIGN THAT INSERTS MOUNT TO.
5. LETTERS SHALL BE BLACK WITH WHITE BACKGROUND EXCEPT PARDON US WHICH SHALL BE BLUE WITH WHITE BACKGROUND.

2015

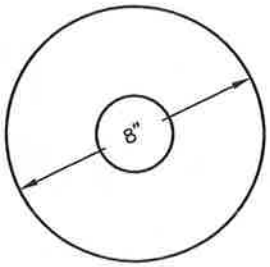
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	UTILITY INFORMATIONAL SIGNS	STANDARD DRAWING NO. SD-2010C



CROSS SECTION



PLAN VIEW



PLAN VIEW

LEGEND

(1) ASPHALT.

(2) CRUSHED STONE.

(3) PIT RUN.

(4) MARKER PLUG.

(5) CONCRETE, CLASS 500 psi (1 1/2).

(6) 5/8" REBAR DRIVEN 30" OR TO REFUSAL.

NOTES:

(A) THIS SECTION TO BE USED PRIMARILY ON BITUMINOUS OR ASPHALT CONCRETE PAVEMENT.

(B) CONCRETE BASE DIMENSIONS SHOWN ARE MINIMUM.

(C) CONCRETE BASE NEED NOT BE FORMED.

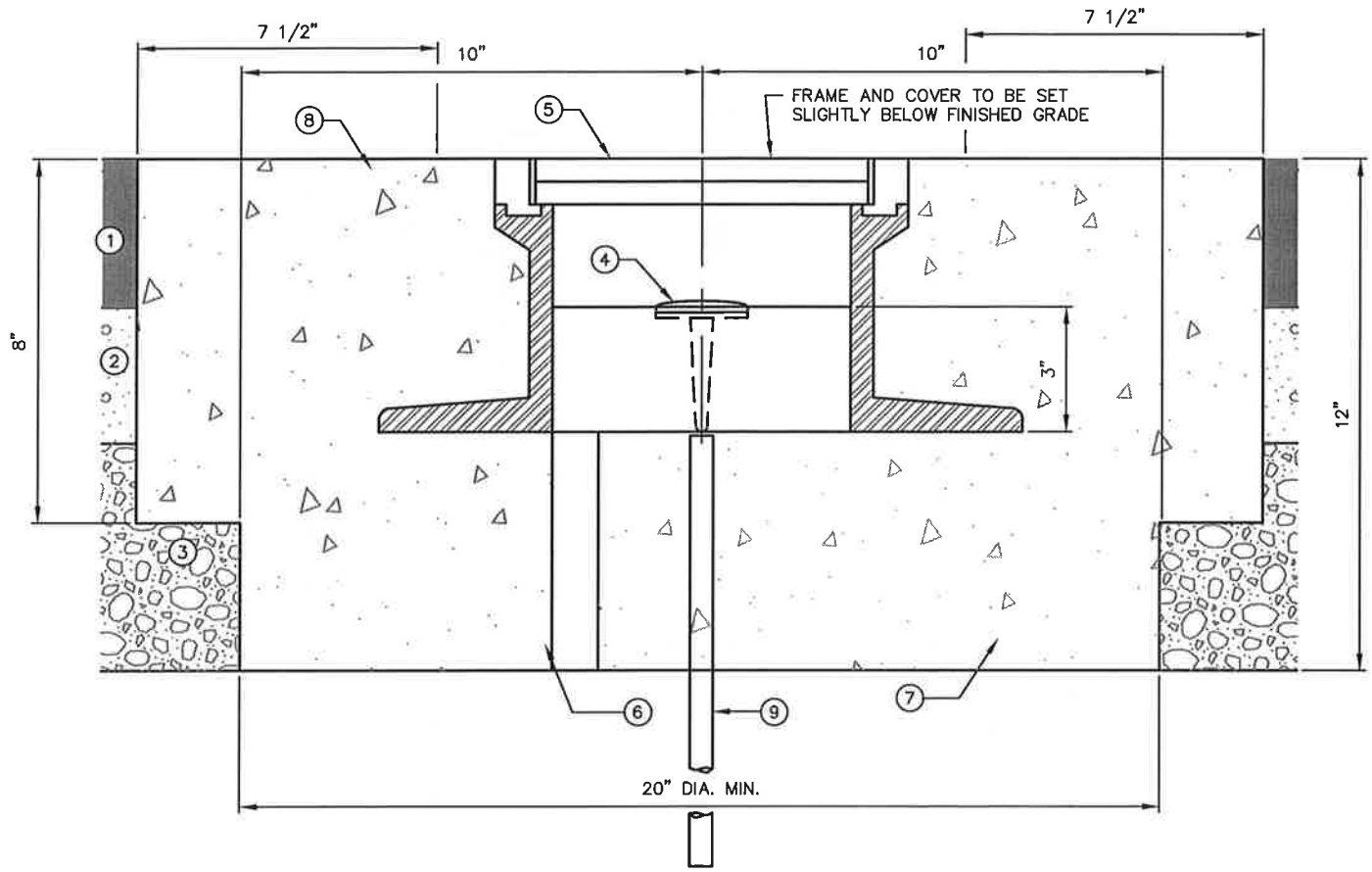
(D) OWNER WILL FURNISH BRONZE PLUG FREE OF CHARGE UNLESS OTHERWISE PROVIDED.

(E) FOR RESURFACING PROJECTS, THE EXISTING PAVEMENT STRUCTURE MAY DIFFER FROM THAT AS SHOWN ON THIS STANDARD PLAN.

(F) THE REMOVAL OF ANY EXITING MONUMENTS AND ALL PAVEMENT REMOVAL SHALL BE INCIDENTAL TO THE CONSTRUCTION OF THE MONUMENT.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	POURED MONUMENT IN PLACE TYPE "A"	STANDARD DRAWING NO. SD-2020A



LEGEND

1. ASPHALT.
2. CRUSHED STONE.
3. PIT RUN.
4. MARKER PLUG.
5. MONUMENT FRAME AND COVER, PER SD-2020E.
6. 1" DIA. DRAIN HOLE.
7. CEMENT CONCRETE CLASS 500 P.S.I..
8. CONCRETE COLLAR PER SD-508 ADJUSTED FOR DIAMETER.
9. 5/8" REBAR DRIVEN 30" OR TO REFUSAL.

NOTES:

A. THIS SECTION TO BE USED PRIMARILY ON BITUMINOUS OR ASPHALT CONCRETE PAVEMENT.

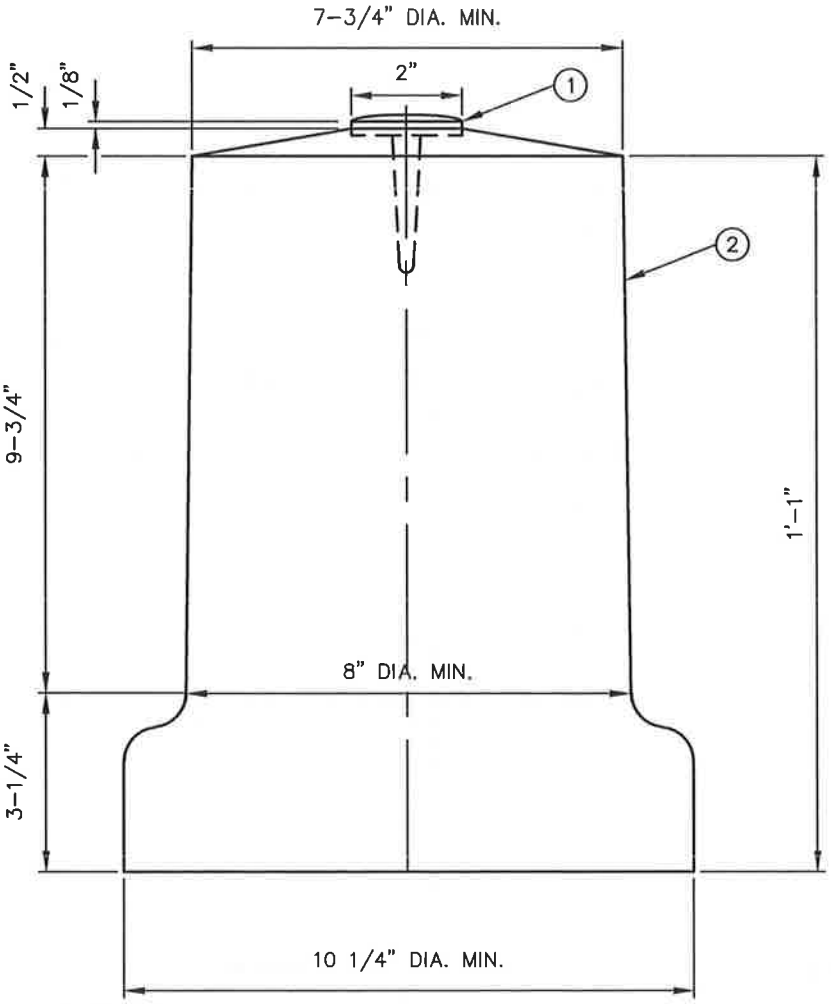
B. CONCRETE BASE DIMENSIONS SHOWN ARE MINIMUM.

C. CONCRETE BASE NEED NOT BE FORMED.

D. OWNER WILL FURNISH BRONZE MARKER PLUG FREE OF CHARGE UNLESS OTHERWISE PROVIDED.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	POURED MONUMENT IN PLACE TYPE "B"	STANDARD DRAWING NO. SD-2020B



LEGEND

(1) MARKER PLUG.

(2) CYLINDRICAL CEMENT CONCRETE CASTING.

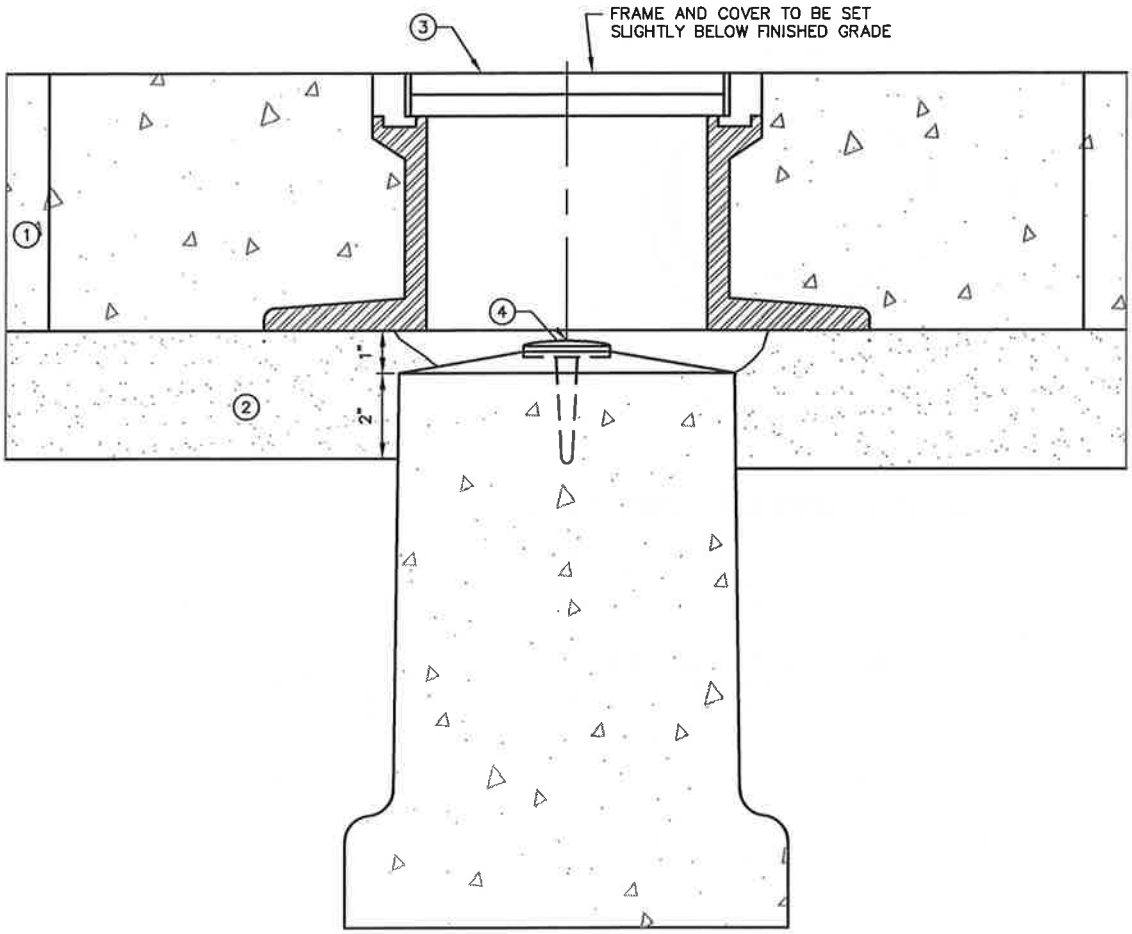
NOTES:

(A) MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF CONCRETE CASTING OF 28 DAYS = 3000 LBS.

(B) MAXIMUM AGGREGATE SIZE TO BE 1".

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	PRECAST CONCRETE MONUMENT	STANDARD DRAWING NO. SD–2020C



LEGEND

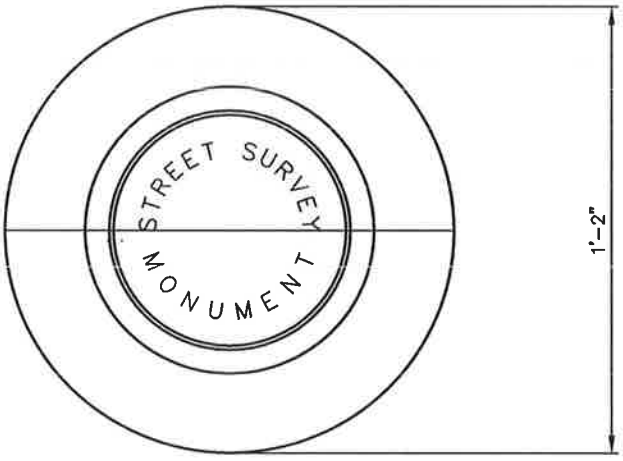
1. CONCRETE LAYER – EXISTING SECTION DEPTH OR 6" WHICHEVER IS GREATER.
2. 3" SAND CUSHION..
3. MONUMENT FRAME AND COVER, PER SD–2020E
4. BRONZE MARKER PLUG.

NOTES:

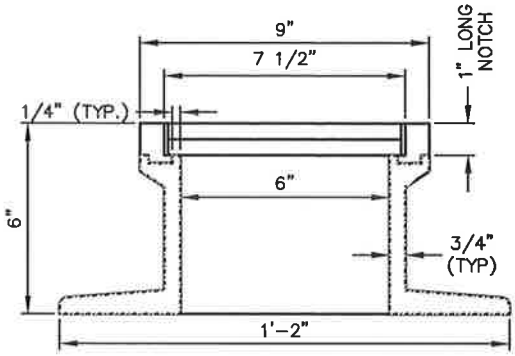
- (A) THIS SECTION TO BE USED PRIMARILY ON PORTLAND CEMENT CONCRETE.
- (B) MINIMUM CONCRETE BASE DIMENSIONS PER SD–2020C.
- (C) CONCRETE BASE NEED NOT BE FORMED.
- (D) OWNER WILL FURNISH BRONZE MARKER PLUG FREE OF CHARGE UNLESS OTHERWISE PROVIDED.

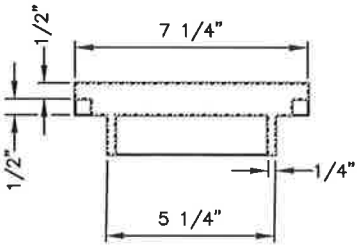
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	SPECIAL INSTALLATION OF MONUMENT FOR CONCRETE PAVEMENT	STANDARD DRAWING NO. SD–2020D

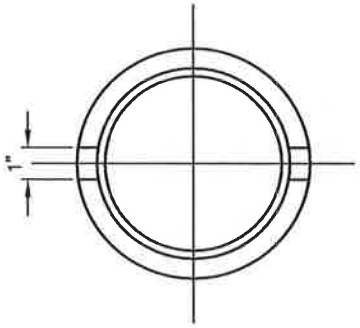


TOP VIEW – FRAME AND COVER





SECTION – FRAME AND COVER



BOTTOM VIEW – COVER

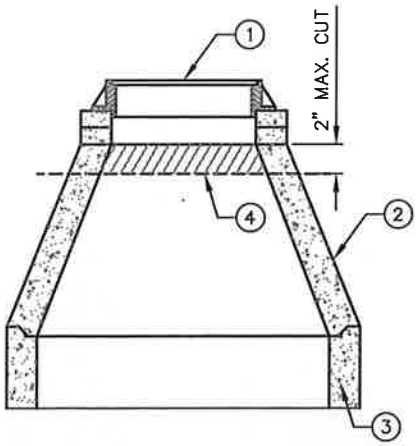
NOTES:

(A) MACHINE BEARING FACES OF COVER AND CASE TO INSURE POSITIVE FIT.

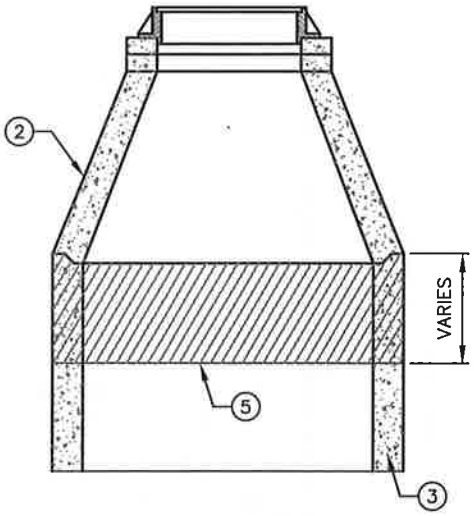
(B) CASTING TO BE GREY IRON, A.S.T.M. DESIGNATION A–48, CLASS 25, AND MUST CONFORM FURTHER TO APPLICABLE SECTION OF SPECIFICATIONS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	MONUMENT FRAME AND COVER	STANDARD DRAWING NO. SD–2020E

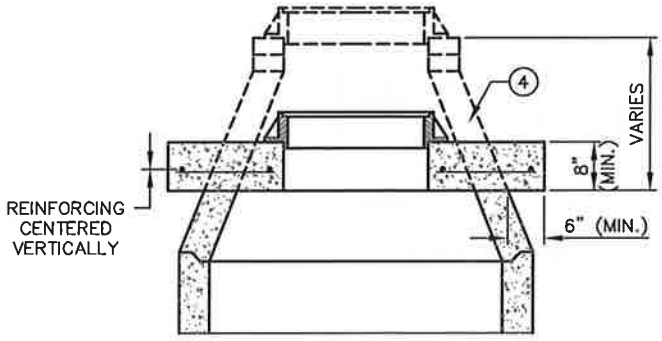


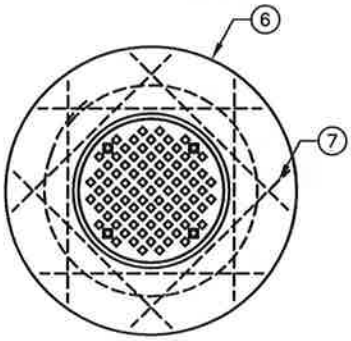
ALTERNATE 1



ALTERNATE 2

TYPE "A" MANHOLE ADJUST





TYPE "B" MANHOLE ADJUST

LEGEND

1. EXISTING MANHOLE RIM AND COVER.
2. EXISTING PRECAST CONE SECTION.
3. EXISTING PRECAST BARREL SECTION.
4. REMOVE INTERFERING PORTION OF CONE.
5. REMOVE INTERFERING PORTION OF BARREL WHEN LOWERING OR, INSTALL A STRUCTURE THROAT EXTENSION WHEN RAISING.
6. 4'-9" DIAMETER MINIMUM CONCRETE COLLAR. (CAST-IN-PLACE OR PRECAST.)
7. ALL REBARS #6 CUT AND/OR BENT TO FIT COLLAR BUILT.

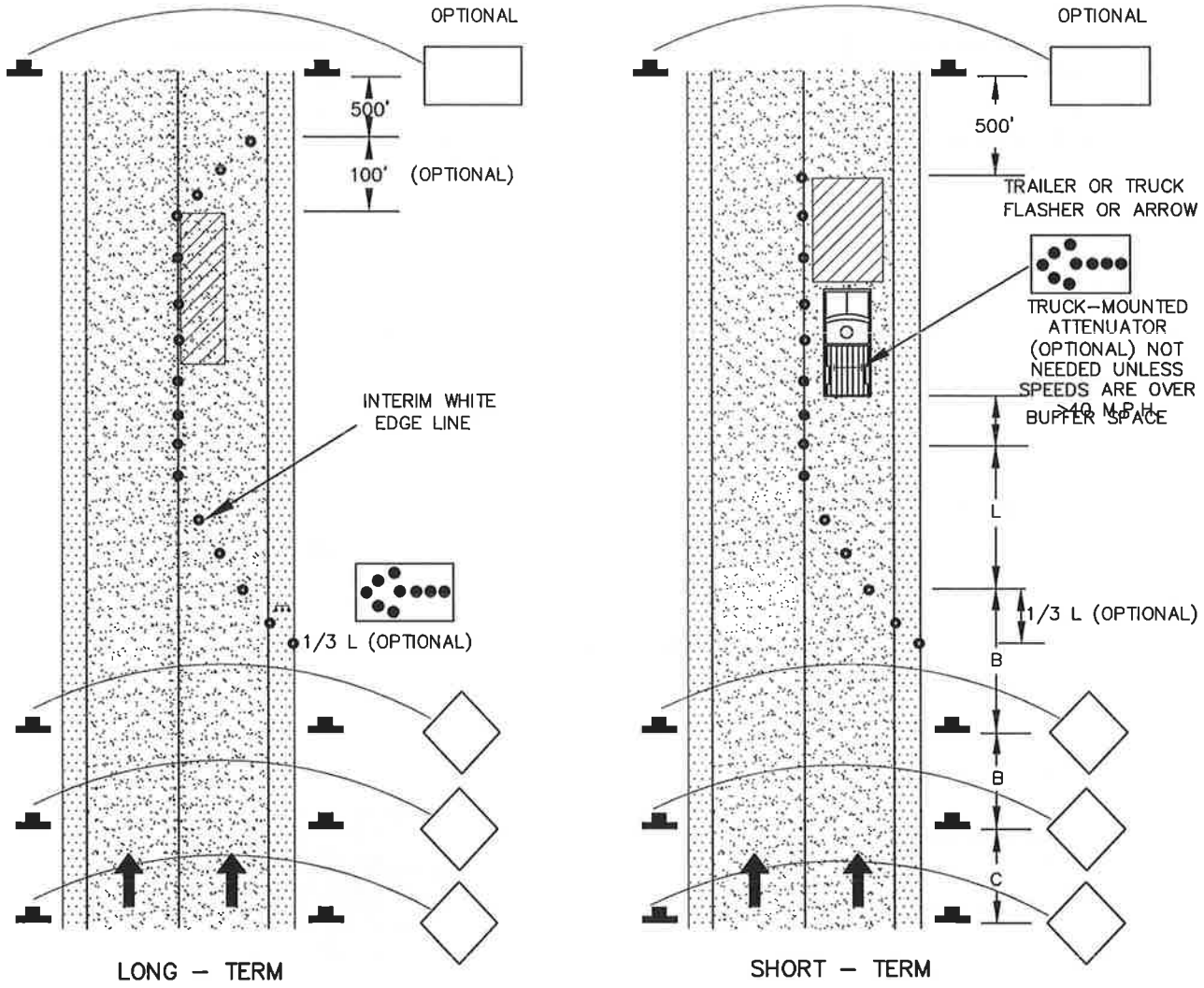
NOTES:

A. FOR TYPE "A" ALTERNATE 1 ADJUSTMENT. PROVIDE A MINIMUM OF 2" BEARING WIDTH BETWEEN FRAME AND CONE AROUND THE ENTIRE CIRCUMFERENCE OTHERWISE, USE ALTERNATE 2 OR TYPE "A" ADJUSTMENT.

B. REFER TO SD-509 FOR OTHER DETAILS.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	ADJUST STANDARD MANHOLE TYPE A TO GRADE	STANDARD DRAWING NO. SD-2030A



ROAD TYPE	DISTANCE BETWEEN SIGNS		
	A	B	C
URBAN (LOW SPEED*)	200	200	200
URBAN (HIGH SPEED*)	350	350	350
RURAL	500	500	500
EXPRESSWAY / FREEWAY	1,000	1,600	2,600

FORMULAS FOR L**

SPEED	FORMULA
40 MPH OR LESS	$L = \frac{WS^2}{60}$
45 MPH OR GREATER	$L = W \times S$

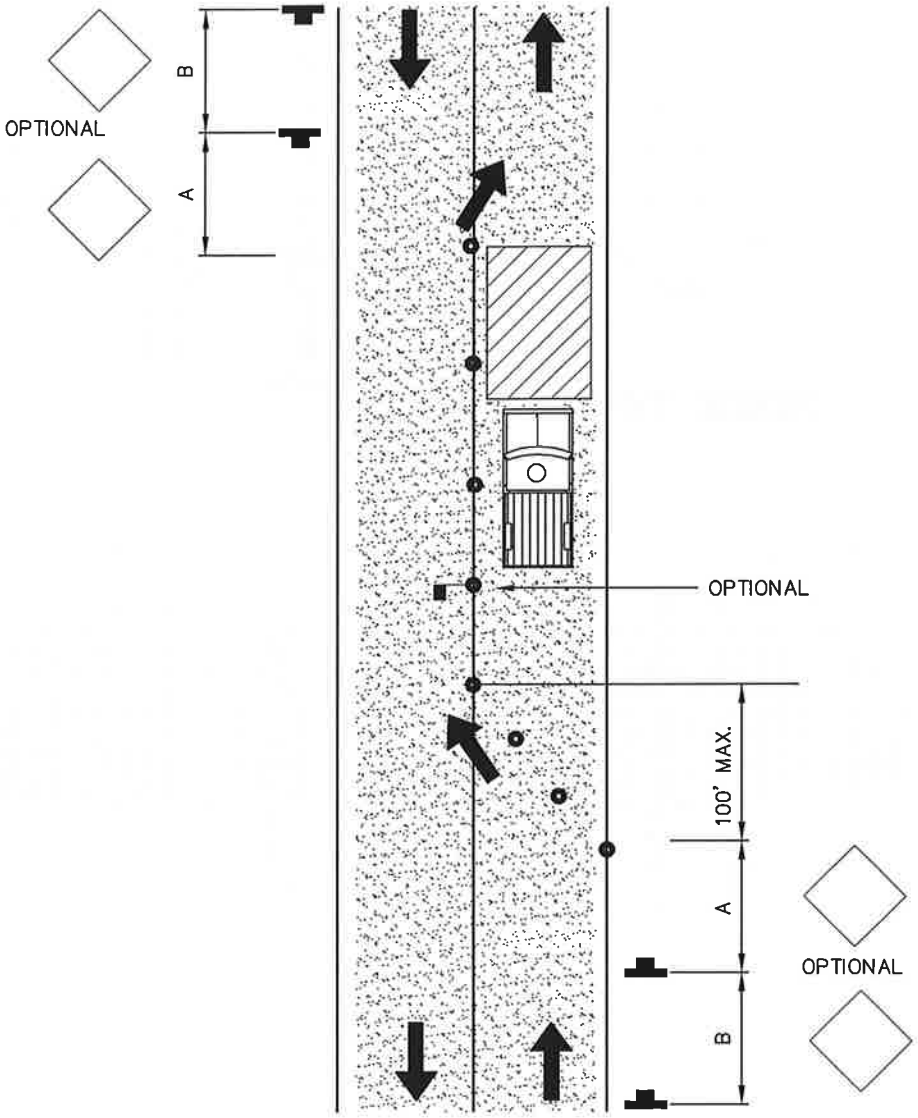
* SPEED CATEGORY TO BE DETERMINED BY STATE HIGHWAY AGENCY IN COOPERATION WITH LOCAL JURISDICTIONS.

** L = TAPER LENGTH IN FEET.
W = WIDTH OF OFFSET IN FEET.
S = POSTED SPEED, THE OFF–PECK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.

PLACING WORK ZONE TRAFFIC CONTROL DEVICES (ONE WAY STREET ONLY)

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONSTRUCTION TRAFFIC CONTROL	STANDARD DRAWING NO. SD–2030AA



ROAD TYPE	DISTANCE BETWEEN SIGNS		
	A	B	C
URBAN (LOW SPEED*)	200	200	200
URBAN (HIGH SPEED*)	350	350	350
RURAL	500	500	500
EXPRESSWAY/FREEWAY	1,000	1,600	2,600

FORMULAS FOR L**

SPEED	FORMULA
40 MPH OR LESS	$L = \frac{WS^2}{60}$
45 MPH OR GREATER	$L = W \times S$

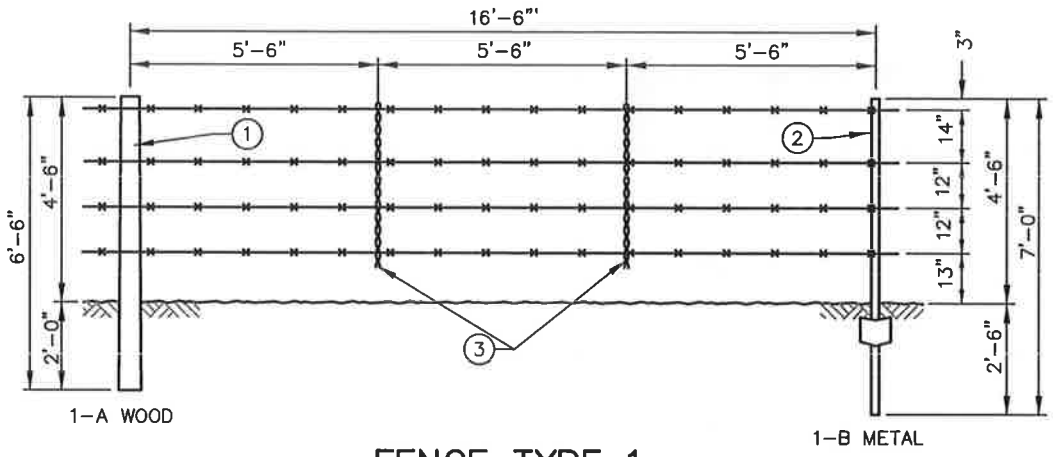
* SPEED CATEGORY TO BE DETERMINED BY STATE HIGHWAY AGENCY IN COOPERATION WITH LOCAL JURISDICTIONS.

** L = TAPER LENGTH IN FEET.
W = WIDTH OF OFFSET IN FEET.
S = POSTED SPEED, THE OFF-PECK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH.

LANE CLOSURE ON MINOR STREET

2015

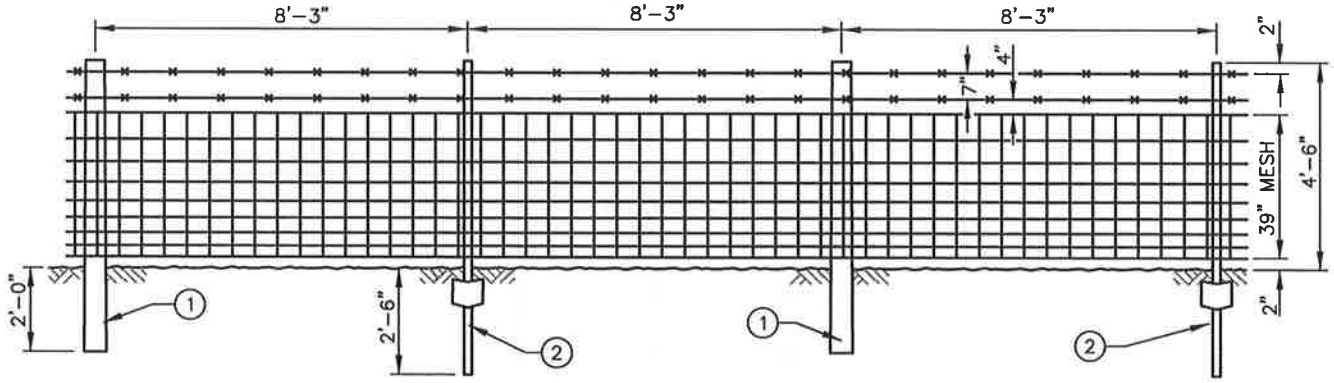
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	CONSTRUCTION TRAFFIC CONTROL	STANDARD DRAWING NO. SD-2030BA



LEGEND

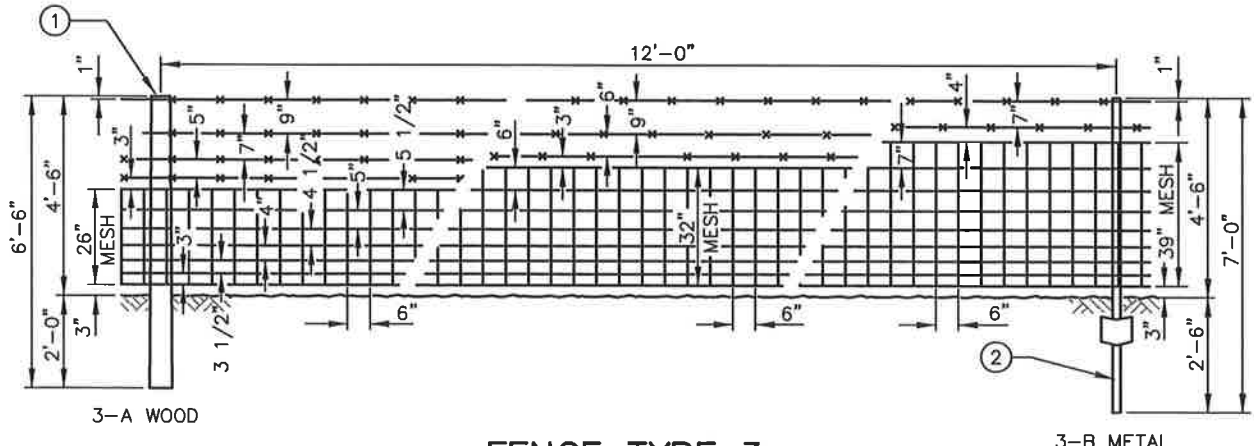
1. WOOD POST.
2. METAL POST.
3. TWO 9 GAGE WIRE STAYS BETWEEN POSTS.

FENCE TYPE 1



(WOOD AND METAL POSTS TO BE ALTERNATED).

FENCE TYPE 2



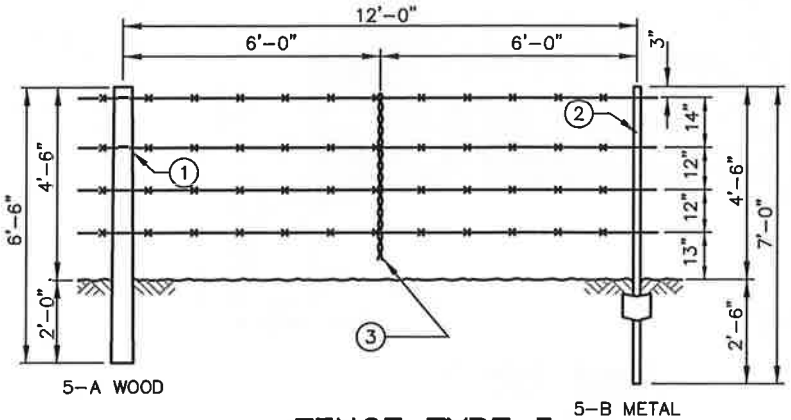
FENCE TYPE 3

NOTE:

(A) FENCE TYPE 3 WILL HAVE THE MESH HEIGHT SHOWN AFTER THE POST MATERIAL SUFFIX; i.e., TYPE 3-A (26") OR TYPE 3-B (32").

2015

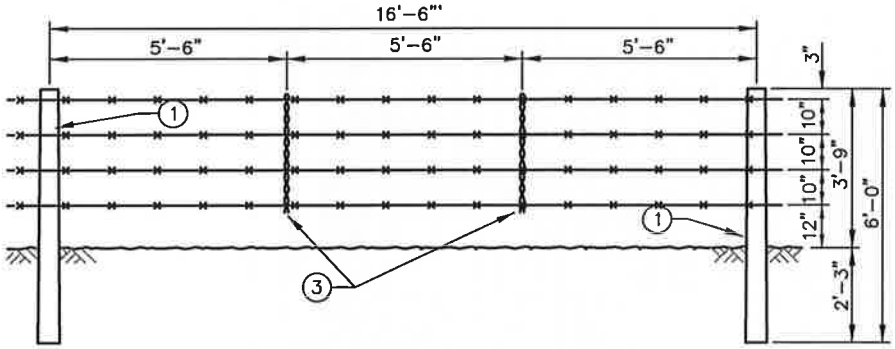
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD FENCE TYPES 1, 2 & 3	STANDARD DRAWING NO. SD-2040A



LEGEND

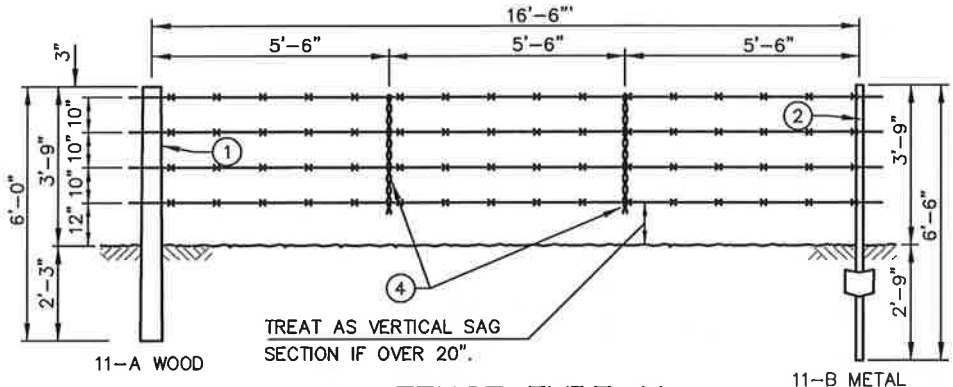
1. WOOD POST.
2. METAL POST.
3. ONE 9 GAGE WIRE STAYS BETWEEN POSTS.
4. TWO 9 GAGE WIRE STAYS BETWEEN POSTS.

FENCE TYPE 5



(SEE WOOD POST STAPLE DETAIL, SHEET 2 OF 3).

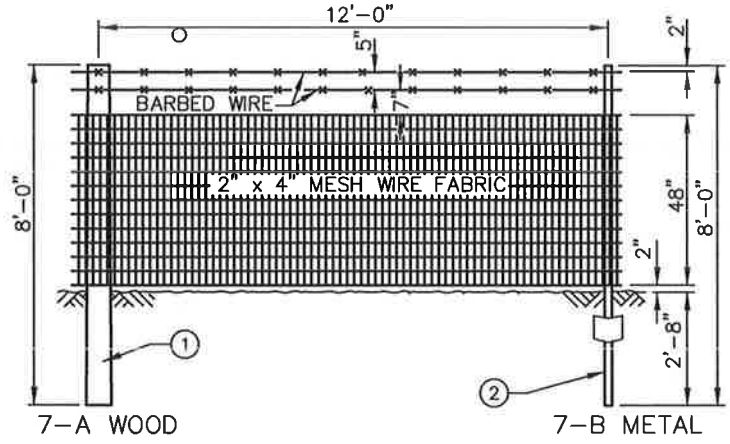
DROP FENCE TYPE 6



FENCE TYPE 11

2015

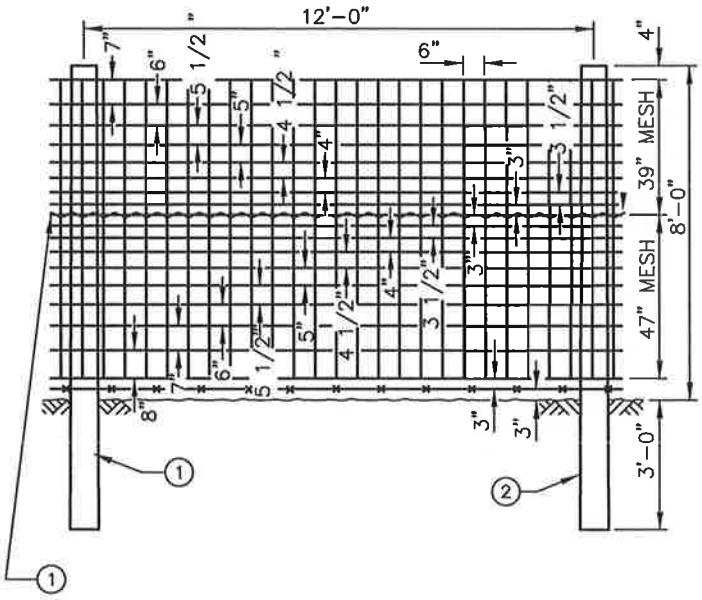
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD FENCE TYPES 5, 6 & 11	STANDARD DRAWING NO. SD-2040B



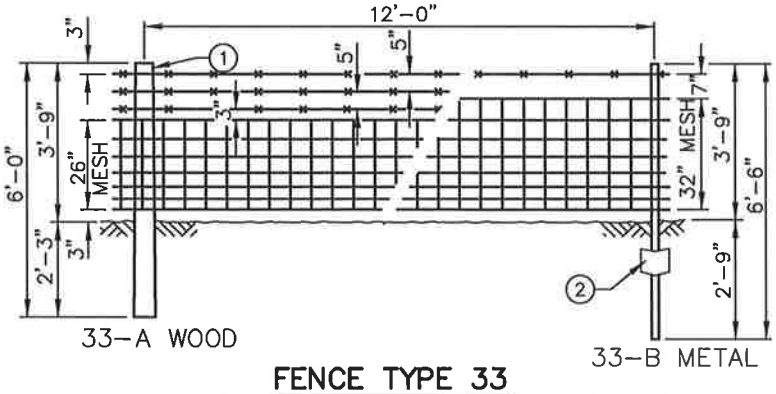
LEGEND

1. WOOD POST.
2. METAL POST.
3. WRAP THE TIE WITH NO. 11 GAGE WIRE, ONE WRAP PER EACH 6" OF MESH SECTION. OTHER METHODS SHALL BE APPROVED.

FENCE TYPE 7



DEER PROOF FENCE TYPE 8



FENCE TYPE 33

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD FENCE TYPES 7, 8 & 33	STANDARD DRAWING NO. SD-2040C

FENCE GROUNDING TABLE			
kV	* c GROUNDING INTERVAL	FENCE DISTANCE FROM TRANSMISSION ℄	FENCE TYPE
500	200'	0' – 100'	ALL
500	500'	100' – 200'	ALL
345	400'	0' – 100'	ALL
345	1000'	100' – 150'	ALL
<230	500'	50' – 100'	ALL
100 – 230	120'	WITHIN R/W	ALL
>100	NONE	WITHIN R/W	W/METAL POSTS
	1/4 MI.	WITHIN R/W	W/WOOD POSTS
* c FENCE PORTIONS LESS THAN THE GROUNDING INTERVAL IN LENGTH SHALL BE GROUNDED ONCE.			

NOTES:

(A) FENCE TYPES TO HAVE WOOD POSTS WHEN THE SUFFIX "A" IS USED AND METAL POSTS WHEN THE SUFFIX "B" IS USED; I.E., TYPE 3–A (WOOD POSTS) ON TYPE 1–B (METAL POSTS).

(B) MESH WIRE ON WOOD POSTS TO HAVE STAPLES ON ALTERNATE WIRES EXCEPT FOR SAG SECTIONS WHEN ALL WIRES WILL BE STAPLED. MESH WIRE ON STEEL POSTS TO HAVE FOUR WIRE CLAMPS PER POST EXCEPT IN SAG SECTIONS THREE ADDITIONAL CLAMPS PER POST WILL BE REQUIRED.

(C) BARBED WIRE ON WOOD POSTS TO HAVE ONE STAPLE PER WIRE PER POST AND TWO STAPLES PER WIRE PER POST IN SAG SECTIONS. BARBED WIRE ON METAL POSTS TO HAVE ONE WIRE CLAMP PER WIRE PER POST.

(D) ALL METAL POSTS TO HAVE AN ANCHOR PLATE ATTACHED TO THE POST UNLESS THE POST IS SET IN SOLID ROCK. DRILL HOLES TO BE GROUTED IN FOR METAL POSTS SET IN SOLID ROCK.

(E) WHERE A FENCE TIES INTO A BRIDGE PARAPET OR RAILING, THE TOP OF THE FENCE IS NOT TO PROJECT ABOVE THE TOP OF THE PARAPET OR RAILING.

(F) ALL METAL POSTS, BARBED WIRE, MESH WIRE, AND WOVEN WIRE MUST CONFORM TO SUBSECTION 206 OF THE STANDARD SPECIFICATIONS.

(G) FOR STANDARD BRACE PLACEMENT AND SPECIAL APPLICATIONS ON BARBED WIRE FENCES AND WOOD BRACES SEE SD–205 – SD–209.

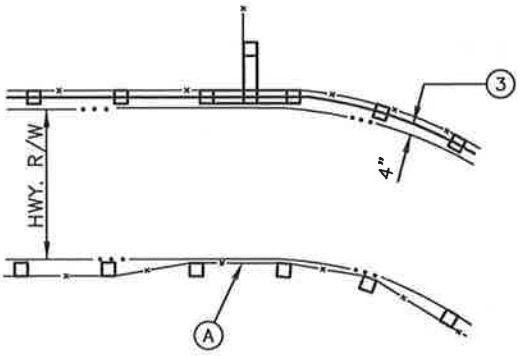
(H) ALL BARBED, WOVEN, MESH, AND COMBINATION WIRE FENCES MUST BE GROUNDED ACCORDING TO THE FENCE GROUNDING TABLE AND THE METHOD SHOWN ON FENCE GROUNDING DETAIL. GATES FALLING WITHIN THESE AREAS BE GROUNDED WITH A FLEXIBLE GROUNDING CABLE ATTACHED TO THE GATE FABRIC. ATTACH THE CABLE TO A SEPARATE FENCE GROUNDING SYSTEM ON THE SWING SIDE OF THE GATE.

LEGEND

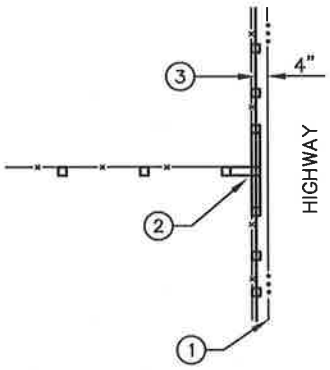
1. R/W LINE
2. THREE-WAY BRACE
3. ℄ OF POST SHALL BE 4" OUTSIDE R/W

NOTE

A. PLACE WIRE SO THAT PULL OF WIRE IS AGAINST POST.

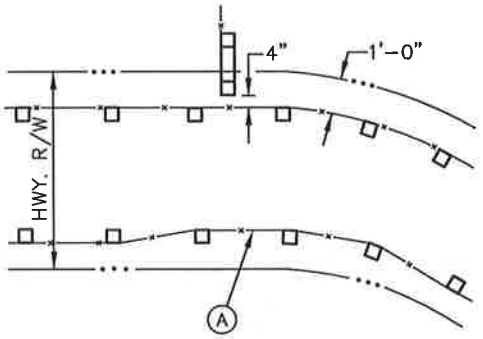


POST & WIRE LOCATION

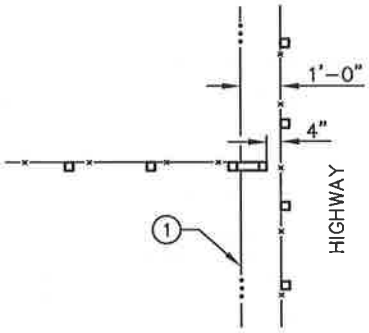


PLAN – FENCE TERMINAL

STANDARD APPROACH POLICY & PARTIAL CONTROL ACCESS



POST & WIRE LOCATION

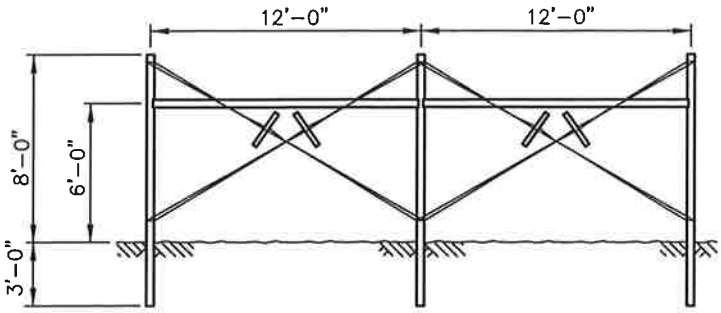


PLAN – FENCE TERMINAL

FULL CONTROL ACCESS

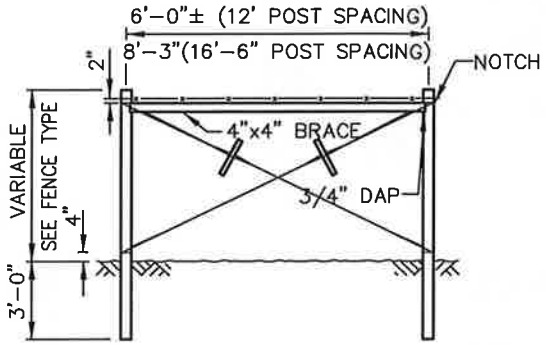
2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD FENCE PLACEMENT	STANDARD DRAWING NO. SD-2040E

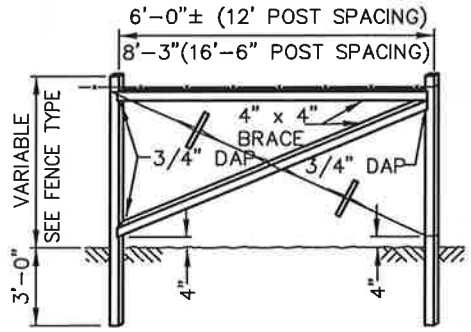


TYPE 8 FENCE SHALL BE BRACED AT INTERVALS NOT EXCEEDING 400 FEET.

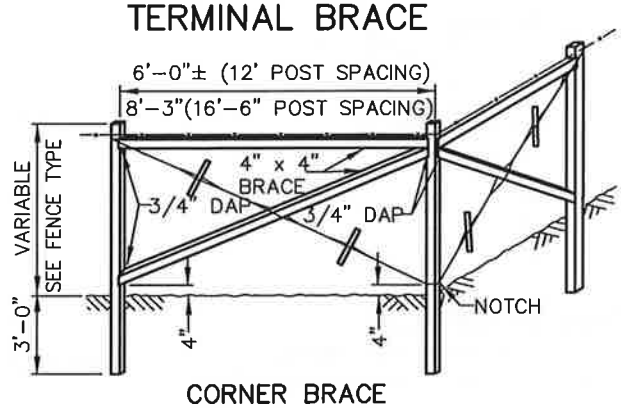
WOOD LINE BRACE FOR TYPE 8 FENCE



LINE BRACE



TERMINAL BRACE



CORNER BRACE

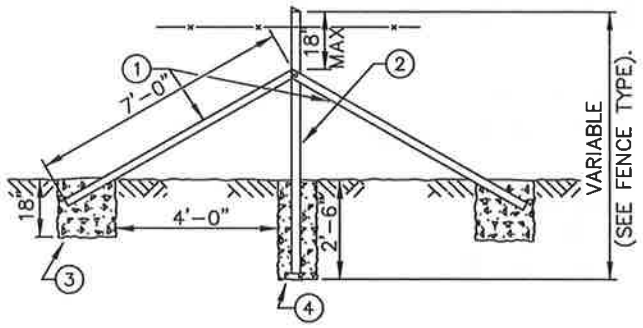
WOOD BRACES

2015

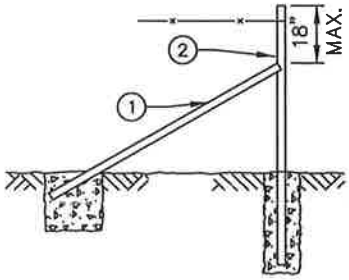
IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	STANDARD FENCE BRACES	STANDARD DRAWING NO. SD-2040F

LEGEND

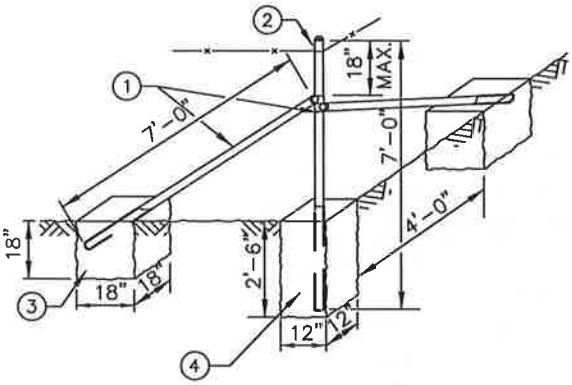
1. * a STEEL PIPE OR ANGLE.
2. * b STEEL PIPE OR ANGLE.
3. 18" SQ. OR 18"ø CONCRETE BLOCK.
4. 12" SQ. TOP OR 12"ø CONCRETE BLOCK.
5. EACH SINGLE WIRE CONNECTED TO 6 BRAID GROUND CABLE WITH SPLIT ELECTRICAL BOLT AND FABRIC CONNECTED APPROXIMATELY EVERY 18".
6. ALL WIRES CONNECTED TO 6 BRAID GROUND CABLE WITH SPLIT ELECTRICAL BOLT.
7. 3" STAPLES.



LINE BRACE



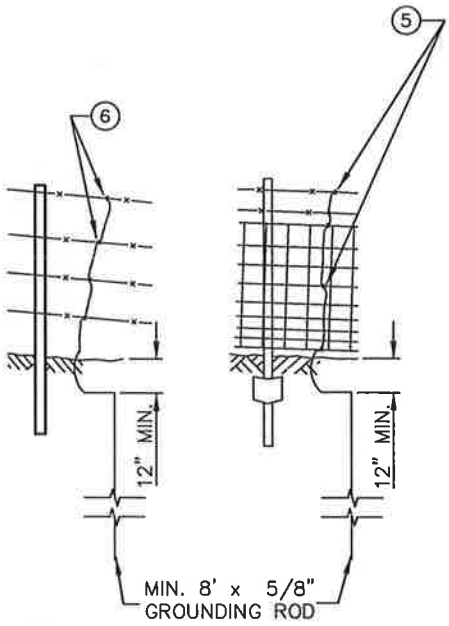
TERMINAL BRACE



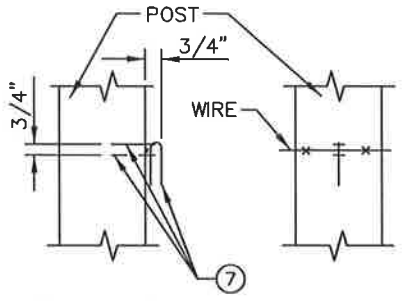
CORNER BRACE

* a 2" x 2" x 1/4" ANGLE OR 1.625" O.D. STD. STEEL PIPE BRACE.
* b 2 1/2" x 2 1/2" x 1/4" ANGLE OR 2.375" O.D. STD. STEEL PIPE POST.

METAL BRACES



FENCE GROUNDING DETAIL

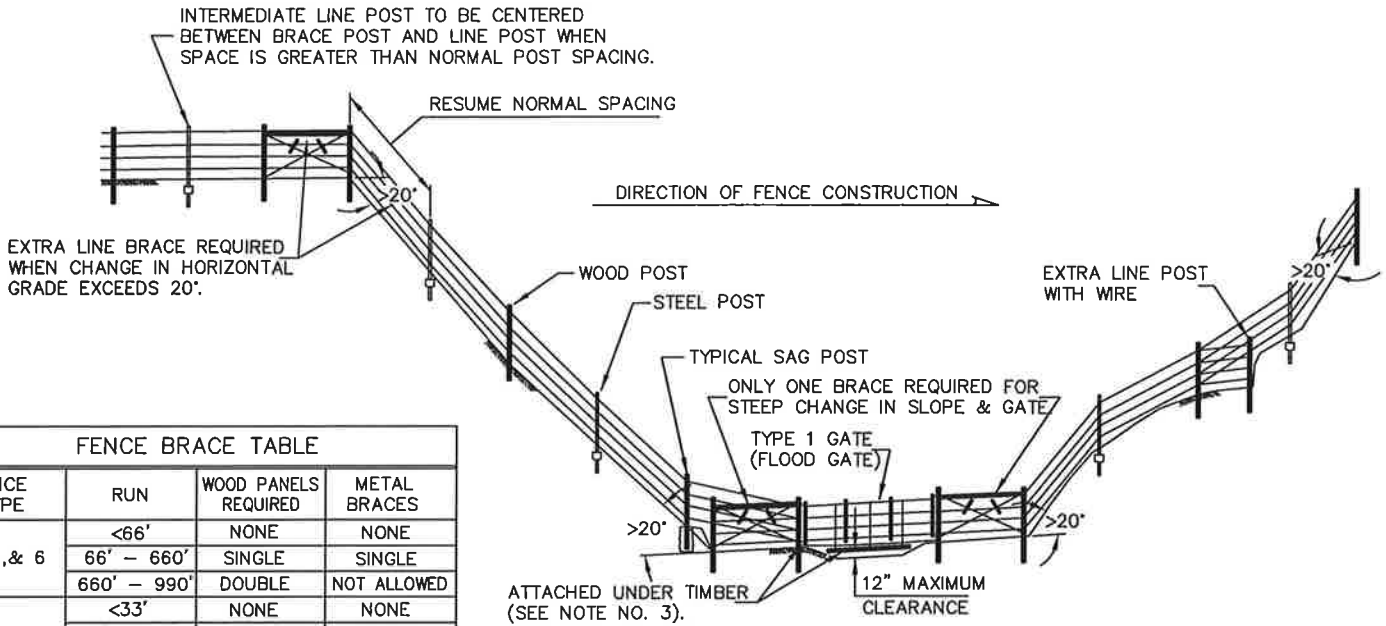


(SIDE VIEW) (FRONT VIEW)

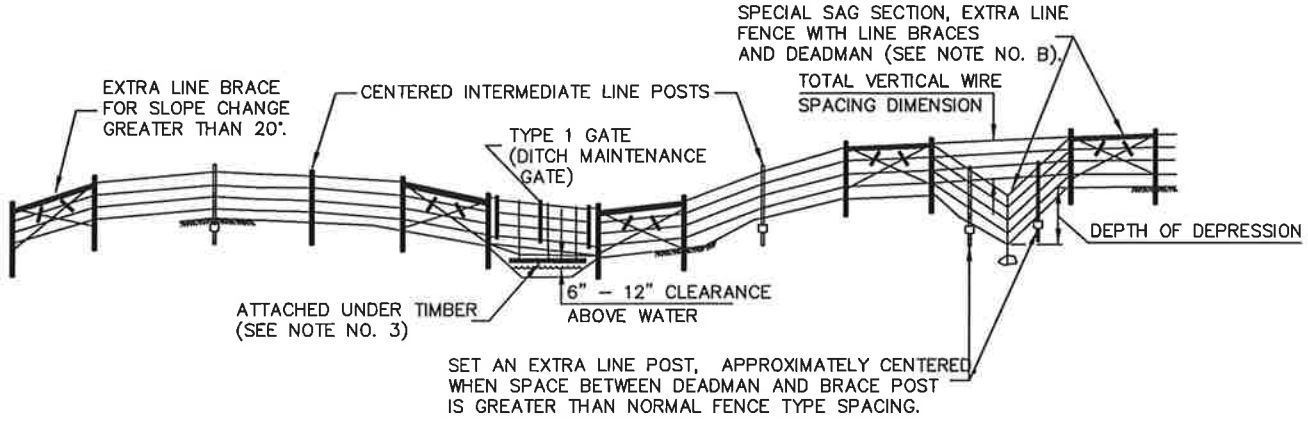
WOOD POST STAPLE DETAIL
(FOR DROP FENCE TYPE 6)

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	FENCE DETAILS	STANDARD DRAWING NO. SD-2040G



FENCE BRACE TABLE			
FENCE TYPE	RUN	WOOD PANELS REQUIRED	METAL BRACES
1,5,1,& 6	<66'	NONE	NONE
	66' – 660'	SINGLE	SINGLE
	660' – 990'	DOUBLE	NOT ALLOWED
2,3,7,& 33	<33'	NONE	NONE
	33' – 330'	SINGLE	SINGLE
	330' – 660'	DOUBLE	NOT ALLOWED



FOR TYPE 1, 5, & 11 FENCES

SPECIAL APPLICATIONS FOR BARBED WIRE FENCES

NOTES

(A) WHEN A FENCE LINE APPROACHES A DITCH, GULLY, OR DEPRESSION, THE LAST POST ON LEVEL GROUND PLACE CLOSE ENOUGH TO THE EDGE OF THE DROP–OFF THAT THE WIRE MAY BE STRUNG TO A POST IN THE DEPRESSION WITHOUT TOUCHING THE GROUND.

(B) WHEN THE DEPTH OF A DEPRESSION ON A TYPE 1, 5, OR 11 FENCE EXCEEDS THE TOTAL VERTICAL WIRE SPACING OVER A MAXIMUM HORIZONTAL RUN OF 2 SPACES, CONSTRUCT AN EXTRA FENCE THROUGH THE DEPRESSION. EXTRA LINE BRACES AND A DEADMAN ARE INCLUDED IN THIS APPLICATION. SEE THE SPECIAL APPLICATIONS FOR BARBED WIRE DETAIL.

(C) WHEN A TYPE 1 GATE IS USED IN A SPECIAL SITUATION AS SHOWN ON THE ABOVE DETAIL, EXTRA LINE BRACES AND THE ATTACHED UNDER TIMBER, WIRE, AND WIRE STAYS ARE INCLUDED. THE HORIZONTAL WIRES ON THE UNDER TIMBER ARE NOT TO BE STAPLED BUT WRAPPED AROUND BRACE POST TWICE THEN AROUND THE WIRE ITSELF.

(D) THE SPECIAL APPLICATIONS FOR BARBED WIRE FENCES MAY BE USED FOR WOVEN WIRE AND MESH WIRE FENCE TYPES 2,3,7 AND 33 WITH PRIOR APPROVAL BY THE ENGINEER OR AS DIRECTED IN THE PLANS. A TYPE 2 GATE SHOULD BE USED WITH THESE FENCES. BARBED WIRE MAY BE USED THROUGH THE DEPRESSIONS OR ETC., HOWEVER THE WIRES MUST MATCH THE WOVEN/MESH WIRE SPACING AS NEARLY AS POSSIBLE. THE UNDER TIMBER SHOULD NOT BE ATTACHED DIRECTLY TO A TYPE GATE.

(E) WHEN WOOD BRACES ARE USED AND THE FENCE CORNER ANGLE EXCEEDS 30° ON THE EXTERIOR ANGLE OF THE FENCE, USE DOUBLE PANELS ON THE CORNER BRACE. DOUBLE PANELS FOR LINE AND TERMINAL BRACES TO BE INSTALLED ACCORDING TO THE FENCE BRACE TABLE.

(F) USE METAL BRACES AS SHOWN IN THE METAL BRACE DETAILS AND THE FENCE BRACE TABLE.

(G) NOT TO SCALE.

2015

IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION	FENCE DETAILS	STANDARD DRAWING NO. SD–2040H

ISPWC – DIVISION 2100

QC Division

ISPWC Reference	Item or Material	Qualifier	Test Type	Test Method or Reference	Minimum Acceptance Criteria	Minimum Testing Frequency (5)
DIVISION 200 - EARTHWORK						
202.3.5.G	**Top 12 inches of Subgrade**	**Material is not too granular to test**	Compaction	AASHTO T 310	95 percent of AASHTO T 99 95 percent of Idaho T 74	1 test per each 300 linear feet of roadway. 1 test per 10,000 square feet of general fill area.
		Material is too granular to test	Compaction	202.3.8.C.3	Lift Thickness and Minimum Passes Specified	Observation.
202.3.8.C	**Embankment and General Fill**	**Material is not too granular to test**	Compaction	AASHTO T 310	95 percent of AASHTO T 99 95 percent of Idaho T 74	1 test per 8-inch lift per each 300 linear feet of roadway.1 test per 10,000 square feet of general fill and ebankment areas.
		Material is too granular to test	Compaction	202.3.8.C.3	Lift Thickness and Minimum Passes Specified	Observation.
204.3.4.E.1.a	**Backfill**	**Trenches**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	Horizontal Location: Test at start of trench with subsequent tests a maximum of every 500 feet. Test a minimum of 2 locations in trenches greater than 100 feet but less than 500 feet in length. Vertical Location: At every horizontal location, test the first lift of fill and every 18 vertical inches of fill. Also test the fill at the top of the trench.
204.3.4.E.1.b					95 percent of Idaho T 74	
204.3.4.E.2.a	**Backfill**	**Linear Foundations**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	Horizontal Location: Test at start of foundation with subsequent tests a maximum of every 250 feet. Test a minimum of two locations for foundations longer than 100 feet in length. Vertical Location: At every horizontal location, test the subgrade and every 18 vertical inches of fill. Also test the top lift of fill.
204.3.4.E.2.b					95 percent of Idaho T 74	

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ISPWC Reference	Item or Material	Qualifier	Test Type	Test Method or Reference	Minimum Acceptance Criteria	Minimum Testing Frequency (5)
204.3.4.E.3.a	**Backfill**	**Area Foundations**	Compaction	Section 202	95 percent of AASHTO T 99	Horizontal Location: Perform one test for every 2,500 square feet of backfill surface area. Vertical Location: At every horizontal location, test the subgrade and every 18 vertical inches of fill. Also test the top lift of fill.
204.3.4.E.3.b					95 percent of Idaho T 74	

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ISPWC Reference	Item or Material	Qualifier	Test Type	Test Method or Reference	Minimum Acceptance Criteria	Minimum Testing Frequency (5)
DIVISION 300 - TRENCHING						
301.3.1.D	**Trench Bottom**	**Over-Excavation**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
304.3.1.D	**Trench Bottom**	**Over-Excavation**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
304.3.2.A	**Type II Bedding**	**Foundation Stabilization**	Lift Depth	Field Measurement	6" Maximum	Observation.
304.3.2.B	**Type II Bedding**	**Foundation Stabilization**	Compaction	AASHTO T 310	6" maximum lift thickness; 95 percent of AASHTO T 99	None.
305.3.1.A	**Trench Bottom**	**Over-Excavation**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
305.3.9.A & E	**Bedding**	**Trenches**	Lift Depth	Field Measurement	6" Maximum	Observation.
305.3.10.A	**Type II and Type III Bedding**	**Trenches**	Compaction	AASHTO T 310	92 precent of AASHTO T 99	None.
306.3.2.A	**Trench Bottom**	**Over-Excavation**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
306.3.3.C.4	**Type A-1 Trench Backfill**	**Lower Zone**	Compaction	AASHTO T 310	92 percent of AASHTO T 99	Horizontal Location: Every 50-100 linear feet Vertical Location: 8" maximum lifts.
		Upper Zone			95 percent of AASHTO T 99	
306.3.3.D.2	**Type A-2 Trench Backfill**	**Lower Zone**	Compaction	AASHTO T 310	92 percent of AASHTO T 99	Horizontal Location: Every 50-100 linear feet Vertical Location: 8" maximum lifts.
		Upper Zone			95 percent of AASHTO T 99	
306.3.3.E	**Type A-3 Trench Backfill**	**Water Settling and Rolling**	Compaction	306.3.3.E.2	Lift Thickness and Minimum Passes Specified	Observation.
306.3.4.B	**Type C Trench Backfill**	**None**	Compaction	AASHTO T 310	92 percent of AASHTO T 99	None.
306.3.5.A	**Fractured Rock Backfill**	**Water Settling and Rolling**	Compaction	306.3.5.A	Lift Thickness and Minimum Passes Specified	Observation.
307.3.7.E	**Type "C" Surface Restoration**	**Aggregate Surfacing**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.

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307.3.8.D	**Type "P" Surface Restoration**	**Aggregate Base**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
307.3.9.D	**Type "P" Surface Restoration (with Pavement Fabric)**	**Aggregate Base**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
307.3.13.B & C	**Gravel Access Road**	**Aggregate Materials**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
309.3.6.A	**Carrier Pipe**	**Water**	Cleaning, Flushing, Pressure and Leakage Testing as Required	Section 401	As required in the individual Section referenced	As required in the individual Section referenced.
309.3.6.B		**Gravity Sewer**		Section 501		
		Pressure Sewer		Section 505		
		Culvert, Storm Drain, and Gravity Irrigation		Section 601		
		Pressure Irrigation		Section 901		

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DIVISION 400 - WATER						
401.3.6	**Water Pipe**	**HDPE Pipe**	Hydrostatic Pressure	ASTM F 2164	Allowable Leakage	Until passing test is achieved.
		All Other Pipe Materials		401.3.6.C, D, and E		
401.3.9.A		**Prior to Disinfection; After Pressure Test**	Flushing Velocity	401.3.9.A	2.5 feet per second	Until velocity requirement is achieved.
401.3.9.B		**Disinfection via Chlorination**	Tablet/Granular	ANSI/AWWA C 651	Passing Bacteriological Tests	Until passing bacteriological test results are achieved.
			Continuous Feed			
			Slug Method			
401.3.9.D		**After Final Flushing**	Bacteriological		Absense of coliform bacteria	(2) samples from each location at least 24 hours apart; sample from each 1200 feet of new main and (1) from each branch.
403.3.2.G	**Hydrants**	**All Hydrants**	Disinfect and Flush	401.3.9	Passing Bacteriological Tests	Until passing bacteriological test results are achieved.
403.3.3			Pressure	401.3.6	Allowable Leakage	Until passing test is achieved.
			Drainage	403.3.3.B	Noticeable Suction	
404.3.2.L	**Water Service Pipe**	**All Water Service Pipe**	Disinfection	401.3.9	Passing Bacteriological Tests	Until passing bacteriological test results are achieved.

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ISPWC Reference	Item or Material	Qualifier	Test Type	Test Method or Reference	Minimum Acceptance Criteria	Minimum Testing Frequency (5)
DIVISION 500 - SEWER						
501.3.4	**Gravity Sewer Pipe (refer to Spec for testing method)**	**All Pipe**	Visual Inspection	501.3.4.B	Full pipe visibile from manhole to manhole	Until passing tests are achieved.
		24" Diameter and Less	Low Air Pressure	501.3.4.C	Allowable pressure loss over allowable time period	
		Larger than 24" Diameter or Groundwater Above Invert	Hydrostatic Exfiltration	501.3.4.D	Allowable leakage over allowable time period	
		27" - 60" Large Diameter Pipe	Low Air Pressure	Uni-Bell UNI-B-6-98	Allowable pressure loss over allowable time period	
		Larger than 60" Diameter Pipe	Low Air Pressure	ASTM C 1103	Allowable pressure loss over allowable time period	
		All Flexible Pipe	Deflection	501.3.4.G	Less than 5 percent deflection	
		All Pipe	Closed Circuit Television (CCTV) Inspection	501.3.4.H	Allowable standing water depth; no observed structural defects; no observed installation defects; no observed infiltration	
502.3.12.C	**Sewer Manholes**	**All Manholes (refer to Spec for testing method)**	Hydrostatic Test	502.3.12.C.1	Allowable leakage over allowable time period	Until passing test is achieved.
			Vacuum Test	502.3.12.C.2	Allowable pressure increase over allowable time	
503.3.5	**Clean-outs**	**All Clean-outs**	Various Testing as Required	501.3.4	As required in the individual Section referenced	As required in the individual Section referenced.

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ISPWC Reference	Item or Material	Qualifier	Test Type	Test Method or Reference	Minimum Acceptance Criteria	Minimum Testing Frequency (5)
504.3.8	**Sewer Services**	**All Services**	Various Testing as Required	501.3.4	As required in the individual Section referenced	As required in the individual Section referenced.
505.3.3.A	**Pressure Sewers**	**All Pressure Sewers**	Flushing	401.3.9.A	As required in the individual Section referenced	As required in the individual Section referenced.
			Hydrostatic Presure	401.3.6		
506.3.14	**Plastic Liner**	**All Plastic Liners**	Visual Inspection	506.3.14.A	No areas of liner failing inspection or spark test	Until passing tests are achieved.
			Spark Test			
507.3.8	**Gravity Sewer Pipe (Open Cut Repair/Rehab)**	**Repaired or Rehabilitated Pipe Segments**	Visual or CCTV	507.3.8.B	No indication of faulty workmanship	Until passing tests are achieved. Additional testing types may be required at the discretion of the Engineer.
508.3.5	**Gravity Sewer Pipe (Slip-Line)**	**Prior to Pipe Insertion**	Clean and CCTV	508.3.5.D & E	Complete removal of debris	Until all debris are removed.
508.3.8		**After Pipe Insertion**	Visual or CCTV	508.3.8.B	No indication of faulty workmanship	Until passing tests are achieved. Additional testing types may be required at the discretion of the Engineer.
509	**Gravity Sewer (CIPP Rehabilitation)**	**All CIPP**	Infrared (IR) Sample	509.2.1.D.4	Compare installed IR spectrum to baseline IR spectrum of proposed product	(1) sample at wetout facility or available access point in field.
			Clean, CCTV, and Conduct Final Pre-Lining CCTV of Host Pipe	509.3.4.B	Complete removal of debris and obstructions to Engineer's satisfaction; Identification of protruding conduit or taps, pipe collapses or other reduction in flow area	Until problem areas are corrected.
		24" Diameter and Less	Low Air Pressure	509.3.9.B	Allowable pressure loss over allowable time period	None.
		Larger than 24" Diameter	Hydrostatic Exfiltration	ASTM F 1216	Allowable leakage over allowable time period	

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ISPWC Reference	Item or Material	Qualifier	Test Type	Test Method or Reference	Minimum Acceptance Criteria	Minimum Testing Frequency (5)
509	**Gravity Sewer (CIPP Rehabilitation)**	**All CIPP**	Samples: (1) field cut, (1) fabricated	509.3.9.D	Mininum Flexural Strength = 4,500 psi; Minimum Flexural Modulus = 250,000 psi; Minimum Wall Thickness no < 87.5% of design thickness	None.
			Post-Installation CCTV	509.3.10	All laterals reinstated; no liner damage; no wrinkles exceeding 2% of pipe diameter	Until passing tests are achieved; Additional testing types may be required at the discretion of the Engineer.
510.3.8.A	**Gravity Sewer (Pipe Bursting)**	**All Pipe**	Various Testing as Required	501.3.4	As required in the individual Section referenced	As required in the individual Section referenced.
510.3.8.B			Closed Circuit Television (CCTV) Inspection	501.3.4.H	As required in the individual Section referenced	As required in the individual Section referenced.
511	**Gravity Sewer (Fold-N-Form)**	**All Pipe**	Clean and CCTV Host Pipe; Re-CCTV after repairs	511.3.2.D	Complete repair of all defects and elimination of infiltration.	Until problem areas are corrected.
			Visual or CCTV	511.3.7	No indication of faulty workmanship	Until passing tests are achieved; Additional testing types may be required at the discretion of the Engineer.

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ISPWC Reference	Item or Material	Qualifier	Test Type	Test Method or Reference	Minimum Acceptance Criteria	Minimum Testing Frequency (5)
DIVISION 600 - CULVERTS, STORMDRAINS, AND GRAVITY IRRIGATION						
601.3.5	**Storm Drain, Culvert, Gravity Irrigation Pipe**	**Larger than 24" Diameter**	Various Testing as Required	501.3.4	As required in the individual Section referenced	As required in the individual Section referenced.
602.3.11	**Storm Drain Inlets, Catch Basins, Manholes, Gravity Irrigation Structures**	**All Manholes**	Hydrostatic Test	502.3.12.C.1	As required in the individual Section referenced	As required in the individual Section referenced.
		With Engineer pre-approval or otherwise directed in Contract Documents	Vacuum Test	502.3.12.C.2	As required in the individual Section referenced	
602.3.14	**Type I Aggregate**	**PVC Drainage Structures**	Compaction	AASHTO T 310	12" maximum lift thickness; 95 percent of AASHTO T 99	None.

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DIVISION 700 - CONCRETE						
703.3.2.C.3.g 705.3.10.A	**Concrete**	**Surface Temperature**	None.	Cold Weather - No Fly Ash	Minimum 50F for 7 days	Minimum 2 tests daily.
					Minimum 70F for 3 days	
				Cold Weather - With Fly Ash	Minimum 50F for 10 days	
					Minimum 70F for 5 days	
703.3.6.E 705.3.10.A	**Concrete**	**Making and Curing Strength Specimens**	AASHTO T 23	Not Cold Weather	None.	3 specimens/100 cubic yards.
				Cold Weather	None.	4 specimens/100 cubic yards (one specimen is field cured).
703.3.6.F 703.2.4.C	**Concrete**	**Slump**	AASHTO T 119	Class 4000A and 4000AF	2.5 ± 1 inches	First truck load, then for every 100 or less cubic yards of each class of concrete placed.
				Class 4000B, 3000, and 3000F	Maximum 5 inches	
				Class 4000BF		
				Class 1500 and 1500F	Maximum 8 inches	
				Flowable Fill	6-8 inches	
				Compactable Fill	0-1 inches	
705.3.10.A	**Concrete**	**Slump**	AASHTO T 119	Class as specified in Contract.	Maximum 4 inches, or 2 inches when using a slip form method.	
703.3.6.G 703.2.4.C	**Concrete**	**Air Content**	AASHTO T 152	Class 4000A, 4000B, 3000, 4000AF, 4000BF, 3000F	6.5 ± 1.5 percent	First truck load, then for every 100 or less cubic yards of each class of concrete placed.
				Class 1500 and 1500F	0-6 percent	
				Flowable Fill and Compactable Fill	No Test Required	
705.3.10.A	**Concrete**	**Air Content**	AASHTO T 152	Class as specified in Contract.	6.5 ± 1.5 percent	

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706.3.11.A 703.3.6.E	**Concrete**	**Making and Curing Strength Specimens**	AASHTO T 23	Not Cold Weather	None.	3 specimens/100 cubic yards.
				Cold Weather	None.	4 specimens/100 cubic yards (one specimen is field cured).
706.3.11.A 706.2.4.A	**Concrete**	**Slump**	AASHTO T 119	Class 3000	Maximum 5 inches	One test per project per class of concrete placed.
				Class 1500	Maximum 8 inches	
		Air Content	AASHTO T 152	Class 3000	6.5 ± 1.5 percent	One test per project per class of concrete placed.
				Class 1500	0-6 percent	

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DIVISION 800 - AGGREGATES AND ASPHALT						
801.3.4.4	**Uncrushed Aggregate**	**Material is not too granular to test**	Compaction	AASHTO T 310	95 percent AASHTO T 99 95 percent Idaho T 74	1 test per 8-inch lift for each 300 linear feet of roadway or 10,000 square feet of general fill and embankment area.
		Material is too granular to test	Compaction	202.3.8.C.3	Lift Thickness and Minimum Passes Specified	Observation.
801.2.2.H		**None.**	Sampling	AASHTO T 2	Samples meet project requirements for gradation and sand equivalency.	1 sample for each 3,000 tons or one sample per project, whichever frequency is greater.
802.3.4.F	**Crushed Aggregate**	**None.**	Compaction	AASHTO T 310	95 percent AASHTO T 99 95 percent Idaho T 74	1 test per lift per 300 linear feet of roadway or 10,000 square feet of general fill and embankment.
802.2.4.A		**None.**	Sampling	AASHTO T 2	Samples meet project requirements for gradation, sand equivalency, and fractured faces.	1 sample per each 1,000 tons delivered to the jobsite.
808.2.2.F	**Cover Coat Aggregate**	**None.**	Sampling	AASHTO T 2	Samples meet project requirements for gradation, Cleanness value, and fractured faces.	1 sample for every 400 tons or 26,000 square yards of material placed.
808.2.2.G	**Choke Sand**	**None.**	Sampling	AASHTO T 2	Samples meet project requirements for gradation	1 sample per day.
	Blotter Aggregate	**None.**	Sampling	AASHTO T 2	Sample meets project requirements for gradation	1 sample per project.
810.2.2.C.1	**Plant Mix Cold Feed**	**None.**	Sampling	AASHTO T 2	Samples meet project requirements for gradation, sand equivalency, and fractured faces.	1 test per each 1,500 tons of plant mix produced.

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810.3.8.B.1	**In-Place Plant Mix HMA**	**Joints above 185F.**	Smoothness	810.3.13	0.25 inches in 10 feet	Test all joints.
810.3.12	**Plant Mix HMA**	**None.**	Sampling	810.3.12A	Samples meet project requirements for asphalt cement content and gradation	1 sample per 750 tons produced or fraction thereof. Minimum of 1 sample per day.
	In-Place Plant Mix HMA	**Acceptance by cores.**	Compaction Testing	AASHTO T 166	92.0 to 96.0 percent of AASHTO T 209	Randomly at one core per 300' of roadway and 12 inches from joints. Not required for plant mix leveling course or temporary pavement.
		Acceptance by correlated nuclear densometer.	Compaction Correlation	WAQTC TM8/ AASHTO T 166	None.	1 core for every 5 density tests performed, but not less than 3 cores per project. Not required for plant mix leveling course or temporary pavement.
			Compaction Testing	WAQTC T M8	91.0 to 96.0 percent of AASHTO T 209	Randomly at 1 test per 100 linear feet of roadway and 12 inches from joints.
810.3.13.A	**In-Place Plant Mix HMA**	**None.**	Smoothness	810.3.13.A	0.25 inches in 10 feet	Randomly.
811.2.1.A.2	**Road Mix Aggregates**	**None.**	Sampling	AASHTO T 2	Samples meet project requirements for gradation, sand equivalency, and fractured faces.	1 sample for each 700 cubic yards or 1,000 tons of mix produced
811.3.8.A	**In-Place Plant Mix**	**None.**	Smoothness	Idaho IR 87	0.25 inches in 10 feet	Randomly.
813.2.2.A.1	**Blotter Aggregate**	**None.**	Sampling	AASHTO T 2	Sample meets project gradation requirements.	1 sample per project.

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DIVISION 900 - PRESSURE IRRIGATION						
901.3.6	**Pressure Irrigation Pipe**	**HDPE Pipe**	Hydrostatic Pressure	ASTM F 2164	Allowable Leakage	Until passing test is achieved.
		All Other Pipe Materials		401.3.6.C, D, and E		
901.3.9		**All Pipe; After Pressure Test**	Flushing Velocity	401.3.9.A	As required in the individual Section referenced	As required in the individual Section referenced.

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DIVISION 1100 - TRAFFIC						
1101.3.2.T	**Loops**	**None**	Continuity and Inductance	1101.3.2.T	Inductance within 20% of specifications; Resistance not to exceed 7 ohms	None.
1101.3.11.F	**Concrete Foundations**	**Backfill**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
1102.3.9.F	**Backfill at Poles**	**Within 6-inches**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
		Other Disturbed Soils			92 percent of AASHTO T 99	

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DIVISION 2000 - MISCELLANEOUS						
2020.3.2	**Survey Monuments**	**Base Material**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.
2030.3.3	**Structures**	**Backfill**	Compaction	AASHTO T 310	95 percent of AASHTO T 99	None.

Notes:

1) This Division contains information limited to field inspection, testing, and related observations.
2) This Division does NOT contain requirements for submittals, equipment performance acceptability, or related requirements found elsewhere.
3) If there is a conflict between this Division and the ISPWC Specifications, the ISPWC Specifications (including Special Provisions or Supplemental Specifications) will control.
4) For failure requirements, refer to relevant ISPWC Specification, if applicable.
5) "None" indicates none in the ISPWC Specifications. Frequencies may be listed in Special Provisions or Supplemental Specifications.