CITY OF BILLINGS STANDARD MODIFICATIONS TO
MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS
SIXTH EDITION

PREPARED BY
CITY OF BILLINGS ENGINEERING DEPARTMENT
February 2018
FOREWORD

The City of Billings has unique requirements which are not addressed in the “Montana Public Works Standard Specifications” (MPWSS), Sixth Edition, April, 2010, so the “City of Billings Standard Modifications” were created. This document addresses those specific requirements which the City of Billings has that are not addressed in the MPWSS or are modified from the MPWSS. All projects in the right of way in the City of Billings shall be completed in accordance with MPWSS and the City of Billings Standard Modifications.

Where a City of Billings modification to MPWSS does not exist for a particular Section of MPWSS, it shall be assumed the work is to be completed in accordance with the appropriate MPWSS Section. When a City of Billings modification to the MPWSS does exist, the requirements of that modification supersede the related MPWSS requirement. The same holds true for City of Billings Standard Drawings: however, there are some Standard Drawings which do not replace or supersede the MPWSS Standard Drawing but are additional drawings created specifically for the City of Billings.

Each Section of the MPWSS that has been modified is listed in the Table of Contents. The entire section from the MPWSS has not been rewritten for these modifications. Instead, modifications are indicated for a specific section, subsection, paragraph, sentence or drawing. Also, there are several sections and forms not in the MPWSS which are included in this document and are to be used for all projects where applicable.

Appendix A of these modifications includes forms that should be used for City of Billings projects. Appendix B of these modifications contains a list of MPWSS Standard drawings followed by “Active” or “Replaced” or “Deleted”. “Active” means that the drawing is usable as shown in MPWSS; “Replaced” indicates that the drawing has been replaced by a City of Billings Standard Drawing; and “Deleted” indicates the drawing is not to be used. Appendix C contains City of Billings Standard Drawings which replace the MPWSS drawings or are in addition to the drawings in the MPWSS.
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Appendix A - Miscellaneous Forms (Yellow)
Appendix B - MPWSS Standard Drawings Status
Appendix C - City of Billings Standard Drawings (Green)
MODIFICATIONS TO MPWSS SECTIONS

For the sections included in this portion of the document, the entire section from the MPWSS has not been rewritten for these modifications. Instead, modifications are indicated for a specific section, subsection, paragraph, sentence or drawing.
SECTION 00100 – INVITATION TO BID

Delete the first paragraph and replace with the following: Separate sealed bids for the construction of __________________________ will be received by the City of Billings at the Office of the City Clerk, 210 N. 27th Street, Billings, MT 59101 or P.O. Box 1178, Billings, MT 59103 until 2:00 p.m. local time on Tuesday, __________, 20__, and then publicly opened and read aloud.

Add to the seventh paragraph after payable to “the City of Billings, MT”.

Replace the last 2 paragraphs with the following: The City of Billings is an Equal Opportunity Employer.

Published at Billings, Montana, this ________ day of ______ 20___.

City Clerk
P.O. Box 1178
Billings, MT 59103

Advertisement dates: ________________________

____________________
SECTION 00200 – INSTRUCTIONS TO BIDDERS

Article 3.2 Add the following: and e) attended the pre-bid conference (in case of mandatory pre-bid).

Add the following subsection:
Article 3.5 Water and Wastewater Plant Facilities Only: Within five (5) days after the bid opening, the apparently successful Bidder may be required to submit the SAFETY PERFORMANCE AND PROGRAM SUMMARY form supplied by the Owner (a copy of this form is in the Standard Modifications to MPWSS section of this Project Manual). The information required on the form represents a summary of the bidder’s safety history during the previous five (5) years. The information on the form may be used to determine whether a Bidder is responsible. The successful Bidder shall comply with the additional safety requirements found in 29CFR1910.119(h)(2) and (3).

Article 7.3 Delete the last line that reads “any Bid in which all issued addenda are not acknowledged will be considered incomplete and will not be read.”

Article 8.1 Replace paragraph with: A Bid must be accompanied by Bid Security made payable to the City of Billings and in accordance with BMCC 13-501.

Article 8.2 Delete paragraph

Article 8.3 Delete paragraph

Article Add the following subsection:
Article 12.4 Add the following: The use of subcontractors listed by the bidder and accepted by Owner prior to the Notice of Award will be required in the performance of the work.

Add the following subsection:
Article 13.12 For the convenience of the Engineer, none of the Instruction to Bidders, Bid Form, Bond Forms, Agreement, Contract Specifications, or other specifications should be removed from the bound copy of Contract Documents prior to submission of the bid.

Add the following subsection:
Article 13.13 Bidders must be on the plan holders list and must purchase contract documents.

Add the following subsection:
Article 22.2 On all projects and contracts with the Owner, Contractor and all subcontractors shall pay the standard prevailing rate of wages for all labor employed. The standard prevailing rate of wages, as used herein, means that standard prevailing rate of wages in the locality where the work is to be performed as determined under the Montana Statewide Prevailing Wage Rates and as bound herein. The Contractor and subcontractors are directed to the City Engineer’s Office for information on the standard prevailing rate of wages applicable to this contract within this area.
Add the following subsection:
Article 22.3 Contractor shall post in a prominent and accessible place on the site of the work a legible statement of all wages to be paid to the employees.

Add the following subsection:
Article 22.4 In accordance with Title 15, Chapter 50, MCA, the Owner shall withhold, in addition to other amounts withheld as provided by law or specified herein, one percent (1%) of all payments due the Contractor and shall transmit such monies to the Montana Department of Revenue.
SECTION 00500 - AGREEMENT FORM

Add to the second line: .....by and between “City of Billings” hereinafter called OWNER

Article 4.02.A Add to the end: Final completion of the Work shall be within ___ days after the date of Substantial Completion.

Article 4.03.A Add to the end: and ________ dollars ($________) for each day that expires after the time specified in paragraph 4.02 for Final completion. The liquidated damages specified herein includes unscheduled employment.

Article 9.01.A. Add the following:
11.d. Notice of Award
12.d. Any Notice of Partial Utilization
12.e. Notice of Substantial Completion
12.f. Lien Waivers
12.g. Notice of Final Completion and Acceptance
13. Proposal Form (where applicable)
14. Disadvantaged Business Enterprises (DBE) Requirements (where applicable)
15. FHWA Form 1273 (where applicable)
16. Required Contract Provisions for Federal-Aid Construction Contracts (where applicable)
17. Special Provisions, EEO Affirmative Action Requirements on Federal and Federal-Aid Construction Contracts (where applicable)
18. Supplementary Specifications
19. Certificates of Insurance
20. Standard General Conditions
21. Wage Rates
22. Special Provisions (Section 00900 of Std Mods and project specific)
SECTION 00810 - SUPPLEMENTARY CONDITIONS

Delete SC-2.03

Delete SC-5.04

Modify SC-14.02.A.3. Insert after “in lieu of cash retainage” the words “provided the Contractor executes the Owner’s standard “APPLICATION FOR SUBSTITUTION OF SECURITIES IN LIEU OF CASH RETAINAGE”, a copy of which is bound herein.”

Delete SC-14.02.C

FORM C-620 - CONTRACTOR’S APPLICATION FOR PAYMENT

Replace “CONTRACTOR’S APPLICATION FOR PAYMENT” with “PAYMENT ESTIMATE” included in Appendix A.

SECTION 01010 – SUMMARY OF WORK

Modify 1.2.D 1-7 as follows:
1. Change Orders
2. Addendums
4. Contract Specifications
5. Plan Drawings
6. City of Billings Standard Modifications
7. Montana Public Works Standard Specifications
3.1. E Contractor shall give Engineer 24-hour notice of readiness of the work for testing.

3.1. F Table 1, shown below, outlines the minimum frequency of quality assurance testing which may be performed by the City of Billings or its designated representative for acceptance. This frequency may be reduced at the discretion of the City. This testing does not replace an appropriate Contractor quality control testing program as described earlier in this section. In the case of a conflict between QC and QA testing, the QA testing shall govern.

Table 1 - City of Billings Materials Testing Requirements

<table>
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<tr>
<th>Test Specification/Material</th>
<th>Test Method</th>
<th>Minimum Required Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPHALT CONCRETE PAVEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt Concrete Pavement</td>
<td>Mix designGradation</td>
<td>1 Submittal</td>
</tr>
<tr>
<td>(Base Course and Surface</td>
<td>Asphalt Oil Content Marshal Test</td>
<td>1 test/first day or 1/1000</td>
</tr>
<tr>
<td>Course)</td>
<td>Rice Specific Gravity (MPWSS 02510)</td>
<td>TN</td>
</tr>
<tr>
<td>Compaction of Asphalt</td>
<td>In-Place Density/Thickness</td>
<td>1 test/day or 1/1500 TN</td>
</tr>
<tr>
<td>Concrete Pavement</td>
<td></td>
<td>1 core/day or 1 core/500</td>
</tr>
<tr>
<td>PORTLAND CEMENT CONCRETE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portland cement Concrete</td>
<td>Mix design</td>
<td>1 Submittal</td>
</tr>
<tr>
<td>Portland Cement Concrete</td>
<td>Air, Slump, and 7-Day and 28-Day</td>
<td>Every 100 CY</td>
</tr>
<tr>
<td>Pavement</td>
<td>compressive strength (MPWSS 02515)</td>
<td></td>
</tr>
<tr>
<td>Portland Cement Concrete</td>
<td>Air, Slump, and 7-Day and 28-Day</td>
<td>Every 50 CY</td>
</tr>
<tr>
<td>Flatwork and Curb &amp; Gutter</td>
<td>compressive strength (MPWSS 02515)</td>
<td></td>
</tr>
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</table>
**EARTHWORKS**

<table>
<thead>
<tr>
<th>Test Specification/Material</th>
<th>Test Method</th>
<th>Minimum Required Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench Backfill</td>
<td>Moisture-Density ((MPWSS 02221) 97% Minimum</td>
<td>1 Sub/soil type encountered / 1 Submittal/borrow source</td>
</tr>
<tr>
<td>Trench Compaction</td>
<td>In-Place Density(MPWSS 02221/1.4) 97% Minimum</td>
<td>1 test/lift/200 LF</td>
</tr>
<tr>
<td>Trench Compaction (laterals outside the road template, structures, valves, hydrants and manholes)</td>
<td>In-Place Density(MPWSS 02221/1.4) 97% Minimum</td>
<td>1 test/for each 2 ft of vertical depth/2 ft from edge of structure, valve, hydrant, or manhole</td>
</tr>
<tr>
<td>Pipe Bedding</td>
<td>Type I Bedding gradation &amp; Plasticity Index / Type II Bedding Gradation (MPWSS 02221)</td>
<td>1 Submittal</td>
</tr>
<tr>
<td>Subgrade and Embankment</td>
<td>Moisture-Density (MPWSS 02230) 95% Minimum</td>
<td>1 Submittal per soil type encountered / 1 Submittal per borrow source</td>
</tr>
<tr>
<td>Compaction of subgrade under curbs, gutters, and sidewalks</td>
<td>In-Place Density(MPWSS 02230/1.3) 95% Minimum</td>
<td>1 test/lift/200 LF (C &amp;G) or 1 test/lift/1000 SF (flatwork)</td>
</tr>
<tr>
<td>Compaction of subgrade and embankment for roadways</td>
<td>In-Place Density(MPWSS 02230/1.3) 95% Minimum</td>
<td>1 test/lift/4000 SF</td>
</tr>
<tr>
<td>Sub Base Course</td>
<td>Gradation - Moisture Density – Fractured Faces (Crushed) - LA Abrasion, LL, PL, and PI (MPWSS 02234)</td>
<td>1 Submittal</td>
</tr>
<tr>
<td>Compaction of Sub Base Course for roadways</td>
<td>In-Place Density(MPWSS 02234/1.3) 95% Minimum</td>
<td>1 test/lift/4000 SF</td>
</tr>
<tr>
<td>Crushed Base Course</td>
<td>Gradation - Moisture Density – Fractured Faces (Crushed) - LA Abrasion, LL, PL, and PI (MPWSS 02235)</td>
<td>1 Submittal</td>
</tr>
<tr>
<td>Compaction of crushed base course under curbs, gutters, and sidewalks</td>
<td>In-Place Density(MPWSS 02235/1.3) 95% Minimum</td>
<td>1 test/lift/200 LF (C &amp;G) or 1 test/lift/1000 SF (flatwork)</td>
</tr>
<tr>
<td>Compaction of crushed base course for roadways</td>
<td>In-Place Density(MPWSS 02235/1.3) 95% Minimum</td>
<td>1 test/lift/4000 SF</td>
</tr>
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SECTION 01500 - CONSTRUCTION AND TEMPORARY FACILITIES

1.3  A **Revise Paragraph to read:** Be responsible for dust control, providing all equipment and personnel for the work. Furnish Engineer name(s) and telephone numbers(s) of the person(s) responsible for dust control during evenings and weekends. If a responsible person cannot be contacted or does not respond within four (4) hours, Owner may perform or contract out dust control duties at Contractor expense.

1.4 **Delete this Subsection**

1.5 **Delete this Subsection and replace with new subsection as follows:**

RESTORATION OF RIGHT OF WAY

Asphalt pavement or concrete must be replaced within seven (7) working days from the time of removal except for arterial streets which must be restored within 24 hours. Work within disturbed ROW will continuously progress until ROW is restored. Exceptions can be made upon approval of Engineer. During periods when hot plant mix asphalt is not available, a temporary cold asphalt mix or concrete shall be used for surface restoration and removed and replaced with hot plant mix asphalt as soon as weather permits.

Add the following Subsections:

1.6 **IRRIGATION SYSTEMS**

Contractor shall remove and reinstall; or modify irrigation systems as necessary to accommodate the construction work. Irrigation systems shall be operational within three (3) calendar days after initial shutdown for construction between April 15th and October 15th. The Contractor shall coordinate construction activities with the appropriate property owner to assure proper shutdown, removal, relocation, and replacement of existing sprinkler or irrigation systems. It is recommended that the Contractor contact the property owners where sprinkler or irrigation systems are located to determine whether the system is functioning properly prior to starting any work. Contractor shall take care to cut and remove the system with as little damage as possible. Replacement of damaged components will be with parts of equal or greater quality and preferably the same brand as the existing system. Although the Contractor will not be required to restore a non-functional system to be functional, it will be the Contractor’s responsibility to restore any portion of the system that is damaged during construction. Contractor shall notify Engineer immediately of the locations of non-functioning sprinkler or irrigation systems.

1.7 **NOTIFICATION OF PROPERTY OWNERS**

Contractor shall notify property owners or tenants of the approaching work in order to arrange for the removal of parked vehicles or other items in the right of way that would interfere with construction operations. Contractor shall notify, in writing, property owners or tenants two (2) to five (5) days prior to start of work. If work is not started within the time specified, Contractor shall re-notify property owners or tenants until work has actually commenced.
Contractor shall submit a copy of the notification to Engineer for approval prior to distribution. Contractor shall schedule notifications at such a time as an Owner's representative can accompany Contractor's personnel making notifications or the Contractor shall make a written list of notifications with date and time for submission to the Engineer.

1.8 ACCESS AND PARKING

Contractor shall maintain resident access to driveways within the project area. Approach grades into driveways shall be maintained to provide reasonable comfort and access. Access for garbage pickup and mail delivery must be provided.

On-street parking may be temporarily removed, with the approval of the Engineer, to accommodate construction. The Contractor shall provide property owners with a minimum of 48 hours notice whenever their normal access will be interrupted or whenever on street parking adjacent to their property will be removed. At least one access shall be maintained at all times to commercial properties (including schools, apartments, and condominiums), including parking lots.

1.9 WATER FOR CONSTRUCTION PURPOSES

Construction water required for compaction, embankments, subgrade, trenches, dust control, or any other construction related work must be supplied by the Contractor at Contractor's expense. Should the Contractor desire or elect to use City water for construction related work, Contractor shall make proper arrangements with and pay all necessary fees to the City of Billings Public Works Department or the Height's Water District, whichever is applicable.

Contractor shall not use property owner’s water or hoses without property owner’s permission.

2.0 WATER MAIN NOTIFICATIONS

Add sentence to paragraph to read:

The Contractor is hereby cautioned that all water valves shall be operative and available at all times. Water valves shall only be operated by City of Billings Public Works Department Collection and Distribution Division personnel or Heights Water district personnel during normal business hours (weekdays between 8:00AM and 5:00 PM). The Contractor is required to fill out and submit the City’s Valve Operation Request Form to the Project Engineer four (4) working days prior to the requested time. The project Engineer shall have two (2) full working days (8 hours) to receive and review each request prior to forwarding it to The City of Billings. The City of Billings requires a minimum of 48 hours notice on any involvement that will require City personnel to be on the job. Valve requests not completed within 24 hours of date and time of requested shut down, shall require a resubmittal of the valve request with the 48 hour minimum notification period in effect.
SECTION 01570 - CONSTRUCTION TRAFFIC CONTROL

1.2. A Revise Sentence to read: Perform work under this section meeting Manual of Uniform Traffic Control Devices (MUTCD), Americans with Disability Act (ADA), and contract requirements.

1.3. B Replace Paragraph with: Submit a Traffic Control Plan at least one week before construction begins or before changes in segments or phases of the work on the project. Staging area(s), haul routes, and pedestrian access routes shall be denoted on all Traffic Control Plans. The Owner will review and approve the Traffic Control Plan considering known off-site activities and may require modification to the plan or construction timing to coordinate events. Work shall not commence until said plan is approved.

1.3. C Replace Paragraph with: For projects involving an arterial or collector or as otherwise directed on a traffic control plan review, submit a news release which includes, as a minimum, the work activity and duration. Once approved, furnish the news release to the local media and public services included in Appendix A at least three days before starting work. Notify all landowners or residents adjacent to the work of the type and duration of the construction.

1.3. D Add the following subsection: All full road closures are to be reviewed and approved by the owner prior to construction. Full closures of the “Arterials” or “Collectors” on the current edition of the city’s Functional Classification Map will require a signed detour using another “arterials” and “Collectors”. Changeable message signs (CMS) will be required to be placed at the point of the proposed closure for both directions of travel prior to full closures.

2.1. C Add to end of paragraph: Assure all traffic control devices are clean, legible, reflective for night-time use, and operable. Signs and devices must meet standards outlined in the current ATSSA “Quality Guidelines for Temporary Traffic Control Devices” to be measured for payment. Failure to adequately maintain and clean traffic control devices in use renders the traffic control operation unacceptable.

3.2. F Add the following subsection: Contractor shall furnish Engineer with the name and phone number of the person(s) responsible for traffic control during evenings and weekends. If a responsible person cannot be contacted or does not respond, Owner may perform or contract out traffic control operations at Contractor’s expense.

3.3. A Replace paragraph with: All flag persons must be currently certified as traffic control flaggers by the Montana Flagger Training Program (MDT/LTAP) or by an American Traffic Safety Services Association (ATSSA) flagger training program. They shall wear safety apparel and use STOP/SLOW paddles meeting the requirements of Chapter 6E in the Manual of Uniform Traffic Control Devices (MUTCD).
**Revise title of Section to read:**
SECTION 02112 – REMOVAL OF EXISTING PAVEMENT, CONCRETE CURB, SIDEWALK, DRIVE APPROACH AND/OR STRUCTURES

**Add the following subsections to MPWSS:**

3.2 SIDEWALK TRIPPER REPAIR BY SAW CUTTING OR GRINDING

A. Vertical displacements of ½” or more are considered trippers. Criteria for allowing horizontal saw cutting or grinding methods to remove trippers on concrete sidewalks are as follows:
   1) Sidewalk panel must be free of chipped, cracked or spalled concrete.
   2) Vertical displacement must not exceed 2”.
   3) Vertical displacement must be at a tooled joint.
   4) Spacing between adjacent panels must not exceed ½”.
   5) Sidewalk cross slope must not exceed 2%.

B. Saw or grind vertical displacements between ¼” to ½” to a slope not steeper than 1:2. The saw cut or grind shall be applied across the entire vertical surface displacement.

   Saw or grind vertical surface displacements over ½” to a slope not steeper than 1:12 (8.3%).

   The finished surface shall have a uniform appearance with essentially the same or slightly rougher texture as the existing sidewalk. Repaired surfaces shall not be smooth or polished.

   If saw cutting or grinding does not meet the slope and surface area criteria, the sidewalk must be removed and replaced.

4.5 SIDEWALK TRIPPER REPAIR BY SAW CUTTING OR GRINDING

A. Measurement and payment for sidewalk repair by saw cutting or grinding shall be paid by the contract unit price bid per sidewalk panel up to a width of seven (7) feet, and shall be full compensation for all equipment, tools, labor, cleanup and incidentals required for the completion of the item.
SECTION 02113 - ADJUSTING EXISTING MANHOLES, LAMPHOLES, INLETS, WATER VALVE BOXES, WATER SERVICES, AND FIRE HYDRANTS TO GRADE

3.1. A Revise Paragraph to read: Adjust to required grade all existing manholes, inlets, lampholes and water valve boxes by either lowering or raising in accordance with the details shown in the contract documents or standard drawings. Do not lower manholes, lampholes, or inlets by removal of portions of the cones or barrel sections. Accomplish downward adjustments by replacement of existing sections with shorter sections. Assure that all structures have a minimum of 4 inches of concrete adjusting rings and a maximum of 12 inches of rings under the casting. Grout may be used between concrete rings for final adjustment of castings.

3.1.E Revise Paragraph to read: Provide backfill material conforming to the requirements of Section 02235, 1 inch minus crushed base course, and compacted to at least 97 percent of the maximum dry density as determined by ASTM D698.

4.2.B.1 Revise Sentence to read: Existing Manholes to Adjust – Per Each

4.3. A Revise Sentence to read: This item is measured and paid for by the adjustment of existing fire hydrants, complete in place, at the contract unit price bid for “Adjustment of Existing Fire hydrants,” constituting full compensation for all materials, excavation, backfill, compaction, labor, tools and incidentals.

4.3.B.1 Revise Sentence to read: Adjustment of Existing Fire Hydrant – Per Each

4.4 Delete this Section in its entirety
SECTION 02114 - RELOCATING OR REMOVING UTILITY POLES, STREET SIGNS AND MAILBOXES

Part 2: *Revise Section in MPWSS to read: Products*

2.1. **A Add the following subsection in MPWSS:** Relocated sign assemblies shall be installed on new Telespar, or approved equivalent posts.

3.2. **J Revise paragraph to read:** Remove all sign assemblies designated for removal without damaging the sign panels. Salvage and deliver sign panels to Owner and dispose of sign posts, anchors and miscellaneous sign hardware.

3.3. **A Replace Paragraph with:** Remove mailboxes and posts designated for relocation and place at a location that ensures uninterrupted mail delivery. Upon completion of construction, reinstall mailboxes and posts in permanent location in accordance with U.S. Post Office regulations and applicable City Standards. Contractor shall contact property owner if existing mailbox support is of a condition rendering it unsuitable for reuse.

**Add the following Subsection:**

3.4. **A COORDINATION**

Contractor will coordinate all utility relocation activity with construction activity. If a utility company is non-responsive, Contractor shall notify Engineer.
SECTION 02221 - TRENCH EXCAVATION AND BACKFILL FOR PIPELINES & APPURTENANT STRUCTURES

1.2. A Add the following references to this Section:

<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D4253</td>
<td>Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table</td>
</tr>
<tr>
<td>ASTM D4254</td>
<td>Standard test methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density</td>
</tr>
</tbody>
</table>

1.2. A and 1.4.B.1 Delete reference to AASHTO T99

1.3. A.1 Revise sentence in MPWSS to read:

2.1.A.1 Revise paragraph in MPWSS to read:
Type 1 Pipe Bedding includes the material placed below the bottom of the pipe, around the pipe and up to the springline of the pipe for reinforced concrete pipe and ductile iron pipe; and below the bottom of the pipe to 12 inches over the top of the pipe for flexible piping, per the standard modifications drawings.

2.1. A.2 Replace Paragraph with: Provide Type 1 Bedding material consisting of gravel having a gradation as follows and a maximum plasticity index of 6, as determined by AASHTO T89 and T90 or by ASTM D4318. ¾” crushed bedding rock is acceptable Type I Bedding.

<table>
<thead>
<tr>
<th>Sieve Opening</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 inch (25mm)</td>
<td>100</td>
</tr>
<tr>
<td>3/4 inch (19 mm)</td>
<td>90-100</td>
</tr>
<tr>
<td>3/8 inch (9.5 mm)</td>
<td>20-55</td>
</tr>
<tr>
<td>No. 4</td>
<td>5-10</td>
</tr>
<tr>
<td>No. 8</td>
<td>0-5</td>
</tr>
</tbody>
</table>

2.1.B Delete subsection in MPWSS in its entirety.

2.1. C.3 Replace Paragraph with: Type 2 Bedding shall consist of granular material meeting the following gradation and a maximum plasticity index of 6 and a maximum liquid limit of 25%.

<table>
<thead>
<tr>
<th>Sieve Opening</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>0 – 25</td>
</tr>
<tr>
<td>No. 200</td>
<td>0 – 10</td>
</tr>
</tbody>
</table>
2.1. D.1 *Delete paragraph in MPWSS and replace with new paragraph:*
In locations where pipelines are installed below the groundwater level, or as directed by the Engineer, a geotextile pipe bedding wrap shall be installed around the entire pipe bedding. Where lapping is required and where edges are brought together at the top of the bedding, the geotextile fabric shall overlap a minimum of 2 feet. The geotextile fabric for bedding wrap shall be a non-woven geotextile with the following properties.

<table>
<thead>
<tr>
<th>Properties</th>
<th>Requirement</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Strength</td>
<td>205 lbs.</td>
<td>ASTM D 4632</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>80 lbs.</td>
<td>ASTM D 4533</td>
</tr>
<tr>
<td>CBR Puncture</td>
<td>500 lbs.</td>
<td>ASTM D 4833</td>
</tr>
<tr>
<td>Permittivity (Max)</td>
<td>1.4 sec⁻¹</td>
<td>ASTM D 4491</td>
</tr>
<tr>
<td>Apparent Open Size</td>
<td>80 US Sieve</td>
<td>ASTM D 4751</td>
</tr>
</tbody>
</table>

The geotextile fabric for bedding wrap shall be Mirafi 180N, Propex Geotex 801, or approved equal.

2.2 A.1 *Revise Paragraph to read:*
Backfill material obtained from trench excavations must be free of cinders, ash, refuse, organic or frozen material, boulders, *concrete, asphalt,* or other deleterious materials. Backfill materials and placement are further described in the Execution Section of this specification. *Sand or soil as approved by Engineer may be accepted.*

3.3.B.2.a *Revise paragraph in MPWSS to read:*
Excavate to provide room to install, join and bed pipe as specified. The minimum trench width is 3'-6" for outside pipe diameters of 18 inches or less. The minimum trench width is 3'-0" plus the outside diameter of the pipe for pipe sizes exceeding 18 inches. The trench shall be excavated so a minimum clearance of 12 inches is maintained on each side of the pipe for proper compaction of the bedding and backfill material.

3.3.B.3.a *Revise paragraph in MPWSS to read:*
Excavate the trench as required for the invert grade or pipe bury as specified in the contract documents, plus the depth under the pipe specified in the standard drawings for the Type 1 Pipe Bedding. If bedrock, boulders or large stones are encountered at the bottom of the trench, excavate at least 8 inches below the bottom of the pipe for backfilling with Type 1 Pipe Bedding.

3.3. E.2 *Replace Paragraph with:*
All pavement damaged during construction by the Contractor’s equipment or the use thereof shall be removed to at least a depth of two (2) inches and replaced. Removal and replacement shall be over an area that is continuous with the asphalt restoration and as otherwise required by the Engineer to provide a smooth and durable patch. No compensation will be allowed for removal and replacement of damaged pavement outside of the pay limits for pavement restoration.
Patches less than two (2) inches in thickness will not be allowed. Work and materials shall be in accordance with the requirements for pavement restoration.

3.4.B **Revise paragraph in Standard Mods to read:** If dewatering is deemed necessary at the time of construction, the Contractor shall consult a licensed professional engineer or certified professional hydrogeologist familiar with the local geologic, hydrogeologic, and geotechnical conditions as well as the construction practices pertaining to the Contractor’s means and methods of dewatering and submit a dewatering and monitoring plan for review prior to commencing dewatering operations. The dewatering plan shall be designed and stamped by a licensed professional engineer or certified professional hydrogeologist.

3.6. B.1.a **Revise paragraph to read:** Place Type 1 Pipe Bedding material under the pipe to the depth as specified in the standard drawings; around the pipe and up to the springline of the pipe for reinforced concrete pipe; and around the pipe to 12 inches over the top of the pipe for flexible piping. Place in maximum lifts of 6 inches using hand operated or other compaction methods without damaging or disturbing the pipe. Thoroughly compact each layer. Use special care to assure compaction under pipe haunches.

3.6. B.2 **Delete subsection in MPWSS in its entirety**

3.6. C.1 **Add new paragraph to subsection in MPWSS:** After the pipe bedding materials are placed and compacted as specified, backfill the trench. Use backfill material free of cinders, ash, refuse, organic or frozen material, boulders, or other deleterious materials. From the top of the Select Type 1 Bedding to 6 inches (1.5 cm) below the ground surface, or to the subgrade elevation, material containing rock up to 8 inches (20 cm) in the greatest dimension may be used.

Backfill for short duration utility excavations for repairs or connections to existing utilities within the right of way shall be crushed base course material meeting the requirements of Section 02235. Native soils may be used for backfill with Engineers approval. All costs associated with crushed base course backfill material and haul away of native soil shall be incidental to the work.

3.6. C.2.a **Replace Paragraph with:** **Type A** Trench Backfill is compacted backfill and shall be used for all work in the right of way.

3.6. C.2.b **Replace Paragraph with:** **Type B** Will not be used in the right of way unless approved by Engineer.

3.6. C.2.c **Replace Paragraph with:** **Type C** Will not be used in the right of way unless approved by Engineer.

3.6. C.6.a **Revise Paragraph to read:** **Type A Trench Backfill.** Place trench backfill in maximum 8 inch compacted lifts within 3 percent of optimum moisture content, and compact to at least 97 percent of maximum dry density determined by ASTM D698, or for
materials which do not exhibit a typical well-defined moisture-density curve, 70% relative density as determined by ASTM D4253 and D4254.

3.6. C.6.b **Revise Paragraph to read:** Type B Trench Backfill. Place backfill in maximum 8 inch lifts, within 3 percent of optimum moisture content, and compact to at least 95 percent of maximum dry density, as determined by ASTM D698, or for materials which do not exhibit a typical well-defined moisture-density curve, 50% relative density as determined by ASTM D4253 and D4254.

3.6. F.1 **Revise Paragraph to read:** Provide warning tape as described in PRODUCTS Section 2.4.A. Bury tape a maximum 18 inches below finish surface grade or immediately below designed street section.

4.4. B **Revise Paragraph to read:** Payment for Type II Pipe Bedding is made at the contract unit price bid per cubic yard, which includes additional excavation, furnishing, placing and compacting Type II Bedding material as specified and all other labor, materials, equipment and incidentals necessary for completion of this item.

4.4. C **Revise paragraph in MPWSS to read:** Payment quantity is based upon an excavation width of 3.0 feet plus the outside pipe diameter with a minimum payment width of 3.5 feet.

4.5. B **Revise paragraph in MPWSS to read:** The trench width for measurement and payment is 3.0 feet plus the outside pipe diameter with a minimum payment width of 3.5 feet, measured between vertical planes for the depth required.
Revise section heading to read:
SECTION 02222- LOW PERMEABILITY TRENCH BACKFILL PLUGS

3.1. A.1 Add to the end of paragraph: Impervious flowable fill is allowed for pipe bedding and trench backfill plugs.

SECTION 02225- FLOWABLE FILL

2.3. B Revise paragraph in Standard Mods to read: The Contractor shall submit, to the Engineer, a mix design based upon a trial batch or field experience, including the proportions and sources of all constituent materials, air entrainment and (optionally) other admixtures, expressed as cubic yard batches. Measured compressive strength, air content, initial set time and yield for the mix design trial batch (or for the field experience based mix design) shall be submitted.

2.4. A Revise Paragraph to read: Flowable fill shall be designed to achieve a 28-day compressive strength of 30 to 150 psi when tested in accordance with ASTM C39. Test specimens shall be made in accordance with ASTM D4832. Compressive strength tests shall be performed at frequencies of at least one test set per 150 yd³ and at least one test set per day of placement. Flowable fill shall be designed to attain initial set within four (4) hours of batching. Submit test results based upon a trial batch to the Engineer verifying this property before use.

SECTION 02230 - STREET EXCAVATION, BACKFILL AND COMPACTION

Add the following References:

ASTM D4253  Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

3.1.A Add to the end of paragraph: Construction limits shall be defined as all areas between lines 1.0 feet outside the back of sidewalk and/or curb and gutter, or 2.0 feet outside the edge of pavement where sidewalks and/or curb and gutter is not required, and all areas within the cut lines, and all areas covered by 3.0 feet, or less, embankments.
SECTION 02234 - SUB BASE COURSE

3.3. A Revise Paragraph to read: Furnish watering and rolling to obtain a minimum field density of 97 percent of the maximum dry density determined by ASTM D698. No separate compensation is allowed for rolling and watering the sub-base course other than the sub-base course bid item or items listed on the Contract documents.

SECTION 02235 - CRUSHED BASE COURSE

2.2. C Revise Paragraph to read: Crush material so the percentage of fractured particles in the finished product is as constant and uniform as practical. Crush to produce material where at least 50 percent of the material retained on the No. 4 sieve has at least one fractured face.

3.3. C Change reference from AASHTO T99 to ASTM D698

SECTION 02502 – ASPHALT PRIME AND/OR TACK COAT

3.3.A Revise paragraph to read: The asphalt tack is the application of a diluted, slow-breaking, SS-1 or SS-1h asphalt emulsion to insure bonding between the surfaces being paved and the overlying course. Immediately before applying tack coat, clean the surface to be tacked and adjacent surfaces of all dirt and loose materials using blowers or power brooms, supplemented by hand brooming if necessary.

3.3.B Revise paragraph in to read: Apply asphalt tack when surface is dry and when the air temperature in the shade is at least 50° F and rising. The tack coat should be applied in a uniform and consistent manner. Tack coats that are streaky or striped will not be accepted. Vary application rate based on the condition and roughness of the pavement receiving the tack coat. Do not sweep dirt, dust or loose materials from adjacent surfaces onto tacked pavement.

3.3.E Revise paragraph to read: After the tack coat has been applied, it is to remain undisturbed until the emulsion breaks (turns from brown to black) and sets (when all the water has evaporated). Paving equipment, haul trucks, and other vehicles are prohibited from driving or parking on the tack coat until the tack coat breaks and sets as determined by the Engineer.
SECTION 02510 - ASPHALT CONCRETE PAVEMENT

2.2.A Revise paragraph to read: Furnish aggregates from acceptable sources approved by the Engineer. Sample and test for specification compliance before aggregate is crushed for stockpiling. Sampling and testing must be completed within the last one-year period and/or upon change of source before aggregate is crushed for stockpiling.

Add the following subsection:

2.2.E.1 Up to 15% Recycled Asphalt Pavement (RAP) by weight may be incorporated into a mix. If RAP is included in the job mix formula and the final mix, meet all of the aggregate plant mix requirements.

2.2.G Revise paragraph to read: Produce surface course aggregate retained on the No. 4 sieve having a minimum 85% by weight of particles with at least two mechanically fractured faces. When two fractures are contiguous, the angle between the fracture planes shall be at least 30 degrees to count as two fractured faces. Fine aggregate angularity is to be 45% minimum. Sand equivalent is to be 45% minimum. The course aggregate shall not exceed 40% wear at 500 revolutions.

2.2.I Revise Table 1 to read:

<table>
<thead>
<tr>
<th>Percentage by Weight Passing Job Mix Target Bands</th>
<th>Type A-Mod</th>
<th>Type B-Mod</th>
<th>Type C</th>
<th>Job Mix Tolerances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Size</td>
<td>Arterials Collectors Commercial Industrial</td>
<td>Local and Residential Only</td>
<td>Patches with at least one dimension less than 6 feet and leveling</td>
<td></td>
</tr>
<tr>
<td>1&quot;</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>¾&quot;</td>
<td>90-100</td>
<td>82-95</td>
<td>100</td>
<td>+/- 7</td>
</tr>
<tr>
<td>¾&quot;</td>
<td>0-90</td>
<td>70-90</td>
<td>91-93</td>
<td>+/- 7</td>
</tr>
<tr>
<td>No. 4</td>
<td>45-65</td>
<td>51-71</td>
<td></td>
<td>+/- 6</td>
</tr>
<tr>
<td>No. 10</td>
<td>32-45</td>
<td>34-46</td>
<td></td>
<td>+/- 6</td>
</tr>
<tr>
<td>No. 40</td>
<td>15-25</td>
<td>16-26</td>
<td></td>
<td>+/- 5</td>
</tr>
<tr>
<td>No. 80</td>
<td>8-16</td>
<td></td>
<td></td>
<td>+/- 2</td>
</tr>
<tr>
<td>No. 200</td>
<td>2-10</td>
<td>4-8</td>
<td>5-9</td>
<td>+/- 2</td>
</tr>
</tbody>
</table>

Asphalt Cement 4.0-6.5%

2.3.A.1 Revise the paragraph as follows:

a. PG 58-22 (not to be used unless approved by Engineer)
b. PG 58-28 (not to be used unless approved by Engineer)
c. PG 64-22
d. PG 64-28 (not to be used unless approved by Engineer)
e. PG 70-28 (Required for all Type A-Mod unless approved by Engineer)

2.3.B. Revise paragraph to read: The percentage of asphalt by weight, to be added to the aggregate will be, generally, between 4 and 6 percent of the weight of the total mix.
Add the following subsection:
2.5.A.3.k Provide Hamburg Wheel Track Testing results for all Type A-Mod asphalt surface courses.

Add the following subsection:
2.5.A.5 For mix designs using RAP, furnish the asphalt content and gradation of the RAP prior to mixing and after mixing with the virgin aggregate.

2.5.B.2 Add tables at the end to read:

<table>
<thead>
<tr>
<th>Table 5</th>
<th>Type A and Type B-Modified Marshall Design criteria as determined by ASTM D1559</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type A-Mod</td>
</tr>
<tr>
<td>Number of Blows per Face</td>
<td>75</td>
</tr>
<tr>
<td>Stability, Minimum</td>
<td>1800 lbs</td>
</tr>
<tr>
<td>Flow</td>
<td>8-18*</td>
</tr>
<tr>
<td>Percent Air Voids - Design</td>
<td>4-5</td>
</tr>
<tr>
<td>Percent Air Voids - Production</td>
<td>3-5</td>
</tr>
<tr>
<td>Percent Air Voids Filled with Bitumen</td>
<td>65-75</td>
</tr>
<tr>
<td>Voids in Mineral Aggregate (VMA)</td>
<td>14 min</td>
</tr>
</tbody>
</table>

*Upper flow requirements do not apply for any mix with a polymer modified binder (where the difference between the upper and lower temperature number is 90 degrees or greater).

<table>
<thead>
<tr>
<th>Table 6</th>
<th>Hamburg Wheel Track Requirements according to AASHTO MT 334-14</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Design</td>
</tr>
<tr>
<td>Design</td>
<td>15,000 Passes – rut depth not to exceed ½”</td>
</tr>
</tbody>
</table>

3.12.C Revise paragraph to read:  Apply asphalt tack to edges of curbs, fillets, double gutters, existing pavements and structures prior to placement of asphaltic concrete pavement to provide a water-tight joint.

Add the following subsections:
3.12.D Tack coat shall be used between asphalt lifts.

3.13.E Revise paragraph to read:  Apply asphalt tack to edges of curbs, fillets, double gutters, existing pavements and structures prior to placement of asphaltic concrete pavement to provide a water-tight joint.

3.13.F Tack coat shall be used between asphalt lifts.

3.14.B.3.c. Revise paragraph to read:  Cut asphalt edges at least 12 inches wider than the trench width on each side of the trench excavations, or as directed by Engineer; and in general, be cut parallel to the street centerline for mainline construction and perpendicular to the street centerline for service lateral construction.
Add the following subsection:
3.14. B.3
   d. Skin patching shall not generally considered a satisfactory method of repair.
   e. More stringent repair standards shall apply to all patches in new pavement.
Owner shall provide new pavement repair standards.

Add the following subsections:
3.14. D Restoration

Street restoration shall include asphalt and either a crushed aggregate base or a lean mix base as follows:

<table>
<thead>
<tr>
<th>Road Classification</th>
<th>Asphalt Thickness</th>
<th>Base Course Thickness</th>
<th>Lean Mix Base Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterials</td>
<td>*Min 4” or Match Existing</td>
<td>*Min 14” or Match Existing</td>
<td>5”&gt;</td>
</tr>
<tr>
<td>Minor Arterials</td>
<td>*Min 4” or Match Existing</td>
<td>*Min 12” or Match Existing</td>
<td>4”&gt;</td>
</tr>
<tr>
<td>Collectors</td>
<td>*Min 4” or Match Existing</td>
<td>*Min 10” or Match Existing</td>
<td>3”&gt;</td>
</tr>
<tr>
<td>Local Commercial</td>
<td>4”</td>
<td>10”</td>
<td>3”&gt;</td>
</tr>
<tr>
<td>Local Residential</td>
<td>3”</td>
<td>10”</td>
<td>3”&gt;</td>
</tr>
</tbody>
</table>

*Whichever is greater

1. If the disturbed section has a geotextile fabric or grid which has been cut through, the Contractor shall consult with the Engineer to determine the appropriate restoration for the geotextile fabric/grid and surfacing section.

2. Contractors can use a different surfacing section if it has been supported by a geotechnical report and approved by the Engineer.

3. The composition of the lean mix for street restoration shall consist of the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement</td>
<td>188 lbs.</td>
</tr>
<tr>
<td>3/4” Coarse Aggregate</td>
<td>50%</td>
</tr>
<tr>
<td>Fine Aggregate</td>
<td>50%</td>
</tr>
<tr>
<td>Air</td>
<td>9 oz.</td>
</tr>
<tr>
<td>Slump</td>
<td>4-5 in.</td>
</tr>
</tbody>
</table>

The percentages as shown for coarse aggregate and fine aggregate shall produce one cubic yard of lean mix base material. Admixtures to help set the lean mix faster will be approved at the discretion of the Engineer.
a. The Contractor shall place lean mix base for all street cuts less than 3 feet wide. Placement of lean mix base for widths greater than 3 feet will be by Engineering Approval or Direction.

b. Do not place lean mix on frozen ground. Mix and place only when the air temperature is at least 35 degrees F and rising. Stop placement when the air temperature is 40 degrees F and falling.

c. Lean mix shall be placed by methods that preserve the quality of the material and follow the applicable tolerances and specifications of placing a crushed base course. It shall be placed to be self-compacting in a uniform layer at the specified thickness.

3.17. A Replace paragraph with: Pave base and surface courses with a self-propelled formless lay down machine with a floating screed. The hot mix asphalt (HMA) must be delivered to maintain a relatively constant head of material in front of the screed. This involves maintaining a minimum amount of HMA in the hopper (one third full), regulating HMA feed rate by controlling conveyor/auger speed and flow gate openings (if present), and maintaining a constant paving speed. During paving the hopper should never be allowed to empty and the hopper wings should never be emptied into the hopper. If there are no transport vehicles immediately available to refill the hopper stop paving operations when the hopper is one third full. HMA in the bottom of the hopper and against the hopper wings shall not be incorporated into the mat and shall be wasted when paving operations have been completed.

3.17. C Revise paragraph to read: Construct longitudinal joints and edges to true line markings. Establish lines for the paver to follow in placing individual lanes parallel to the centerline of the proposed roadway or within 6” of the line dividing the traffic lanes.

3.17. H Revise paragraph to read: Assure edges against which additional pavement is to be placed is straight and approximately vertical. Use a lute or covered rake immediately behind the paver, when required, to obtain a true line and vertical edge. Fanning of the material over the pavement surface is not permitted. Correct all irregularities in the surface of the pavement course directly behind the paver. Remove excess material forming high spots by a shovel or lute. Fill low areas with hot mix and smooth it with the back of a shovel being pulled over the surface. Fanning of the material over such areas is not permitted.

3.20. G Revise paragraph in Standard Mods to read: The finished compacted surface of the plant mix asphalt concrete shall be ⅛” to ¼” above lip-of-gutter, double gutter or fillet and shall be flush with the surface of the existing asphalt surface.

Add the following subsections: 3.21. F and 3.22.C Seal the surface at the joint with hot PG 64-22 asphalt cement. Heat and maintain asphalt cement sealant between 265F and 320F. Two coats of tack oil is also acceptable. Do not place sealant when the air temperature is below 40F, unless otherwise allowed by the Engineer. Apply the sealant only to joints in pavement surfaces that are clean, dry, and free of any loose material and debris. Clean with a power broom as required. Utilize a pressure applicator with a wand or nozzle capable of applying hot asphalt sealant in a straight and consistent width band of 4” to 6” and thickness of 1/16 inch.
± 1/32 inch at specified temperature range. Center the sealant band within 1 inch of the joint. Immediately level high spots with a squeegee or wand. Remove and dispose of excess sealant. Re-seal areas of the joint that are inconsistently or not completely covered.

3.28. **A Revise paragraph to read:** The average mat density shall be equal to or greater than 93 percent of the maximum density as determined by ASTM D2041 and no individual sample shall be less than 92 percent of the maximum (Rice’s) density, prepared as specified in Part 2-Products in this section and made from plant mix meeting the job-mix formula. Verification of maximum density as determined by ASTM D2041 from plant produced material during production is recommended. *The average joint density shall be equal to or greater than 90 percent of the maximum density as determined by ASTM D2041.*

3.28.F **Revise 3rd sentence to read:** If any irregularities or defects remain after the final compaction, such as alligator cracking, block cracking, edge cracking, rough or uneven joints, potholes, trench settlement, raveling, segregation, heaving, sinking, separation from curb and gutter ponding, and settlement along curb and gutter, approaches, or valley gutters, remove the surface course and place and compact new material to a true and even surface.

3.29.E **Revise first sentence of paragraph to read:** The density and thickness of the pavement is determined by testing and measurement of the core samples. The actual thickness must be no more or less than ¼ inch from the specified thickness.

4.1.A.1 **Add sentence to paragraph to read:** These items are measured by the ton of 2,000 pounds (900 kg) of asphalt paving mixture, including the weight of the asphalt. The quantities measured for pavement are the amount of asphalt paving materials actually used in the completed work in accordance with the plans and specifications. Contractor shall make no claim for payment of asphalt pavement tonnage that exceeds the specified thickness by more than 1/4 inch as determined by core samples.

4.1.B.1 **Revise subsection to read:** This item is measured by the ton of 2000 pounds. The tonnage to be paid for is the number of tons of the asphalt cement materials *per the mix design* in the accepted work. Tonnage used in the paving mixture is computed from the truck weight tickets by using the percentage of asphalt in the approved mix design (and verified by extracted asphalt cement content by ASTM D6307). “Performance Graded Asphalt Cement” measured as provided above, will be paid for at the unit prices bid per ton. Contractor shall make no claim for payment of asphalt cement tonnage for pavement thickness exceeding the specified thickness by more than 1/4 inch as determined by core samples.

The tonnage of asphalt cement used in accepted RAP mix designs to be paid for is the number of tons of asphalt cement added per the mix design to obtain the required asphalt content. No payment will be made for the percent asphalt from the RAP.
SECTION 02528 - CONCRETE CURB AND GUTTER

2.5. A **Revise Paragraph in Standard Mods to read:** Furnish liquid membrane forming compound for curing concrete in accordance with ASTM C 309 Type 1-D, clear or translucent.

2.5. B **Delete this subsection in its entirety.**

3.1. B **Add the following subsection in MPWSS:** Concrete poured after November 1st or during periods that meet the definition of cold weather concrete in ACI 306 must submit a plan for meeting requirements of ACI 306 before performing the work. All work must be done in accordance with ACI 306 and Section 03310.

3.2. C **Revise Paragraph in Standard Mods to read:** Place at least 6” of gravel base material under all curb and gutter and compact to a minimum density of 95%.

3.5. A **Revise paragraph in MPWSS to read:** Place and compact the gravel base material to the specified grade before placing the concrete. Spade and tamp the concrete thoroughly into the forms to provide a dense, compacted concrete free of rock pockets. Float, finish and broom the exposed surfaces. Each concrete crew shall have at least one ACI Certified Flatwork Finisher present at all times during concrete placement.

3.6. C.1 **Revise paragraph in Standard Mods to read:** The application of water or the excessive use of evaporation reducer or finishing aid on the surface of the concrete is strictly prohibited and may be grounds for rejection of the concrete. The Contractor shall bear all costs associated with the removal and replacement of rejected concrete. The use of an evaporation reducer or finishing aid is only allowed when weather conditions warrant (high temperature, low humidity, windy, or direct sun) and shall be applied per the manufacturer’s directions.

3.9. E **Add to end of paragraph:** Complete all backfill within three (3) days after curb and gutter is cured adequately.

3.10. A **Revise this subsection in MPWSS to read:** Tacking of adjacent surfaces shall be done per Section 2510 3.12.C and 3.13.E.

3.11. A **Revise paragraph to read:** Perform the work to produce a curb and gutter meeting the specified line and grade uniform in appearance and structurally sound. Remove and replace at Contractors expense curb and gutter having unsightly bulges, ridges, and/or low spots in the gutter, cracks at locations other than control joints, excessive honeycombing, or other defects as **determined by Engineer.** Grade shall not deviate more than 1/8-inch and alignment shall not vary more than 1/4-inch from plan elevation, grade or alignment. Tolerances may be checked using survey instruments, straight edges, or water puddling. Puddled water cannot exceed 1/4-inch in depth.
Defective curb and gutter shall be removed and replaced at existing expansion or control joints (typically a 10-foot section). Replacement sections shall not be less than 5 feet in length.

4.1. A Revise paragraph in Standard Mods to read: This item is measured and paid for by the lineal feet of combined curb and gutter in place at the contract unit price for “Combined Concrete Curb and Gutter”. Price and payment is full compensation for all materials, excavation, crushed base course material, compaction, hot and cold weather curing, expansion joint material, epoxy coated dowels, all equipment, tools, labor, and for the performance of all work and incidentals necessary to complete the item. Measurement is made along the flow line of the gutter.
SECTION 02529 - CONCRETE SIDEWALKS, DRIVEWAYS, APPROACHES, CURB
TURN FILLETS, VALLEY GUTTERS, AND NEW MISCELLANEOUS NEW CONCRETE
CONSTRUCTION

1.2. A.4 and 1.2.A.7 Delete references to Std Dwgs 02529-4 and 02529-6

2.2. A Delete subsection in MPWSS in its entirety.

2.5. A Revise paragraph in Standard Mods to read: Furnish liquid membrane forming
compound for curing concrete in accordance with ASTM C 309 Type 1-D, clear or
translucent.

2.5. B Delete this subsection in its entirety.

Add the following Subsection:
3.1. C Any concrete poured after November 1st or during periods that meet the definition of
cold weather concrete by ACI 306 must submit a plan for meeting the requirements of ACI
306 before performing the work. All work must be done in accordance with ACI 306 and
Section 03310.

3.2. B Revise paragraph in Standard Mods to read: Place at least 6” of gravel base
material under all concrete flatwork and compact to a minimum density of 95%.

3.4. A Delete this subsection in MPWSS in its entirety.

3.5. A Revise paragraph in MPWSS to read: Assure the subgrade is compacted and
brought to the specified grade. Place and compact the gravel base material to the specified
grade before placing the concrete. Dampen the gravel base material immediately before
placing the concrete. Spade and tamp the concrete thoroughly into the forms to provide a
dense, compacted concrete free of rock pockets. Float, finish and broom the exposed
surfaces. Each concrete crew shall have at least one ACI Certified Flatwork Finisher
present at all times during concrete placement.

3.6.C. Revise paragraph in Standard Mods to read:
The application of water or the excessive use of evaporation reducer or finishing aid on the
surface of the concrete is strictly prohibited and may be grounds for rejection of the
concrete. The Contractor shall bear all costs associated with the removal and replacement
of rejected concrete. The use of an evaporation reducer or finishing aid is only allowed
when weather conditions warrant (high temperature, low humidity, windy, or direct sun) and
shall be applied per the manufacturer’s directions. When concrete is placed between 4.5
and 5 inch slump, evaporation reducer or finishing aid will not be applied to the surface.

Add the following Subsection:
3.6.D Screeding
Do not use a vibrating screed when the concrete slump exceeds 3 inches. Vibrating
screeds should be moved rapidly to ensure consolidation but avoid working up an
excessive layer of mortar on the surface.
3.8.C Revise paragraph in MPWSS to read: Divide sidewalk into sections using contraction joints formed by a jointing tool or other approved methods. Extend the contraction joints into the concrete for at least one-fourth to one-third of its depth and be approximately ⅛ inch wide. Unless otherwise directed, space contraction joints at a distance equal to the sidewalk width up to a maximum distance of 1.5 times the sidewalk width.

Add the following subsection
3.8. D Drive approaches shall be divided into sections not exceeding 100 sq feet.

3.9. C Revise Paragraph to read: Compact backfill to prevent settlement and level the surface to a neat appearing and free draining surface. Complete all backfill within seven (7) days after concrete is placed.

3.10. A Replace paragraph with: Assure all items of construction covered by this section present clean, uniform surfaces and lines free of irregularities and distortions. Remove and replace at Contractor’s expense work having irregularities, distortions, cracks at locations other than joints, and other defects as determined by Engineer. Plane surfaces and vertical tangent lines are tested with a 10-foot straightedge and shall not deviate more than 1/4-inch from the straightedge. Defective work shall be removed and replaced in full sections between joints. Replacement concrete flatwork with a thickness of 6 inches or more shall be dowelled to adjacent concrete with 12-inch #4 epoxy coated reinforcing bars spaced every two (2) feet.


4.1.A Revise paragraph in MPWSS to read: This item is measured and paid for by the number of curb turn fillets constructed, complete in place, including curb, at the contract unit price bid for “Curb Turn Fillets”. Price and payment is full compensation for all material, excavation, crushed base course material, backfill, hot and cold weather curing of concrete, isolation joint material, equipment, tools and labor, and for the performance of all work and incidentals necessary to complete this item.

4.2.A Revise paragraph in MPWSS to read: This item is measured and paid for by the square foot at the contract unit price for “Concrete Valley Gutters”. Price and payment is full compensation for all material, excavation, crushed base course material, backfill, hot and cold weather curing of concrete, isolation joint material, equipment, tools and labor, and for the performance of all work and incidentals necessary to complete this item.

4.3.A Revise paragraph in Standard Mods to read: This item is measured and paid for by the square foot at the contract unit price for “Concrete Approaches”. Price and payment is full compensation for all material, excavation, crushed base course material, backfill, hot and cold weather curing of concrete, isolation joint material, equipment, tools and labor, and for the performance of all work and incidentals necessary to complete this item.
1. Payment is made under Concrete Approach – per square foot.

4.4.A Revise paragraph in Standard Mods to read: This item is measured and paid for by the square foot at the contract unit price for “Concrete Sidewalk”. Price and payment is full compensation for all material, excavation, crushed base course material, backfill, hot and cold weather curing of concrete, isolation joint material, equipment, tools and labor, and for the performance of all work and incidentals necessary to complete this item.

1. Payment is made under Concrete Sidewalk – per square foot.
SECTION 02660 - WATER DISTRIBUTION SYSTEMS

1.3 Add the following references:
AWWA C515  Reduced-wall, Resilient Seated Gate Valves for Water Service
AWWA C550  Protective Interior Coatings for valves and Hydrants
AWWA C800  Underground Service Line Valves and Fittings
ANSI/NSF 61  Municipal Drinking Water System Components

2.2. B.1 Revise Sentence to read: Furnish Special Thickness Class 52 wall thickness meeting AWWA C151, American National Standard for Ductile Iron Pipe.

2.2. B.2 Replace paragraph with: Use underground pipe and fittings having push-on joints meeting AWWA C111. Use mechanical joints only as approved by the Engineer.

2.2. B.5.a Revise Paragraph to read: Assure joints are push-on joints meeting AWWA C111. Use mechanical joints only as approved by the Engineer. Assure the fitting interior is cement mortar lined meeting AWWA C104. Assure the fitting exterior is bituminous tar coated 1 mil thick. Use compact fittings having a rated working pressure of 350 psi following manufacturer recommended laying lengths.

2.2. B.6.a.1) Add to the end of sentence: Cast type with cast iron or ductile iron sleeves and malleable or ductile iron flanges as manufactured by Rockwell, Dresser, or an approved equal.

2.2. B.6.a.3 Revise paragraph to read: Limit use of the first type to a maximum 16 inch diameter. Use the manufacturer’s standard gasket for use in potable water systems. Use Cor-Ten or stainless steel bolts and nuts. Coating to be “manufacturers’ standard”.

2.2. C.1 Revise paragraph to read: Furnish PVC water main pipe meeting AWWA C900/C905 requirements, made to ductile iron O.D.’s for “Push-On” joints. Assure pipe joints are bell and spigot having an elastomeric gasket. Use DR18 (235 psi) pipe or DR14 (305 psi) as determined by the Engineer.

Add the following subsection

2.2.C.2  Fittings

    a. If approved by the Engineer, furnish PVC fittings with gasketed push-on joints made to accept ductile-iron sized PVC pipe and meeting one of the following:

    1. For standard sizes through 12-inch, Pressure Class 235psi injection molded PVC fittings meeting the requirements of AWWA C907, ASTM D3139, certified to CSA B137.2, and having a hydrostatic design basis of 4000psi.

    2. For sizes larger than 12-inch, fabricated PVC fittings meeting the requirements of AWWA C900/C905, ASTM D3139, and certified to CSA B137.3. Fittings shall be made from pipe materials that qualify for minimum hydrostatic design basis of 4000psi. Fitting Pressure Class must match the pipe.
2.2. E.1. Add to the end of paragraph: For compression connections, use Mueller 110; Ford Q Series “Quick Joint” connection; or A.Y. Mcdonald McQuick Compression-Q Series.

2.2. E.1.d.1) Revise last sentence of paragraph to read: Use class 200 polyethylene pipe.

Add the following Subsection
2.2. E.2) When possible, a continuous pipe between the main line corporation stop and the property line curb valve shall be utilized. Couplings shall only be permitted on long service lines or on replacement projects.

2.3. A.3 Revise Paragraph to read: Assure both types have a class 125, ANSI B16.1 outlet flange, are rated for a minimum 150 psi working pressure and contain a threaded test plug on the neck or body of the tapping sleeve. Assure gaskets are manufacturers’ standard for use in potable water systems. Use Cor–Ten or stainless steel bolts and nuts. Assure mechanical joint type is fusion-bonded, 12-mil thickness, and epoxy coated. When using type (2.) above on PVC pipe, assure that the body length of the sleeve meets the minimum requirement of the pipe manufacturer. Assure tapping valves meet the applicable requirements for gate valves, as outlined in this section, with flanged inlets compatible with the flange of the tapping sleeve and mechanical joint outlet.

2.4. A Replace paragraph with: Furnish brass ball corporation stops conforming with AWWA C800 and ANSI/NSF 61 having inlets of standard AWWA Taper C.C. threads and outlet connections of flared copper coupling nuts or compression connections. For copper coupling nut connections, use Mueller B-25008 or B-25000, Ford FB600, or A.Y. McDonald 4701B. For compression connections, use Mueller B25008 or Ford FB1000 Series “Quick Joint” 701BQ connection, or A.Y. McDonald ‘McQuick’ Compression-Q Series.

2.5. A Replace paragraph with: Service clamps for metal pipe, where required, shall be flat, double strap, brass/bronze metal conforming to ANSI/NSF 61 with cemented-in-place Neoprene gasket and corporation stop threads as manufactured by Mueller BR2B with AWWA taper thread C.C. Series, or equal. Service clamps for PVC pipe shall be all brass/bronze, O.D. controlled, with cemented-in-place Neoprene gasket and corporation stop threads as manufactured by Mueller H-13400 Series, or equal. PVC pipe clamps shall provide full support around the pipe circumference with a bearing area of sufficient width along the pipe axis, 2 inch minimum, to ensure the pipe will not be distorted when the saddle is tightened. PVC pipe clamps shall not have lugs that will dig into the pipe, U-bolt type straps that do not provide sufficient bearing area, or a clamping arrangement that is not fully contoured to the outside pipe diameter. Taps for water service saddles shall be full-size taps with AWWA taper (C.C.) threads. The saddle and corporation stop shall be set on the pipe prior to tapping and the tap shall be made through the corporation stop using a standard tapping machine only. Undersized taps will not be allowed. Shell cutters shall be used for tapping PVC pipe.

2.6. A Replace paragraph with: Furnish curb stops meeting AWWA C800 and ANSI/NSF 61 with bronze plug, tee head key with Minneapolis pattern and screw box mount. Valve
shall be one-quarter turn full on - full off. Inlet/outlet connections shall be straight copper coupling nuts or compression connections with both connections being of the same type. For straight copper coupling nut connections, use Mueller H-15151, H-15201 (larger than 1-inch diameter), B-25154, Ford B22-M Series or A.Y. McDonald 6104. For compression connections, use Mueller B-25155, Ford B44-XXMQ series “Quick Joint” connection, or A.Y. McDonald 6104Q.


2.8. A.1 Replace paragraph with: Furnish iron body gate valves, resilient seat or double disc gate valves with non-rising stems with design, construction and pressure rating meeting AWWA C500, AWWA C509, or AWWA C515, requirements and the following. Unless designated otherwise, valves 12-inch in diameter and smaller will be gate valves. Use NDZ-5 (low-zinc) high strength bronze or stainless steel in the manufacture of the valve stems.

2.8. A.2 Replace paragraph with: Assure stem seals are triple “O” ring seals.

2.8. A.3 Revise Paragraph to read: Furnish gate valves for underground installation equipped with a 2-inch square operating nut for key operation. All valves are to open counterclockwise. Equip valves with push-on joints for pipe connections.

2.8. A.4 Add the following subsection:
Any valve operating nuts that are greater than 8.5 feet in depth from the top of the nut to the finish grade surface shall be supplied with valve operator extensions. These extensions shall be securely connected to the valve operator and shall come to a level of 6-6.5 feet below finish grade. They shall be “permanently centered” in the valve box for ease of operation. Securely connect to the valve operator nut by drilling a hole 1/4” in depth of sufficient size to allow the set screw to be seated. The hole must be coated with the same coating at the 2 inch operating nut or an approved equal. The set screw threads shall be coated with lock tight prior to connection to the operating nut.

Add the following Subsection:
2.8. A.5 Furnish double disc valves by Mueller, Kennedy, J&S, or an approved equal, with resilient seat valves limited to Mueller, Kennedy, Clow, American Darling, Waterous, J&S, U.S. Pipe and AVK.

2.8. B.1 Revise Paragraph to read: Furnish Class 250 B, rubber seated, butterfly valves for water distribution systems meeting AWWA C504 requirements. Valves to be equipped with mechanical joint ends and lubricated traveling nut type operators designed for underground service. Unless designated otherwise, all valves larger than 12-inch diameter shall be butterfly valves. Valves shall be installed with the operating mechanism oriented on either the south or west side of the pipeline or on the “even” addressed side.
2.8. B.3 Revise paragraph to read: Assure underground service operators are permanently lubricated, traveling nut type, totally enclosed and watertight constructed. Assure overload protection is incorporated in the operator allowing 450 foot-pounds input torque at full-open and full-closed positions without damaging the operator or valve. Provide a 2-inch square operating nut and valve box for operating the valve. Valves are to open counterclockwise. Furnish performance certification, leakage and hydrostatic tests as specified in AWWA C504. Assure valve manufacturer has at least five years experience manufacturing waterworks and distribution valves. Furnish bonnet and gland bolts and nuts either fabricated from low-alloy steel for corrosion resistance or electroplated with zinc or cadmium. The hot-dip process in accordance with ASTM A153 is not acceptable. Cor-Ten or stainless steel shall be used in corrosive soils. Furnish butterfly valves by Dresser Industries, Henry Pratt “Groundhog”, Valmatic, or an approved equal.

2.8. B.4 Add the following subsection:
Any valve operating nuts that are greater than 8.5 feet in depth from the top of the nut to the finish grade surface shall be supplied with valve operator extensions. These extensions shall be securely connected to the valve operator and shall come to a level of 6-6.5 feet below finish grade. They shall be “permanently centered” in the valve box for ease of operation. Securely connect to the valve operator nut by drilling a hole ¼” in depth of sufficient size to allow the set screw to be seated. The hole must be coated with the same coating at the 2 inch operating nut or an approved equal. The set screw threads shall be coated with lock tight prior to connection to the operating nut.

Add the following Subsection:
2.8. B.4 Evenly coat all exterior ferrous surfaces, except the flange faces, with black asphalt varnish in accordance with Section 5.3 of AWWA C509, or epoxy in accordance with AWWA C550. Evenly coat with epoxy all wetted ferrous surfaces in accordance with AWWA C550. Apply epoxy coating to a minimum uniform 4-mil thickness.

2.9. A Revise Paragraph in Standard Mods to read: Furnish 5-1/4-inch diameter three-piece screw type adjustable cast iron valve boxes with a base sized for the valve size used. The valve box must be the correct length for the pipe bury and have a cast iron cover stamped with the word “water”. The valve box lid shall weigh a minimum of 12 lbs. and have a minimum depth of 4 inches.

2.10. B Revise Paragraph to read: Furnish hydrants with 5-1/4-inch valve openings, 6-inch, slip-on joint inlets, one 4-inch pumper connection, and two 2-1/2-inch hose connections. Assure hose nozzles have National Standard Hose Threads, and pumper nozzle has threads in accordance with City of Billings standard (four threads/inch; pitch diameter = 4.800 ± 0.005 inches). Coat all hydrant nozzle threads with food grade anti-seize. Furnish National Standard operating nut. Furnish hydrants opening counter clockwise and having an arrow on the hydrant top designating the opening direction.

2.10. C Revise Paragraph to read: Furnish “Compression” type hydrants with safety flange and safety stem coupling above the ground line permitting repair without shutting off the water. Assure hydrants are of the dry top, dry barrel design with two or more “O” rings.
sealing the water from the operating mechanism. Assure the operating mechanism is automatically lubricated from a sealed, self-contained lubricating reservoir.

### 2.10. D Revise Paragraph to read:
Paint the hydrant portion above the ground line *aluminum for the barrel and red for the nozzle caps and bonnet*. Furnish hydrants for 6.5 foot bury. *Furnish Mueller Company “Centurion” or Kennedy “Guardian” (K-81); or Waterous “Pacer” (WB-67-250); or AVK “Nostalgic” Series 2780.*

*Add the following Subsection:*

#### 2.10. E
Paint curb traffic yellow for 15 feet each side of fire hydrant (30 feet total) as incidental to the work item.

*Add the following Subsection:*

#### 2.12. A Add to paragraph:
Wrapping shall be two (2) layers of 8 mil polyethylene encasement.

*Add the following Subsection:*

#### 2.13 Insulation Board:
Insulation Board may be installed after approval by Engineer. Water line insulation board shall have a closed cell structure with an R-Value of 5 per inch of thickness. Maximum water absorption shall be 0.1% by volume and minimum compressive strength shall be 100 psi. Insulation board shall be Styrofoam Brand High Load 100 or approved equal. Insulation board shall be installed with 2-inches of sand bedding and 2-inches of sand over the top of the insulation board. Install per Sm_M02660-9. *Insulation board with a compressive strength as low as 60 psi may be allowed if approved by the engineer.*

*3.2. B.2 Revise paragraph in StandardMods to read:*
If dewatering is deemed necessary at the time of construction, the Contractor shall consult a licensed professional engineer or certified professional hydrogeologist familiar with the local geologic, hydrogeologic, and geotechnical conditions as well as the construction practices pertaining to the Contractor’s means and methods of dewatering and submit a dewatering and monitoring plan for review prior to commencing dewatering operations. The dewatering plan shall be designed and stamped by a licensed professional engineer or certified professional hydrogeologist.

*Add the following Subsection:*

#### 3.2.C.12
Mechanically restrain all dead end valves and fittings in accordance with design standards in addition to using concrete thrust restraint.

*3.3.A Add to paragraph:*
Wrapping shall be two (2) layers of 8 mil polyethylene encasement.

*3.4.A.1 Revise Paragraph to read:*
Perform hydrostatic and leakage testing in accordance with AWWA C600. Once the pipe is laid and backfilled, test for at least 2 hours, all newly laid pipe, or any valved section, to a hydrostatic pressure of 200 psig at the highest point along the test section.
3.4.B.1 **Revise Sentence to read:** Before chlorination, flush the mains thoroughly after the pressure and leakage test are completed.

3.4.B.2 **Revise paragraph** to reference Table 1 instead of Table 2.

3.4.C.2.a.2 **Delete this Subsection in its entirety.**

3.4.C.2.a.3 **Delete this Subsection in its entirety.**

3.4.C.3.a **Revise Paragraph to read:** Continuous feed shall be the only method used. Other methods may be used for specific applications if approved by the Engineer. The continuous feed method shall produce a 24 hour residual of not less than 25 mg/L.

3.4.C.3.a.1 **Delete this Subsection in its entirety.**

3.4.C.3.a.3 **Delete this Subsection in its entirety.**

3.4.C.3.a.2.b **Revise Paragraph to read:** Use water from the existing distribution system or other approved source of supply to flow at a constant, measured rate into the newly laid water main. At a point not more than 10 feet downstream from the beginning of the new main assure water entering the new main receives a *dose of chlorine fed at a constant rate such that the water will have at least 50 mg/L free chlorine*. To assure that this concentration is provided, measure the chlorine concentration at regular intervals.

3.4.C.3.a.2.c **Delete this Subsection in its entirety.**

3.4.C.3.a.2.d **Revise Paragraph to read:** During chlorine application, position valves so that the chlorine solution in the main being treated does not flow into the 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 24 hours, operating all valves and hydrants in the section treated to disinfect the appurtenances. At the end of the 24-hour period, the treated water in all portions of the main must have a minimum free chlorine residual of 25 mg/L free chlorine.

3.4.C.3.a.2.f **Delete this Subsection in its entirety.**

3.4.C.a **Add the following sentence to paragraph:** 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. After dechlorination, water is to be turned over twice and flushed according to AWWA standards.

**Add the following subsection:**

3.4.C.4.b **DECHLORINATION**

Dechlorination is required where discharged chlorinated water can enter into either the City's storm water collection system or state receiving water. The Contractor shall be responsible to ensure that dechlorination operations are in compliance with the Montana...
Department of Environmental Quality General Permit for Disinfected Water and Hydrostatic Testing. The contractor shall record all data on the City’s field bench sheets, maintain appropriate standard operating procedures, and verify dosage and feed calculations. All bench sheets must be signed by a City field representative. Completed bench sheets must be submitted directly to the City’s Field Engineering Inspectors or mailed to the Public Works Department, Distribution and Collection Division, at 2251 Belknap Ave. Billings, MT 59101 within five working days. Ascorbic acid shall be used for all dechlorination operations unless written request is submitted and approved by City Engineer to use an alternate product.

3.4. D.1 Revise paragraph to read: After final flushing and before the water main is placed in service, a sample, or samples, collected from the main(s) shall be tested for turbidity and bacteriological quality. The City will perform these tests, and the Contractor will pay for them.

3.4. D.2.a Revise Paragraph to read: If the initial disinfection fails to produce approved bacteriological or turbidity samples, re-flush and resample the main. If check samples show bacterial contamination, re-chlorinate the main until approved results are obtained. The City will perform these tests and the Contractor will pay for them.

3.6.C.1 Revise paragraph to read: For valves 8” and larger, install valves with thrust blocks and anchor rods meeting Standard Drawing 02600-3 requirements. If assemblies are precast, do not lift or move using valve.

3.7.A Revise paragraph to read: Set all hydrants plumb with the pumper nozzle facing the branch valve/street. Set the hydrant with the ground line at the location indicated by the hydrant manufacturer. Install fire hydrants such that breakaway bolts are accessible from underneath and that the bottom of the breakaway flange is no more than two inches above finished grade. In addition, fire hydrants shall maintain a minimum 3 foot clearance from any obstruction and be located a minimum of 2 feet behind street curb lines.

3.7. B Revise Paragraph to read: Provide drainage at the hydrant base by placing clean gravel under and around it. Place gravel at least 1 foot on all sides from the base of the hydrant to at least 6 inches above the drain opening. Brace the hydrant against unexcavated earth at the trench end with concrete backing as detailed on the plans or standard drawings. Restrain hydrant valves to the tee on the water main or to the last full section of pipe. Furnish hydrants with the specified gate valves. Install hydrants meeting Standard Drawing No. 02660-4 or 02660-5 as specified by the Owner.

Add the following Subsection:
3.7. C Temporary blow-off hydrant for 8-inch diameter water mains may be a Kupferle Foundry Mainguard Hydrant No. 77 or a City of Billings standard hydrant. Temporary blow-off hydrant for greater than 8-inch diameter shall be a City of Billings standard hydrant.

3.8. A Revise Paragraph to read: Provide all work and materials for the complete service line installation, including trench excavation and backfill; making the water main tap; furnishing and installing the corporation stop, curb stop and box, service clamp where
necessary, and service line with fittings to make the connections to the stops. Bend the service line adjacent to the water main into a figure “S” in a horizontal plane to avoid a rigid connection. Assure all services have a minimum 6-1/2 feet of cover measured as specified in Standard Drawing No. 02660-6. Water service construction shall utilize continuous pipe sections with minimal fitting connections.

**Add the following Subsection:**
3.8. C Restrain all 4-inch and larger service valves to the water main as shown in Standard Modification Drawing Sm-02660-8.

**Add the following Subsection:**
3.8. D Where necessary, all meter pits/vaults shall be approved by the Public Works Department prior to installation.
SECTION 02720 - STORM DRAIN SYSTEMS

Revise Section 1.3 REFERENCES to note the following:

Remove:  
- AASHTO M294 Corrugated Polyethylene Pipe (HDPE)
- ASTM 3350 High Density Polyethylene Pipe

Add:  
- AASHTO M304 PVC Profile Wall Pipe and Fittings
- AASHTO M330 Polypropylene Pipe and Fittings
- ASTM F2881 Polypropylene Pipe and Fittings
- ASTM F2764 Polypropylene Pipe and Fittings
- ASTM F2435 Steel Reinforced Polyethylene Corrugated Pipe
- ASTM C990 Concrete Pipe and Structures Joint Specification
- ASTM F477 Elastomeric Seals (Gaskets) for Plastic Pipe
- ASTM D3212 Specifications for Joints with Plastic Pipe
- ASTM F2881 Polypropylene Pipe and Fittings
- ASTM F2435 Steel Reinforced Polyethylene Corrugated Pipe
- ASTM C990 Concrete Pipe and Structures Joint Specification
- ASTM F477 Elastomeric Seals (Gaskets) for Plastic Pipe
- ASTM D3212 Specifications for Joints with Plastic Pipe

Delete Section 1.4.A. STANDARD DRAWINGS in its entirety and replace with:

A. Standard Drawings applicable to this section are as follows:

- Drawing No. Sm_M02221-1a Trench Detail for Concrete Pipe
- Drawing No. Sm_M02221-1b Trench Detail for Flexible Pipe
- Drawing No. Sm_M02720-1a 2’ x 3’ Box Type II & III Storm Drain Inlet
- Drawing No. Sm_M02720-1b 30” Barrel Type II & III Storm Drain Inlet
- Drawing No. Sm_M02720-1c Type I Storm Drain Inlet
- Drawing No. Sm_M02720-2 30” Barrel Type IV Storm Drain Inlet
- Drawing No. Sm_M02720-3 Sanitary and Storm Drain Manholes
- Drawing No. Sm_M02720-4 Standard Straight Manhole
- Drawing No. Sm_M02720-5 48” Standard Manhole
- Drawing No. Sm_M02720-9 Standard 24” Cast Iron Ring
- Drawing No. Sm_M02720-10 Storm Drain Service Line

Add the following subsection under Part 1: GENERAL.

1.5 SUBMITTALS

The following shall be submitted prior to installation (Items A and B) and prior to acceptance (Items C and D).

A. Manufacturer’s data sheets and installation instructions.

B. Documentation showing compliance with applicable ASTM and AASHTO standards and requirements.
C. NASSCO Pipeline Assessment certification for remote video technician for information.

D. Pipe inspection report for each pipe for review based upon the requirements of Section 3.5.

**Add the following subsection under Part 1: GENERAL.**

### 1.6 ACCEPTANCE

A. General
1. Each pipe is accepted for payment after verifying that all sections of pipe have passed the appropriate testing and inspection requirements as stated within Section 3.5 and this section.
2. Proposed resolutions for nonconforming pipes require the seal of a licensed Professional Engineer competent in the structural design of the pipe material being evaluated.

B. Joint Gap
1. Do not exceed the joint separation, measured along the length of the pipe, in Table 1.6 below.
   a. Repair or replace joints that show visible signs of soil or water infiltration.

   **Table 1.6**
   
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<thead>
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<th>Nominal Diameter (inches)</th>
<th>Separation (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 to 36</td>
<td>0.75</td>
</tr>
<tr>
<td>42 to 48</td>
<td>1.00</td>
</tr>
<tr>
<td>54 to 90</td>
<td>1.25</td>
</tr>
<tr>
<td>96 to 144</td>
<td>1.75</td>
</tr>
</tbody>
</table>

C. Damage
1. Pipes are to be free from:
   a. Cuts, cracks, spalls, chips, punctures, or dents.
      1) Cracks are allowable up to 0.01 inch in width for reinforced concrete pipe.
   b. Loss or delamination of coatings.
   c. Exposed reinforcing steel and/or bent ribbing.
   d. Imperfect concrete mixing and casting such as honeycomb or open texture.

2.1.C. **Delete existing paragraph in MPWSS and replace with the following:**

Internally label each section of pipe with the manufacturers name or trademark, nominal diameter and manufacturers date. Include the pipe class, gauge and coating according to the pipe material type.
2.1.E. Add paragraph in MPWSS to read:

Reinforced Concrete Pipe is the only approved product for storm drain mains with an internal diameter larger than 36”.

Poly based Thermoplastics shall not be installed when pipe grades are below 0.4%.

2.2.A. Revise paragraph in MPWSS to read:
A. Reinforced Concrete Pipe

1. Furnish concrete storm drain and culvert pipe meeting ASTM C76 or C655. Use round reinforced pipe having O-ring rubber gasket joints meeting ASTM C443 with the O-ring gasket confined in the pipe tongue groove.
2. Use a City approved prequalified supplier of precast concrete products.
3. Use Type V Cement.
4. Do not cast lift holes except for circular pipe that has a nominal diameter greater than 54 inches or for any elliptical pipe.
   a. Plug and seal lift holes in a manner such that the pipe section will meet testing and inspection requirements.
5. Use a mastic joint sealant for elliptical reinforced concrete pipe. Refer to ASTM C 990.

2.2.B.2. Add the following at end of paragraph in MPWSS:

The elastomeric rubber gasket shall conform to ASTM F 477.

2.2.D Revise paragraph in MPWSS to read:

1. An Owner may approve other materials as appropriate for applications where a licensed Professional Engineer has reviewed the site-specific circumstances and provided specifications for installation. When specified, additional materials shall meet the following standards:

   - ASTM C506/C507/C665 RCP Arch, Elliptical, D-Load Pipe
   - ASTM C789/C850 Precast Reinforced Concrete Box Sections
   - ASTM F2764 Polypropylene Pipe and Fittings
   - ASTM F2435 Steel Reinforced Polyethylene Corrugated Pipe
   - ASTM F2881 Polypropylene Pipe and Fittings
   - AASHTO M330 Polypropylene Pipe and Fittings
   - AASHTO M304 PVC Profile Wall Pipe and Fittings

The above list includes references to pipe material only. The appropriate ASTM and AASHTO standards shall be used when considering gaskets, joints and installation. Generally, any pipe used for storm drainage systems must have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412. All pipe must meet all applicable ASTM and AASHTO standards.
2.2.F.b. **Add paragraph in MPWSS to read:**

The 2’ x 3’ Standard Storm Drain Inlet, Type II & III identified by Standard Modification Drawing No. Sm_M02720-1a shall be used for all inlet installations. Other inlet configurations and types identified within the Standard Modifications drawings shall only be used upon approval from the City Engineer’s Office.

3.1.A.2. **Add paragraph in MPWSS to read:**

Minimum Cover Above Pipe: For flexible storm drain pipe, the minimum height of cover identified by the manufacturer shall be modified to reference the distance bounded by the bottom of sub-base excavation to the top of pipe bedding envelope.

3.1.D.1. **Revise paragraph in MPWSS to read:**

Lay and maintain all pipe to the specified lines and grade with fittings, tees and manholes at the specified locations. Place the pipe so that the location of the label specified under Section 2.1.C is above the spring line of the pipe.

3.5. **Revise Section in MPWSS to read:**

TESTS AND INSPECTIONS

A. General

1. Inspect all storm drain pipes, including laterals, where pipe runs are greater than 20 feet. Inspections shall occur after installation per the requirements below.
2. A storm drain pipe is unacceptable if any of the testing and inspection requirements listed below are found to be deficient.
3. Perform the inspections in the presence of the Engineer. Notify the Engineer at least 24 hours before performing an inspection.
4. Clean and flush the pipe with water immediately before the inspection. Remove and dispose of material and debris from pipe flushing.
5. Contractor shall pay all costs for inspection of storm drain pipes for final acceptance.

B. Light Test (Visual)

1. Once the trench is backfilled, perform a light test between manholes to check the alignment and grade for pipe displacement. Except for specified curved alignments, the completed pipeline must permit a true circle of light to be seen from manhole to manhole.
2. If alignment or grade does not meet specifications, correct alignment or grade at contractor’s expense.
C. Leakage Test

1. Unless specified, a leakage test will not be required. Obvious and concentrated leaks, such as open joints, pinched gaskets, cracked barrels or bells, are not allowed and shall be fixed at contractor’s expense.

D. Deflection Testing

1. Deflection testing with a mandrel is required for all circular metal and thermoplastic pipe.
2. Pull a mandrel, without the aid of mechanical pulling devices, which is the lesser value of a) 5 percent less than the pipe’s nominal inside diameter or; b) the pipe manufacturer’s allowable deflection if such deflection is limited to below the 5 percent threshold identified above.
3. Verify the diameter of the mandrel with a proving ring or other method according to manufacturer’s recommendations. Mandrel shall contain at least nine equally spaced runners at 40 degree angles. The length of the mandrel shall not be less than the diameter.
4. Deflection testing shall occur the greater of either a) 30-days after pipe installation or; b) after street base course installation but prior to pavement installation.
5. Contractor shall replace all pipe sections that do not pass mandrel testing requirements at contractor’s expense.

E. Manual Inspection

1. Manual inspection shall occur on all stormwater pipe or box facilities with a nominal inside diameter of 48 inches and greater.
2. Perform manual inspection for pipes in the presence of the Engineer. Follow OSHA requirements for inspecting confined entry spaces.
3. Observe and document the following:
   a. Deflection. Take the following measurements every 10 feet along the length of the pipe to the nearest ¼ inch:
      i. Vertically from the crown to the invert.
      ii. Horizontally at the spring line.
      iii. Two measurements, each diagonally, at 45 degrees to the pipe spring line.
   b. Cracks. Measure cracks using a device capable of measuring 0.01 inches.
   c. Joint Gaps. Measure the widest separation at each joint to the nearest ¼ inch.
d. Damage. Observe and document any damage to the inside of the pipe. Report to Engineer.

4. Contractor shall replace all pipe sections that do not pass manual testing requirements at contractor’s expense.

F. Remote Inspection

1. All storm drain lines shall be inspected by Closed-Circuit Television (CCTV) before final acceptance.
2. Operator performing remote video inspection must have a current NASSCO PACP certification. Record all television inspections in DVD format or an alternate format acceptable to the Owner. Label the electronic storage device with the storm drain line runs that are present on the storage device.
3. Television equipment used for the inspection shall be specifically designed and constructed for storm main inspection and calibrated for lighting and focus. Lighting for the camera shall be suitable to allow a clear, sharp picture for the entire periphery of the pipe. A television picture with blurry vision or distortions will not be acceptable.
4. The camera shall be moved through the storm drain at a uniform rate of no more than 30 feet per minute. The camera shall stop and rotate to observe each lateral service connection. The camera shall pause for a minimum of 3 seconds at defect observed to allow for closer inspection.
5. Contractor shall observe the video during the TV inspection and identify any questionable areas. Questionable areas where ponding is present shall be verified with a gauge (such as a nut) to confirm the depth is not greater than the tolerances specified under Section 02720;3.1.E.1.
6. Engineer will review the video and attempt to confirm areas where ponding is present by scaling the depth and will verify other issues identified by the Contractor. If Engineer is unable to confirm compliance of ponding by scaling and verify other issues Engineer may require additional television inspections of the storm drain pipe at no additional cost to the Owner.
7. Camera movement through the storm drain shall be accomplished by means of a self-propelled transporter or by winch and cables. If the camera is pulled by attaching to the hose of a hydraulic storm drain cleaner, assure the hose is not active during the pulling process.

4.1.B. Add paragraph in MPWSS to read:

Storm drain pipe shall only be accepted for payment after the criteria in Section 1.6 has been met.
SECTION 02730 - SANITARY SEWER COLLECTION SYSTEMS

Entire Section: Remove “wye” from section. Only tee fittings are allowed.

2.3. A.1 Add to the end of paragraph: Construct manholes from precast concrete sections having frames, covers, and steps meeting standards. Manhole cone sections shall be of the concentric type unless approved by Engineer.

Add the following subsection:

3.1.D.5 Where mainline sewer pipe is connected without a bell and spigot or to a pipe of another material, connect pipe using an approved ductile iron or steel transition coupling. All nuts and bolts shall be stainless steel or Cor-Ten. Sewer service connections shall be made with an approved stainless steel reinforced flexible coupling.

3.1. E.1 Add to end of paragraph: Install the pipe within ½-inch of the specified alignment and within ⅛-inch of the specified grade for pipe 15-inch in diameter and smaller and ⅛-inch of specified grade for pipe larger than 15-inch diameter. These tolerances will apply to any point along the entire length of the pipe.

3.2. A. 3 Revise to read: Install adjusting rings on each manhole to bring the manhole top elevation to match the existing or specified ground elevations. Use manhole rings with a 4-inch minimum and 12-inch maximum height. Furnish adjusting rings reinforced with the same percentage of steel as the riser and top.

3.4. D.1 Revise Paragraph to read: Where groundwater is at least six (6) feet above the sewer line, make tests by sealing off the section of lines between manholes and measuring the actual flow by collecting or pumping the discharge into barrels or other approved methods. Continue tests at a minimum of 4 hours for each section tested. Allow time to soak lines and manholes in advance of performing tests.

3.4. D.2 Revise Paragraph to read: When groundwater is not six (6) feet above the pipe, test as follows: On flat slopes where the depth over the centerline of the pipe in the lower manhole of the section being tested will not be more than 10 feet, fill the upper manhole to six (6) feet over the top of the pipe or 2 feet above the groundwater elevation (whichever is higher), and block the lower manhole. When the above conditions cannot be met, the Engineer may order testing the line in sections between manholes. Measure the leakage by checking the water level drop in the manhole over a 4 hour period. Verify groundwater levels at the time of testing by installing a gauging well(s) in the immediate area of the sewer line or by installing a hydrostatic sensing device(s) through the wall of the manhole(s).

3.4. D.3 Revise Paragraph to read: The allowable infiltration or exfiltration, including manholes, cannot exceed 100 gallons per day per mile of sewer per inch of pipe diameter. This does not exclude obvious and concentrated leaks and physical defects, such as open joints, pinched gaskets, cracked barrels or bells, etc. Make repairs on concentrated leaks, and as required to reduce infiltration or exfiltration leakage below the specified rate.
3.4. E.5 Revise Paragraph to read: When the pressure reaches exactly 3.5 psig, disconnect the air supply, start a stop watch and record the time for the pressure to drop to 2.5 psig. The minimum time for the pressure to drop is computed on an air loss rate of $1.0 \text{ cubic feet per minute}$ (cfm) or an air loss rate of $0.0015 \text{ cfm per square foot}$ of inner pipe surface area under test, whichever rate yields the least time for the pressure drop. Should the time of the pressure drop between 3.5 and 2.5 psig be less than the allowable specified time, make the necessary leakage repairs and repeat the air test.

3.4.G.3 Revise Subsection in Standard Mods to read: Operator performing remote video inspection must have current NASSCO PACP certification. Record all television inspections in DVD format or an alternate format acceptable to the Owner. Label the electronic storage device with the sewer line runs that are present on the storage device.

Television equipment used for the inspection shall be specifically designed and constructed for sewer main inspection. The camera shall be capable of tilting at right angles along the axis of the pipe while panning the camera lens through a full circle about the circumference of the pipe. Lighting for the camera shall be suitable to allow a clear, sharp picture for the entire periphery of the pipe. A television picture with blurry vision or distortions will not be acceptable.

Adequately clean and flush the sewer line by sewer jet prior to each television inspection. Minimize flows into the pipe by plugging the main or by bypassing flows. TV inspection of dry sewer lines is not acceptable. The camera shall be moved through the sewer line at a uniform rate of no more than 30 feet per minute. The camera shall stop and rotate to observe each lateral service connection. The camera shall pause for a minimum of 3 seconds at any defect observed to allow for closer inspection.

Contractor shall observe the video during the TV inspection and identify any questionable areas. Questionable areas where ponding is present shall be verified with a $\frac{1}{2}$" gauge (such as a nut) to confirm the depth is not greater than $\frac{1}{2}$" as specified in MPWSS.

Engineer will review the video and attempt to confirm areas where ponding is present by scaling the depth and will verify other issues identified by the Contractor. If Engineer is unable to confirm compliance of ponding by scaling and verify other issues Engineer may require additional television inspections of the sewer line at no additional cost to the Owner.

Camera movement through the sewer line drain shall be accomplished by means of a self-propelled transporter or by winch and cables. If the camera is pulled by attaching to the hose of a hydraulic sewer line cleaner, assure the hose is not active during the pulling process.
SECTION 02910 – SEEDING

2.2.A Revise paragraph in MPWSS to read: Topsoil excavated from the project site shall be stockpiled for reuse in the seeding work. Use topsoil that is loose, friable, loamy and free of excess acid and alkali. Topsoil with sod, hard lumps, gravel, subsoil, weeds, brush or other undesirable material that would form a poor seedbed shall not be used. Use only topsoil that has supported healthy crops, grass or other vegetable growth. If the quantity of stockpiled topsoil is insufficient, import additional topsoil to complete the seeding.

3.1.A Revise paragraph in Standard Mods to read: Place at least 4 inches of topsoil in all areas to be seeded. Import topsoil if sufficient topsoil is not available from excavated areas of the project. Topsoil being reused from other areas of the project or imported shall be approved by the Engineer and shall meet the topsoil requirements Section 02910 Part 2.2.A

4.1.A Revise paragraph in MPWSS to read: Seeding is measured by the square yard and paid for at the unit price bid including topsoil salvage and/or importing, topsoil placement, seedbed preparation, seeding, fertilizer, care of seeded area, complete in place and accepted by the Engineer.

SECTION 02920 – HYDRAULIC SEEDING

3.1.A Revise paragraph in Standard Mods to read: Place at least 4 inches of topsoil in areas to be seeded. Import topsoil if sufficient topsoil is not available from excavated areas of the project. Topsoil being reused from other areas of the project or imported shall be approved by the Engineer and shall meet the topsoil requirements in Section 02910, Part 2.2.A.

3.3. A Replace paragraph with: Water, weed, protect, maintain, mow, and perform all other operations as required to establish a healthy viable stand of grass throughout the warrantee period. Remove weeds and other undesirable vegetation in the seeded area. Reseed any areas failing to germinate and in areas where complete establishment has not occurred. All costs for labor, materials, equipment, water and required operations related to establishing and maintaining a healthy stand of grass are incidental and shall be included in other bid items.

4.1.A Revise paragraph in MPWSS to read: Hydraulic seeding is measured and paid for by the square yard and paid for at the unit price bid including topsoil salvage and/or importing, topsoil placement, seedbed preparation, fertilizer, mulch and seed and maintenance of seeded area, complete in place and accepted by the Engineer.
SECTION 03210 - REINFORCING STEEL

2.1. A.1 *Revise Paragraph to read:* Furnish deformed reinforcement steel meeting ASTM A615, (AASHTO M 31) or ASTM A 705, Grade 40 or Grade 60. *Use only epoxy-coated reinforcement steel supplied by a CRSI certified epoxy-coated reinforcement steel manufacturer.*

3.3. C *Revise Paragraph to read:* Overlap welded wire fabric for successive mats or rolls providing an overlap measured between outermost cross wires of each fabric sheet at least the *spacing of the cross wires, plus 2 inches.* Extend the fabric across supporting beams and walls to within 4 inches of concrete edges. It may extend through contraction joints. Adequately support the fabric during concrete placement to maintain its position in the slab using the methods previously described or by laying the fabric on a concrete layer of the required depth before placing the upper slab layer.
2.2. B.2 Revise paragraph in Standard Mods to read: Furnish concrete at the point of delivery having a maximum slump of 5 inches as determined by ASTM C143. Meet the slump tolerances in ACI 117. When concrete is placed between 4.5 and 5 inch slump, evaporation reducer or finishing aid will not be applied to the surface.

2.2. B.4 Revise Paragraph to read: Concrete must be air entrained. **Severe exposure shall be used to determine the required air content.**

2.2.B.4 Revise the Air Content Tolerance in Table 2.2 to read: Air content tolerance is +2 or –1 percent.

2.2. B.4.c.3 Delete Paragraph in Standard Mods and revert to MPWSS: The fly ash and pozzolan present in IP or IPM blended cement meeting ASTM C595 must be included in the calculated percentage.

2.2. B.4.c.5 Revise Paragraph in Standard Mods and MPWSS to read: If fly ash or pozzolan is used in concrete with ground granulated blast-furnace slag, the Portland cement constituent meeting ASTM C150 cannot be less than 50 percent of the total weight of cementitious material.

3.3.F Revise paragraph in Standard Mods to read: Do not add water to concrete in transit unless mixer truck is equipped with an automated slump monitoring and water measurement system that meets all the conditions of ASTM C94. Water may be introduced into the mixer at the job site under direction of the Engineer, if the specified water-cement ratio is not exceeded. Water must be added in accordance with ASTM C94. Assure the drum revolves continuously after the introduction of cement and water until the concrete is discharged.

3.6 A.2. Revise second paragraph in Standard Mods to read: Cold weather concreting requirements are governed by ACI 306 and shall be followed unless modified herein. Hot weather concreting requirements are governed by ACI 305 and shall be followed unless modified herein. Cold weather exists when the air temperature has fallen to, or is expected to fall below 40° F during the protection and cure period. The protection and cure period is defined as the time required to prevent concrete from being affected by exposure to cold weather.

After November 1st or when cold weather conditions are expected all concreting operations will be suspended unless authorized by the City Engineer. Contractor may receive authorization for concrete placement in cold weather by implementing a cold weather concreting plan that ensures compliance with the requirements set forth in these specifications. The City will perform a limited evaluation of the plan prior to authorization for the probability of acceptable results. The City’s evaluation of the plan is not an endorsement of the plan or approval or verification of the plan. Specific site conditions may require the Contractor to exceed the requirements in these specifications. Contractor is
exclusively responsible for ensuring the plan meets the cold weather requirements with acceptable results.

3.6 A.3 **Replace paragraph with:** Contractor shall assume all risk of placing and protecting concrete in cold weather. Concrete placed in cold weather may be subject to repeated freeze thaw cycles and exposure to deicing chemicals after the protection and cure period ends. Authorization to place concrete during cold weather does not relieve the Contractor of the responsibility for obtaining acceptable results. Contractor shall bear all costs for the removal and replacement of concrete injured by the effects of cold weather during the one-year warrantee period.

3.6 A.4. **Replace paragraph with:** Concrete shall not be placed on frozen subgrade or crushed base course material. Remove all frost and recompact thawed materials disturbed by frost.

Remove snow, ice and standing water from all surfaces and spaces to be filled with concrete. Increase the temperature of formwork, reinforcement, subgrade and base gravel, and adjacent concrete work to a minimum of 35° F.

3.6 A.5 **Revise paragraph to read:** Concrete shall be mixed at a minimum temperature of 65° F. As the air temperature decreases, increase the temperature during mixing to compensate for the heat lost between the time of mixing and placement. The minimum placement temperature of the concrete shall be 55° F. After brooming apply a liquid membrane forming compound for curing concrete in accordance with ASTM C 309 Type 1-D, clear or translucent.

3.6 A.6 **Revise paragraph to read:** Maintain the surface temperature of the concrete in place between 55° F and 75° F for a minimum of 7 days using approved heating devices or enclosures during the protection and cure period. The minimum 7 day protection and cure period is intended only to protect the concrete from the effects of cold. A longer protection period may be needed for the concrete to gain additional strength to support the loads it will experience when in service. Contractor may, bearing all expenses, field cure concrete test cylinders with the in-place concrete and discontinue protection and curing when the field test cylinders reach 3500 psi or estimate real-time strength gain using the maturity method in accordance with ASTM C1074. Contractor shall monitor the concrete temperature daily throughout the protection and cure period and make adjustments as needed to maintain the temperature between 55° F and 75° F. Forms shall be kept in place for the duration of the protection and cure period.

When the protection and cure period has ended reduce the heat gradually so the concrete surface temperature does not decrease faster than 15° per hour until the concrete temperature is the same as the outside temperature.
4.2. D Revise first line and note of Table 4.1 to read:

<table>
<thead>
<tr>
<th>SUBMITTAL</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Monthly</td>
</tr>
<tr>
<td></td>
<td>Twice Yearly</td>
</tr>
<tr>
<td>Complete mix design</td>
<td>Annually, or see 4.2.B.3.a</td>
</tr>
</tbody>
</table>

Note: the above-indicated monthly reports shall not be required during non-production months. Frequency of submittals may change as dictated by variations of test data.
CITY OF BILLINGS STANDARD SECTIONS

The specification sections included in this portion of the document are not in the MPWSS but shall be incorporated into all projects where applicable.
SECTION 00800

CITY OF BILLINGS SUPPLEMENTARY CONDITIONS

These Supplementary Conditions modify the sections included in MPWSS 00700 General Condition for Public Works Project EJCDC 00700. These are in addition to modifications included in the MPWSS Section 00810 and the modifications included within this document pertaining to that section.

Add S.C. General Change multiple references from “Supplementary Conditions” to “Standard/Special Conditions” throughout section 00700.

Add S.C. - 1.01.A.19 Delete definition and add “Public Works Engineering or its agent.

Add S.C. - 2.02 Delete ten and replace with “five”.

Add S.C. - 2.03.A Delete the last sentence beginning with “In no event will the Contract Times…..”.

Add S.C. - 4.04.A.2.e. Verifying the depth and alignment of existing utilities prior to construction by potholing or other investigations in instances where utilities to be installed cross existing utilities. This work will be incidental and will not be paid separately.

Add S.C. – 5.04 Add the following after Paragraph 5.04.B.
C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the amounts required by the Insurance Guide included in Appendix A.

Add S.C. – 5.04 Add the following after Paragraph 5.04.B.6.
7. The Contractors General Liability Policy will not be endorsed with any restrictive endorsements related to acts of the Contractor’s Independent Contractors hired to perform jobs for the City of Billings. General Liability endorsements such as the CG 2294 or any similar/equivalent endorsements will not be allowed. It is the duty of the Contractor to assure the City of Billings that acts of independent contractors are covered by the Contractor’s General Liability Insurance.

Delete 5.05 Owner’s Liability Insurance

Replace 6.05.A with the following:
Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of the proprietary item or the name of the particular Supplier, the specification or the description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words “or equal”, no other items of material or equipment or material or equipment of other Suppliers will be considered. If “or equal” is added, 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.

**Add S.C. - 6.08.A.** Delete first and second sentences and replace with “Any necessary permits, licenses, agreements, insurance, and approvals required by any governmental agency for the performance of this Work shall be obtained by the Contractor at its own expense.

**Add S.C. - 6.13.A.** Add the following:
4. Contractor shall notify utility operator/owner immediately of any damage. Utility owner/operator shall determine the appropriate repair. If the damage results in a release of natural gas or other hazardous substance, or potentially endangers life, health, or property, then Contractor shall immediately contact the utility owner/operator, call 911 and take immediate action to protect the public and property.

**Add S.C. - 13.07.A.4** Nothing in the Standard General Conditions, Article 13, concerning the correction period shall establish a period of limitation with respect to any other obligation which Contractor has under the Contract Documents. The establishment of time periods relates only to the specific obligations of Contractor to correct the work and has no relationship to the time within which Contractor’s obligations under the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor’s liability with respect to Contractor’s obligations other than to specifically correct the work.

**Add S.C.-14.02.C.1** Replace with “Thirty days after presentation of the Application for Payment with Engineer’s recommendation, the amount recommended (subject to provisions of 14.02.D) becomes due, and when due, will be paid by Owner to Contractor.”

**Add S.C. - 17.05 – CONTROLLING LAW:** Delete “the state in which the Project is located.” and replace with “of Montana. The parties expressly agree that venue shall be in the Montana Thirteenth Judicial District Court for Yellowstone County and there shall be no other venue for resolution of disputes arising from the contract or the performance of its terms.”
SECTION 00900
STANDARD PROVISIONS

1. ENGINEERING OVERTIME CHARGES

Contractor shall be responsible for payment of Engineering overtime hours, as overtime charges, for work performed outside normal working hours; on Saturday and Sunday; or on a legal holiday in accordance with the following schedule:

<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>Clerical</td>
<td>$45.00 per hour</td>
</tr>
<tr>
<td>Resident Project Representative</td>
<td>$75.00 per hour</td>
</tr>
<tr>
<td>Project Engineer</td>
<td>$70.00 per hour</td>
</tr>
<tr>
<td>Survey Crew (2-person)</td>
<td>$150.00 per hour</td>
</tr>
</tbody>
</table>

Daily accounting of the Engineer's overtime will be delivered to the Contractor as it accrues. A copy of the overtime record will be retained by the Owner to document reductions from monthly progress payments to the Contractor.

Should the Contractor complete the Work before the allotted work days expire or before the fixed date as stated in the Agreement form, regular time of the Resident Project Representative allotted for the project will be deducted from overtime charges charged to the Contractor for the number of work days unused.

Observed legal holidays:

- New Years Day - January 1
- Martin Luther King Day - Third Monday in January
- President’s day - Third Monday in February
- Memorial Day - Last Monday in May
- Independence Day - July 4
- Labor Day - First Monday in September
- Columbus Day - Second Monday in October
- Veteran’s day - November 11
- Thanksgiving Day - Fourth Thursday in November
- Christmas Day - December 25

2. EXTENSION OF CONTRACT TIME FOR ADVERSE WEATHER

Contractor shall schedule the work to be completed within the contract time stipulated in the Agreement. Contractor’s progress schedule shall include an allowance for time lost due to normal adverse weather. “Adverse weather” is defined as atmospheric conditions at a definite time and place that are unfavorable to construction activities.
Adverse weather occurrences will not constitute justification for an extension of contract time unless the total time lost due to weather occurrences exceeds ten (10) percent of the contract time stipulated in the Contract Agreement.

The Contractor shall be responsible for traffic control, restoration of utilities and services, restoration of streets, driveways, and alleys, and will provide periodic road maintenance during any shutdown period. Materials for this restoration and maintenance will be consistent with the conditions of the roadway. Any costs related to the restoration and road maintenance will be the responsibility of the Contractor.

Contractor shall, throughout the Project, record occurrences of adverse weather and resultant impacts to normally scheduled work, as well as the lingering effects of the occurrence. Adverse weather must prevent work on critical path activities for 50 percent or more of Contractor’s scheduled workday and actually cause a delay to the completion of the Project to be considered an adverse weather delay day. Contractor shall, in a timely manner, submit a written record of each adverse weather occurrence to Engineer for approval.

3. MEASUREMENT AND PAYMENT

Measurement and payment for all bid items included in the Bid Form shall be in accordance with the method of measurement and basis of payment described in the various sections of the Standard Specifications, unless otherwise specified in the Special Provisions.

The total bid price for each item of the contract shall cover all work required by the specifications and other contract documents. All costs in connection with the work, including furnishing all materials, equipment, supplies and appurtenances; providing all construction plant, equipment, and tools; and performing all necessary labor and supervision to fully complete the work, shall be included in the unit and lump sum prices bid. No item that is required by the Contract Documents for the proper and successful completion of work will be paid for outside of, or in addition to, the prices submitted in the bid. All work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Contractor, and all costs in connection therewith shall be included in the prices bid. Bid items shall not be considered for payment until all work associated with the bid item is completed. This work may include, but is not limited to, backfilling and cleanup.

All estimated quantities stipulated in the Bid Form or other contract documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the work, and (b) for the purpose of comparing the bids submitted for the work. The actual amounts of work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished, as measured by the Engineer. The Contractor agrees that he will make no claim for damages, anticipated profits, or
otherwise on account of any difference between the amount of work actually performed and materials actually furnished and the estimated amounts herein.

Either the Owner or the Contractor may demand in writing that a supplemental agreement or change order be prepared to authorize an adjustment in the unit price of any Major Contract item if the quantity of said Major Contract item increases or decreases by more than 25 percent from that shown in the Contract Documents. A Major Contract item is defined as any item having an original contract value in excess of 10 percent of the total original contract (all schedules included together).

4. **MOBILIZATION/DEMOBILIZATION**

Twenty five percent (25%) of the amount bid for mobilization/demobilization shall be paid when five percent (5%) of the contract amount is paid for contract items and for invoiced materials in storage. Subsequent mobilization/demobilization payments shall be made based on the percent of construction completed, excluding previous mobilization/ demobilization payments.

Mobilization shall consist of preparatory work and operations performed by the Contractor including, but not limited to, those necessary for the movement of his personnel, equipment, supplies, and incidentals to the project site; for the establishment of all offices, buildings, and other facilities necessary for all work on the project; and for other work and operations that must be performed or costs incurred before beginning work on the various items on the project site. Mobilization/demobilization costs for subcontracted work shall be considered to be included. Mobilization for this project shall also include submission and approval of the Contractor’s Traffic Control Plan and Quality Control Plan. No payment shall be made for mobilization/demobilization until these plans are reviewed and approved by the Owner.

5. **TAXES, BONDS, INSURANCE**

The lump sum bid for Taxes, Bonds and Insurance shall be paid on the first progress payment one hundred percent (100%) upon mobilization to begin construction of a particular schedule, only if the bid price for this item is less than five percent (5%) of the total price of that schedule. For that portion of the taxes, bonds and insurance greater than five percent (5%), if any, payment shall be made in increments on the basis of the percentage of work completed of each progress payment for that schedule.

6. **STORMWATER MANAGEMENT AND EROSION CONTROL, AND BEST MANAGEMENT PRACTICES (BMPs)**

The Contractor shall make note that this project is subject to Montana Department of Environmental Quality Storm Water General Discharge Permit authorization. The Contractor shall pay the application fee, the first annual fee and additional annual fees necessary until the termination of the permit has been granted by the Montana Department of Environmental Quality (MDEQ). The Contractor is responsible for
securing and administering the permit and installation and maintenance of the erosion control structures. All Storm Water Management and Erosion Control, and BMPs for this project shall comply with the requirements set forth by Chapter 28, Billings Municipal City Code (BMCC) and in the general permit for Storm Water Discharges Associated with Construction Activity which can be obtained from MDEQ at:

http://www.deq.state.mt.us/wqinfo/MPDES/StormwaterConstruction.asp

A Notice of Intent (NOI) and a Storm water Pollution Prevention Plan (SWPPP) shall be required if the project site is greater than one acre or within 50-feet of a state receiving water. The Contractor shall submit the NOI and SWPPP to the City for review and approval prior to submission to MTDEQ. A copy of the State acceptance letter shall be submitted to the City upon receipt. The NOI shall be completed with the Contractor as Applicant/Certified SWPPP Administrator. The applicant shall be responsible for achieving final stabilization and submitting the Notice of termination (NOT).

The Contractor shall comply with all requirements and conditions of the General Permit and the Storm Water Pollution Prevention Plan (SWPPP). Failure to do so will result in the issuing of an order to suspend work in addition to the potential fines that may be assessed by the Montana Department of Environmental Quality.

The Contractor’s responsibilities regarding maintenance of erosion control structures, after final project acceptance, will be limited to the areas disturbed by the utility and street construction for this project only. The Contractor will not be responsible for erosion control beyond the disturbed areas of this project due to adjacent construction. It is the Contractor’s responsibility to document the extent of disruption due to construction activities directly related to this project. The documentation should include pictures with a date stamp that is concurrent with the date of final acceptance.

**Add the following Standard Provisions:**

**8. PROTECTION, PRESERVATION, AND REPAIR**

**A. Existing Structures**

The Contractor shall take any photos, measurements, and/or assessments necessary to accurately document the preconstruction condition of potentially impacted structures, and provide a copy of all such documentation to the Owner upon request.

Where construction will be required adjacent to existing structures, the Contractor shall be solely responsible to maintain the structural integrity of the existing structures. The Contractor shall take whatever means necessary to ensure that the existing structure is not damaged and, if necessary, shall install shoring, sheet piling, or other means of supporting the utility or structure, or change the size or type of construction equipment. The Contractor shall protect, and in the case of any damage, repair the existing structures at the Contractor’s expense. Any fences damaged during
construction shall be repaired to the satisfaction of the Owner. Any delay, additional work, or extra cost to the Contractor caused by existing underground installations shall not constitute a claim for extra work, additional payment, or damages.

B. Asphalt Pavement

The Contractor is responsible for the protection of, and the cost to repair or replace to the satisfaction of the Owner, any and all asphalt damaged due to any construction or travel (hauling, storage, unloading, etc.) operations that is outside of the construction limits identified on the plans. This requirement shall include damage caused by trench sloughing. The Contractor shall familiarize themselves with the existing surfacing sections in the project area and consider self-imposed load restrictions conforming to those sections. The Contractor shall use equipment sized and equipped to protect the asphalt. The Contractor shall make their own assessment of the conditions and adjust their bid accordingly.

C. Miscellaneous Improvements

Any miscellaneous permanent, semi-permanent, or portable improvements within the alley or street right-of-ways, such as signs, individual garbage can pads, bus benches, landscaping features, decorative objects, etc., whether privately or publicly owned, shall be preserved or replaced by the Contractor. The cost to remove, relocate, or reset existing items shall be incidental to all other bid items, whether the items are noted on the Drawings for relocation or are removed and reset for the Contractor's convenience.

END OF SECTION
PART 1: DESCRIPTION

Placement of new signs shall consist of furnishing all materials, fabrication, installation and performing all incidental work. This will include storage, installation, fittings, and meeting the requirements of the Plans and Specifications.

It is the intent of these specifications to comply with the standards and requirements of the Manual of Uniform Traffic Control Devices for Streets and Highways (MUTCD) as adopted by the Federal Highway Administration and the design requirements of the current AASHTO manuals.

All signs specified shall meet the requirements of the MUTCD as modified by these specifications. Details of standard sign faces are to be found in the FHWA manual Standard Highway Designs and in the Standard Drawings. Street name signs designating private streets shall clearly state “Private” on or adjacent to the street name sign.

PART 2: MATERIALS

2.1 SIGNS

*Revise second sentence in Standard Mods to read:*
Sheet aluminum shall be aluminum alloy conforming to Aluminum Association alloy designation 6061-T6. Reflective sheeting, legends and borders shall meet the requirements of the MDT standard specifications for the Road and Bridge Construction Section 704. *Public street name signs shall use green reflective sheeting. Private street name signs shall use blue reflective sheeting and include ‘PVT’ within the legend.*

2.2 POSTS

*Revise sentence in Standard Mods to read:*
Posts shall be 2” perforated square tubing with 2 ½” non-perforated square breakaway anchor. Square tubing shall be “Telespar” or approved equal.

2.3 FASTENERS

*Replace section in Standard Mods with the following:*
Drive rivets can be used on all sign with dimensions of 30” by 30”, or smaller. Use 3/8” Hex bolts, large plate washers, lock washers, and nuts on all signs with dimensions greater than 30” by 30”.

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Add the following subsection:

2.4 BACK BRACING
Use 3/16" by 1" flat metal for back bracing on all signs with dimensions greater than 30" by 30". Back bracing is not required on street name signs mounted back-to-back.

PART 3: FABRICATION

Revise last paragraph in Standard Mods to read:
All signs shall be fabricated by skilled workers, and shall show careful craftsmanship.

All aluminum signs shall have reflectorized background or plain background, as shown in the MUTCD. Reflective sheeting shall be applied to the sign face in complete conformance with the recommendations of the manufacturer of the reflective sheeting used.

Following application of the reflective sheeting, all edges shall be sealed with an edge sealer recommended by the manufacturer of the reflective sheeting used.

Background material shall be applied to the sheet aluminum prior to the fabrication of the sign. Legends and borders shall be furnished from Type III sheeting, permanently adhered to the sign face reflective sheeting.

PART 4: SIGN INSTALLATION

Revise second paragraph in Standard Mods to read:
All signs shall be located and installed as indicated in the plan drawings, except the Engineer may change a sign location where necessary to secure an acceptable location. Post-mounted signs shall be attached to the Telespar, or approved equivalent, according to the manufacturer’s recommendations.

Post foundation holes shall be augured or excavated to a minimum diameter of eighteen inches and to a depth of three feet. Foundation holes for steel signposts shall be backfilled with M-3000, or better, concrete. Foundation holes shall be finished flush with pavement, sidewalks, and other “hard surfaces”. Foundation holes shall be finished 4-inches below the ground surface for any surfaces other than pavement, sidewalks, and other “hard surfaces”. Topsoil shall be placed over the finished concrete and compacted flush with the existing ground surface. All signposts shall be set vertically plumb in fresh concrete. Signs shall not be affixed to posts set in concrete until two days have elapsed following placement of the concrete. Additional bracing is required on street name signs wider than 35 inches and on all other signs with dimensions greater than 30" x 30".

PART 5: MEASUREMENT AND PAYMENT
Relocation of existing street name signs onto new posts will not be separately measured and the cost of all such work shall be included in the cost of the new Telespar posts.
Installation of new signs will be paid at the contract unit price per square foot of sign material on the finished sign, and the posts shall be paid at the contract unit price per each which price and payment will be full compensation for completing the work in an acceptable manner. The contract prices for the various component parts shall include concrete for foundations, all miscellaneous hardware, labor, equipment use, back bracing and other incidentals that may be required.

END OF SECTION
SECTION 02930
TREE REMOVAL

The Contractor shall remove the trees and shrubs within the project limits in accordance with all OSHA and ANSI specifications pertaining to tree work and not endanger life or damage adjacent trees or property, either public or private.

Revise sentence in Standard Mods to read:
All stumps and roots shall be removed by digging, cutting, or grinding to a depth sufficient for construction of planned improvements or a minimum of 6 inches below the top of existing or planned curb and gutter grade for trees removed in boulevard areas.

Revise paragraph in Standard Mods to read:
All stump shavings, twigs, and other organic debris shall be removed. These materials shall not remain on site and in no case be incorporated into the subgrade or placed onto private property. Backfill all areas where stumps and roots have been removed to the level of the adjoining grade with topsoil. The topsoil shall be properly leveled and lightly compacted so as to ensure a minimum of settlement. All adjacent disturbed areas and areas where backfill material was placed shall be seeded per the requirements of Section 02910.

Revise paragraph in Standard Mods to read:
The Contractor shall not cut tree roots or trim tree branches on trees that are not being removed without the approval of the City Forester or the Engineer. Trees shall not be removed until marked with a painted “X” by the Engineer.

No separate payment will be made for removal of trees less than 10 inches in circumference. The cost of performing this work shall be included in other items in the contract. Measurement of larger trees shall be by four ranges of circumference and classified as follows:

- Over 10 inches up to and including 36 inches, Class I
- Over 36 inches up to and including 72 inches, Class II
- Over 72 inches up to and including 126 inches, Class III
- Over 126 inches, Class IV

Revise paragraph in Standard Mods to read:
Measurement of trees for classification shall be made four (4) feet above the ground, or where more than one stem exists below four (4) feet above the ground, to the lowest stem. The unit contract price per each tree shall be full compensation for furnishing all labor, equipment, and material to completely remove and dispose of the tree, removal and grinding of tree stump and roots, topsoil, placement and raking of topsoil, and seeding or sodding in accordance with these specifications and as directed by the Engineer.

END OF SECTION
SECTION 02940
TREE REPLACEMENT

PART 1: GENERAL

1.1 DESCRIPTION

A. At the property owner’s request, a replacement tree for every tree removed by the Project shall be planted in a location suitable to the property owner.

PART 2: PRODUCTS

2.1 TREES

A. Replacement trees shall be void of all disease and pest infestations. The trees shall also display a sound branching structure, stems void of damage, wounding or decay and a healthy, vigorous root system. Replacement trees shall consist of the following sizes.

1. Local Streets: 1½ inch caliper
2. Collector Streets: 2 inch caliper
3. Arterial Streets: 3 inch caliper

2.2 NURSERY STOCK SPECIFICATIONS

A. General

1. Delivery and planting of trees ordered shall be completed as soon as possible.
2. The trees ordered shall comply with Federal, State, and County laws with respect to plant disease and inspection.
3. Substitutions must be approved in advance by Engineer.
4. Trees ordered shall be delivered in good condition with labels intact.
5. All trees planted shall carry a minimum one (1) year warranty.

B. Plant Materials

1. Quality and size shall conform to the American Standards for Nursery Stock of the American Association of Nurserymen.
2. All trees ordered shall be true to name and each shall be labeled with the name and size of the trees herein. Botanical names shall take preference over common names.

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3. All trees ordered shall have average or normal branch systems, with a central leader, vigorous root system, and be free of scale, bark abrasions, sun scald, and other disfigurement.

4. All stock shall be nursery grown.

5. Trees ordered shall be shipped, handled and stored in accordance with current standard nursery practices.

C. Acceptable trees for use in the right of way:

1. Canopy Street Trees
   a. Gleditsia triacanthos var.inermis Thornless Honeylocust
   b. Tilia cordata Little Leaf Linden
   c. Tilia americana ‘Redmond’ Redmond Linden
   d. Quercus macrocarpa Burr Oak

2. Ornamental Street Trees
   a. Crataegus x mordenensis Morden Hawthorns
   b. Syringa reticulate Japanese Tree Lilac
   c. Carpinus caroliniana American Hornbeam
   d. Ostrya virginiana Hop Hornbeam (Ironwood)
   e. Maackia amurensis Amur Maackia

Other trees may be used upon approval by the City Engineer. In no case shall the following trees be planted: Carolina poplar, Canadian poplar, elms, lombardy poplar, silver leaf poplar, weeping willow, and box elder trees.

PART 3: EXECUTION

3.1 PLANTING PROCEDURES

1. Contractor shall be responsible for determining conditions to include tree locations, utility locations, and other conditions that affect the planting of the trees.

2. Contractor shall be responsible for obtaining any permits that may be required.

3. Contractor shall contact each property owner listed prior to planting to coordinate the planting and location to their satisfaction.

4. Trees planted in the boulevard areas will be centered between the back of curb and the sidewalk, or on private property if requested by the property owner. Trees planted on private property will be a minimum of six (6) feet from the back of the sidewalk. No trees will be planted within six (6) feet of any drive approach or alley approach.
5. Trees to be planted closer than six (6) feet from any walks, drives, or curbing shall be surrounded in the ground by an acceptable root deflector system properly installed to prevent future bucking of sidewalks or drives, from growth of surface roots beneath them. This deflector system may not be needed for some types of trees. Engineer can waive this requirement.

6. The burlap shall be entirely removed from the top half of each root ball; wire baskets shall be cut apart over the top 2/3 of the root ball once each tree is in position; and all twine wrappings around the ball and stem, cut and removed.

7. Trees shall be planted according to standard landscaping procedures. Starter fertilizer shall be added to the backfill soil. Rocks, sod, and debris shall be removed from the native soil and the native soil used as backfill for each tree. The trees shall be watered in adequately to eliminate all air pockets and settle the soil around the root ball.

8. Containers shall be completely removed and all circling roots (pot bond) straightened or cut.

9. The sides of all the planting holes shall be a minimum of twelve (12) inches from the root ball. Root flare must be plainly visible when planting is complete and mulch must not be contacting the tree stem.

10. The planting site shall be cleaned up and shaped to form a saucer-like depression around each tree and all sod and debris removed and disposed of by the bidder.

PART 4: MEASUREMENT AND PAYMENT

Measurement and payment will be the actual number of each type of tree planted. The Engineer shall provide the number and type(s) of trees for each property.

END OF SECTION
SECTION 2950

CONCRETE BLOCK RETAINING WALL

PART 1: GENERAL

1.1 DESCRIPTION

A. Work includes furnishing and installing concrete block retaining wall units at locations designated on construction plans or as directed by the Engineer.

1.2 REFERENCE STANDARDS

A. Retaining Wall Units

ASTM C1372  Standard Specification for Segmental Retaining Wall Units.
ASTM C140  Standard Test Methods of Sampling and Testing Concrete Masonry Units.

1.3 SUBMITTALS

A. Materials Submittals: Contractor shall submit manufacturer’s certifications stating that the retaining wall units meet the requirements of this specification.

1.4 DELIVERY, STORAGE AND HANDLING

A. Contractor shall check materials upon delivery to assure that proper color and texture of retaining wall units have been received.

B. Contractor shall prevent mud, wet concrete, epoxies and like materials that may affix themselves from coming in contact with wall units.

C. Contractor shall store and handle wall units in accordance with manufacturer’s recommendations.

D. Contractor shall protect wall units from damage. Damaged wall units shall not be incorporated into the retaining wall.

PART 2: MATERIALS

2.1 RETAINING WALL UNITS

A. Retaining wall units shall be machine formed, Portland cement concrete blocks specifically designed for retaining wall applications. Retaining wall units shall be VERSA-LOK or other approved equal.
B. Color of wall units shall be sandstone. Sample wall units shall be provided by Contractor and approved by Engineer prior to construction.

C. Finish of wall units shall be split faced.

D. Wall unit faces shall be of straight geometry.

E. Wall unit height shall be 6 inches minimum.

F. Wall units shall provide a minimum weight of 105 psf wall face area.

G. Wall units shall have a depth (front face to rear) to height ratio of 2:1 minimum.

H. Wall units shall be interlocked with connection pins, designed with proper setback to provide 8:1 vertical to horizontal batter (7-degree cant from vertical).

I. Wall units shall be capable of being erected with the horizontal gap between adjacent units not exceeding 1/8 inch.

J. Wall units shall be capable of providing overlap of units on each successive course so that walls meeting at corner are interlocked and continuous. Wall units that require corners to be mitered shall not be allowed.

K. Wall units shall be capable of providing split-face, textured surface for all vertical surfaces that will be exposed after completion of the wall, including and exposed sides and backs of units.

L. Wall units shall be sound and free of cracks or other defects that would interfere with the proper placing of the unit or significantly impair the strength or permanence of the structure. Cracking or excessive chipping may be grounds for rejection. Wall units showing cracks longer than 1/2 inch shall not be used within the wall. Wall units showing chips visible at a distance of 30 feet from the wall shall not be used within the wall.

M. Concrete used to manufacture wall units shall have a minimum 28 days compressive strength of 3,000 psi and a maximum moisture absorption rate, by weight, of 8% as determined by ASTM C1372. Compressive strength test specimen shall conform to the saw-coupon provisions of ASTM C140.

N. Wall unit molded dimensions shall not differ more than ± 1/8 inch from that specified, in accordance with ASTM C1372.
2.2 WALL UNIT CONNECTION PINS

A. Wall units shall be interlocked with manufacturer approved connection pins made for the expressed use with the wall units.

PART 3: EXECUTION

3.1 EXCAVATION

A. Contractor shall verify location of existing structures and utilities prior to excavation. Contractor shall ensure all surrounding structures are protected from the effects of wall excavation. Excavation support, if required, is the responsibility of the Contractor.

B. Contractor shall excavate deep enough to accommodate the leveling pad and required unit embedment below grade (10 percent of wall height embedment). Following excavation, the foundation soil shall be compacted to at least 95 percent of maximum dry density as determined by ASTM D698 and shall be approved by Engineer prior to placement of leveling pad materials.

3.2 LEVELING PAD CONSTRUCTION

A. Leveling pad shall be constructed with a minimum thickness of 6 inches of granular material or 2 inches of flowable fill. The leveling pad should extend laterally at least a distance of 6 inches from the toe and heel of the wall unit.

B. Granular leveling pad material shall be compacted to provide a firm, level bearing surface on which to place the first course of units. Well-graded sand can be used to smooth the top 1/4 inch to 1/2 inch of the leveling pad. The granular leveling pad material shall be compacted to at least 95 percent of maximum dry density as determined by ASTM D698.

C. Leveling pad shall be constructed such that it results in the top course being level, independent of sidewalk or street grade.

3.3 WALL UNIT INSTALLATION

A. All wall units shall be installed at locations designated on construction plans or as directed by the Engineer. The wall units shall be installed in general accordance with the manufacturer’s recommendations and these specifications.

B. The first course of wall units shall be placed on the leveling pad. The wall units shall be leveled side-to-side, front-to-rear with adjacent wall units, and aligned to ensure intimate contact with the leveling pad. The first course is the most important to ensure accurate and acceptable results. No gaps shall be
left between the fronts of adjacent wall units. Alignment may be done by means of a string line or offset from base line to back of the wall units.

C. All excess debris shall be cleaned from top of wall units and the next course of wall units installed on top of the units below.

D. Insert connection pins through the pin holes of each upper-course wall unit into receiving slots in the lower-course wall units. Pins shall be fully seated in the pin slot below. Wall units shall be pushed forward to remove any looseness in the unit-to-unit connection.

E. Prior to placement of next course, the level and alignment of the wall units shall be checked and corrected where needed.

F. Layout of curves and corners shall be installed in general accordance with manufacturer’s installation guidelines. Walls meeting at corners shall be interlocked by overlapping successive courses.

G. Procedures C through F shall be repeated until reaching top of wall units, just below the height of the cap units.

3.4 WALL BACKFILL

A. Backfill material shall consist of existing native soils placed in lightly compacted lifts utilizing a lightweight mechanical tamper or plate. Backfill shall be placed level with final top of wall elevation.

3.5 WALL UNIT CAPS

A. Wall unit caps shall be properly aligned and glued to underlying wall units with manufacturer recommended adhesive. Rigid adhesive or mortar is not acceptable.

B. Caps shall overhang the top course of the units by 3/4 inch to 1 inch. Slight variation in overhang is allowed to correct alignment at the top of the wall.

PART 4: MEASUREMENT AND PAYMENT

4.1 GENERAL

A. Concrete block retaining wall is measured and paid by the square foot of exposed front face. The square foot area for payment will be based on the vertical height and length of the retaining wall completed and accepted by the Engineer. The vertical height will be taken as the difference in elevation measured from the top of the finished grade (sidewalk or topsoil) to the top of the wall.
B. Payment indicated to include full compensation for all labor, equipment, materials and incidentals required for the completion of the work.

END OF SECTION
SECTION 02960
SODDING

PART 1: GENERAL

1.1 DESCRIPTION

A. This section covers the installation of sod in the right of way.

PART 2: PRODUCTS

2.1 SOD

A. Sod shall be dense turf grass of good quality and color free of weeds, insects, and undesirable grasses. The sod shall be machine-cut with a uniform mat width and a thickness deep enough to ensure the root system of the grasses will be retained and exposed. Grass length upon cutting shall be approximately 2 inches. Sod shall be well watered to prevent breaking or tearing during cutting, transportation and installation.

PART 3: EXECUTION

3.1 SEASON

A. Perform sodding from April 15th to October 15th or as approved by the Engineer.

3.2 SURFACE PREPARATION

A. Prepare the surfaces to be sodded to the required cross section, grade, and contour. Surfaces shall be lightly compacted prior to sod installation to prevent settlement after sod installation.

B. Make the surface smooth and uniform, free of gravel/stones, roots, clumps, weeds, and other foreign material. Undercut the prepared surface below the adjacent areas so the top of the new sod is flush with adjacent seedbed or turfed areas and 1 inch below sidewalk and curb tops.

C. Break the surface up to a fine, granular texture at least 2 inches deep before placing sod.

D. Fertilize the surface to be sodded a maximum 48 hours before placing sod. Use fertilizer containing a 20-10-10 or 16-16-16 nitrogen-phosphorus-potassium mixture.
3.3 CUTTING AND HANDLING SOD

A. Machine-cut sod in uniform rectangular sections. Cut sod to a depth that preserves intact the grasses live dense root system and prevents tearing or breaking of the sod. Load, unload, and place sod to prevent tearing or breaking of the sod.

3.4 PLACING SOD

A. Lay sod within 36 hours of cutting. Protect sod from dry or cold weather until placed. Place and fit sod as close as possible staggering the joints between horizontal rows.

B. Lay the sod strips horizontally on slopes, starting at the slope bottom and work upwards. On slopes steeper than 3:1, anchor the sod with fasteners spaced a maximum 2 feet apart and driven flush with the sod surface.

C. In waterways, lay the strips parallel to the flow, staggered, and fitted snug and even with the strips already placed.

D. Fill gaps between sod strips with sod pieces cut to the gap size and shape.

E. At slope bottoms, extend the sod edges at least 2 inches into the ground or ditch bottom. Turn all other sod area edges into the ground and cover with topsoil, compact and smooth to blend with adjacent finished grades.

F. Roller compact the sod with a hand roller immediately after placement. Provide a smooth, even surface, free from bumps and depressions.

G. Thoroughly water the sod and re-roll to insure good soil contact.

PART 4: MEASUREMENT AND PAYMENT

4.1 PAYMENT BASIS

A. Payment is made under the bid item for Sodding – per square yard. Price and payment is full compensation for all material, equipment, tools and labor, and for the performance of all work and incidentals necessary to complete this item of work.

4.2 METHOD OF MEASUREMENT

A. Sodding is measured by the square yard in place, parallel to the ground surface. Fertilizer is included in the contract unit price for Sodding per square yard. Topsoil is included in other contract bid items as specified in the MPWSS.
SECTION 03360
SHOTCRETE

PART 1: GENERAL

1.1 DESCRIPTION

A. This work is furnishing all labor, materials, and equipment for batching, mixing, transporting, placing, finishing and quality control of wet or dry mix shotcrete. Shotcrete is pneumatically applied concrete or mortar of the specified thickness and at the specified locations.

1.2 REFERENCES

A. Meet the applicable provisions of the following:

1. American Concrete Institute (ACI) Reference Standards:
   506R-85: Guide to Shotcrete
   506.2-77: (Rev. 1983) Specification for Materials, Proportioning and Application of Shotcrete
   305R-89: Hot Weather Concreting
   306R-88: Cold Weather Concreting

   C33-86: Standard Specification for Concrete Aggregates
   C42-84a: Standard Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
   C78-84: Standard Test Method for Flexural Strength of Concrete
   C94-86b: Standard Specification for Ready-Mixed Concrete
   C309-81: Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
   C494-86: Standard Specification for Chemical Admixtures for Concrete
   C618-85: Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
   A185-85: Standard Specification for Steel Welded Wire Fabric, Plain for Concrete Reinforcement
   A615-87: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
1.3 QUALITY CONTROL

A. Furnish shotcrete test panels for each crew duplicating the position, thickness and reinforcement specified and obtain Engineer approval before starting shotcrete work.

1.4 TESTING

A. Meet Section 01400 requirements for quality control and quality assurance testing. Quality assurance testing frequencies are as follows:

1. Furnish at least six (6) cores for compressive strength tests. Meet the following schedule and strength requirements:

   a. Cores: Tested per ASTM C-42 - Two cores at Each Age

      1) 1 Day: Required Specified Strength - 1000 PSI
      2) 7 Day: Required Specified Strength - 3000 PSI
      3) 28 Day Required Specified Strength - 4500 PSI

1.5 SUBMITTAL FOR APPROVAL

A. Submit to the Engineer within 30 days before shotcreting.

   1. The proposed mix design, materials, and equipment needed for testing. If a proprietary, pre-bagged material is submitted, submit performance data based on in-place shotcreted specimens in lieu of a mix design.

   2. Proposed method and material certification for curing of the test panels and in-place SHOTCRETE.

   3. A detailed statement showing the type of equipment to be used, and the SHOTCRETE process to be used.

PART 2 PRODUCTS

2.1 MATERIALS

A. For job-site mixing, furnish aggregates meeting ASTM C-33 requirements excluding the sand and coarse aggregate gradation as specified in ACI-506.2. Exercise care when using damp sand to assure that the mix can be used to shotcrete before hydration renders the mix unsuitable for placement.

B. Use cement meeting, ASTM C-150, ASTM C-595 or ASTM C-1 157.
C. Use pozzolanic materials meeting ASTM C-618, Class F or C.

D. Obtain Engineer approval of all admixtures.

1. Maintain a SHOTCRETE accelerator on the job with dispensing, equipment meeting the following requirements:
   a. Meet ACI 506R-85 and be tested for compatibility in shotcreted test panels.
   b. Not contain intentionally added chloride ions.
   c. Not cause or promote the corrosion of properly imbedded rebar or wire mesh.

2. Use concrete admixtures meeting ASTM C-494 and not containing intentionally added chloride ions.

3. Use air entraining admixtures meeting ASTM C-260.

E. Use membrane-forming curing compounds meeting ASTM C-309.

2.2 PROPORTIONING AND MIXING

A. When job mixed materials are used, use equipment capable of thoroughly mixing the materials, aggregates and admixtures, conveying the mix to the pump or gun, metering out of the pump or gun through a hose or slick line to the nozzle and sprayed onto the surface to be shotcreted.

B. When proprietary pre-bagged Shotcrete mixes are used, assure shotcreting equipment is able to meter the mix through a hose or slick line to the nozzle for spraying onto the surface to be shotcreted.

C. In either case, use mixes meeting the following strength requirements:

1. Compressive - measured by core tests under ASTM C-42:
   a. 1 Day: 1000 PSI Specified Strength
   b. 7 Day: 3000 PSI Specified Strength
   c. 28 Day: 4500 PSI Specified Strength

2. Additionally, meet the specified performance parameters 'in the special conditions.
PART 3: EXECUTION

3.1 PREPARATION

A. The Engineer will inspect areas prepared for shotcreting before application. Remove all loose and deteriorated concrete. Abrasive blast clean all exposed reinforcing steel removing all loose, flaking rust or contaminants such as oil, dirt, paint, etc. Meet the following requirements in preparing a surface to be shotcreted:

1. When removing deteriorated concrete, remove at least 6” (15 cm) beyond all sides of the apparent deteriorated area.

2. When rebar is encountered and poor quality concrete extends at or beyond the mid-point of the rebar or mesh, extend concrete removal 1-1/2” (38 mm) beyond the rebar or mesh and shotcrete completely surrounding the reinforcement. When sound concrete is found, at or before the reinforcement mid-point, do not remove existing concrete beyond the rebar.

3. Notify the Engineer if reinforcement having a 20% or more cross-section loss is encountered. Obtain Engineer approval of cut-out and replacement.

4. Abrasive-blast all reinforcement before shotcreting.

5. Taper the edges of all repair patches.

6. After deteriorated concrete is removed, air blast the area to remove dust and/or loose particles. Prevent contamination of the air stream with oil or other ingredients that would prevent bond.

7. Do not use external bonding agents (epoxy, latex, etc.).

8. Just before shotcreting, dampen the area with potable water or a combination of air and water.

9. Use an approved evaporation retardant to minimize surface drying caused by low humidity, high winds and elevated temperatures.

3.2 PLACEMENT OF SHOTCRETE

A. SHOTCRETE should flow from the nozzle in a steady uninterrupted flow. When flow becomes intermittent, it shall be directed away from the work area until it becomes steady.
B. The distance the nozzle is held from the work and the angle of the flow shall be such as to give the best result under the conditions. Particular attention shall be given to placement around reinforcing to insure complete encasement with no voids or trapped rebound.

C. Thickness of layers to be applied shall be determined by the material's ability to withstand sagging. Areas exhibiting a tendency to sag will be carefully removed without disruption to adjacent material and replaced.

D. Where succeeding layers are to be placed and the first layer has reached its initial set, rebound should be removed by brooming, or with low pressure air. Rebound that cannot be removed by brooming or low pressure air shall be removed by sand blasting, followed by low pressure air water washing. Prior to placing succeeding layers, the underlying layer shall be dampened prior to relayering with all free water removed. If the first layer has not reached initial set, the next layer of concrete or mortar can be shotcreted into the first layer without any special preparation.

E. Rebound shall not be worked back into the repair area by the nozzleman. Rebound not falling clear of the construction areas shall be removed.

F. Rebound shall be salvaged and used in later batches.

G. Construction Joints should be avoided and will not be permitted without approval of the Engineer. Every effort should be made to apply complete layer to an individual structure member prior to ceasing work on that member. When permitted by the Engineer, the construction joint thus formed shall be thoroughly cleaned and wetted prior to applying additional shotcrete.

3.3 ENVIRONMENTAL REQUIREMENTS

A. Maintain air and substrate temperatures at 40º F (50º C) or higher during shotcreting and for at least seven (7) calendar days following shotcreting. Obtain Engineer approval of methods of heating and protection. Construct and maintain drainage to direct the water away from the area to be shotcreted.

B. Maintain shotcrete mix temperature as placed at a minimum 55º F (13ºC). Make only approved adjustments to the mix design including the use of non-chloride concrete accelerator to meet strength requirements during cold weather.

C. Do not place shotcrete on any frozen surface, saturated ground or where freestanding water exists.
3.4 FINISHING

A. Areas shall be left with a natural gun finish unless specified by the Engineer.

B. Screeding, or other finishing operations should be done immediately after placement; however, it shall not be done in a manner which disrupts bond between the newly placed SHOTCRETE and underlying substrate.

3.5 CURING

A. When a membrane forming curing compound is recommended by the Contractor and approved by the Engineer, it shall be used and applied at a rate meeting the moisture retention requirements of ASTM C-309. Curing compounds should be applied immediately after the Shotcrete has been placed and finished in a manner that would not disrupt the bond to the substrate. Curing compounds should not be applied to Shotcrete where additional layers of Shotcrete will be placed at a later date. When a latex material is added to the Shotcrete mix or is 'Included in the pre-bagged material, only a water-based curing compound should be used.

B. When a curing compound is not used, wet curing by using fog nozzles, wet burlap or soaker hoses shall be maintained for at least seven (7) day.

3.6 CLEAN-UP

A. Clean up overspray or rebound areas.

PART 4: MEASUREMENT AND PAYMENT

4.1 PAYMENT BASIS

A. Payment for shotcrete work is made on one of the following:

1. Lump sum or
2. Area (square units) or
3. Volume (cubic units) or
4. Lineal feet (of tunnel, canal, pipe, etc.)

END OF SECTION
APPENDIX A

MISCELLANEOUS FORMS

CONTRACTOR’S INSURANCE GUIDE
SUSPEND WORK ORDER
RESUME WORK ORDER
MATERIAL STORAGE CERTIFICATION
PAY ESTIMATE (example)
APPLICATION FOR SUBSTITUTION OF SECURITIES IN LIEU OF CASH RETAINAGE
FORCE ACCOUNT REPORT
CONSTRUCTION TRAFFIC CONTROL SUBMITTAL
NEWS MEDIA AND PUBLIC SERVICES CONTACT LIST
SAFETY PERFORMANCE AND PROGRAM SUMMARY
VALVE OPERATION REQUEST FORM
## APPENDIX B

### STATUS OF MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS
STANDARD DRAWINGS

<table>
<thead>
<tr>
<th>Drawing</th>
<th>Description</th>
<th>Status</th>
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<tr>
<td>02213-1</td>
<td>Manhole Adjustment</td>
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<td>Water Valve Adjustment</td>
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<td>Pipe Bedding Alternate</td>
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<td>Drive Over Curb &amp; Gutter</td>
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<td>Double Gutter Detail</td>
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<td>Standard Fillet</td>
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<td>Type II Street Monument</td>
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<td>02529-5A</td>
<td>Boulevard Drive Approach</td>
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<td>02529-5B</td>
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<td>Boulevard Alley Approach</td>
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<td>Curb Walk Alley Approach</td>
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<td>Thrust Blocking for Water Main Fittings</td>
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<td>Thrust Blocking for Water Main Valves</td>
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<tr>
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<td>30&quot; Standard Storm Drain Inlet</td>
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<td>24&quot; Standard Riser Inlet</td>
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<td>Standard 24&quot; Cast Iron Ring Manhole Frame</td>
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### CITY OF BILLINGS STANDARD DRAWINGS

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<td>Traffic Control Setup – TWLTL Lane Closure</td>
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Sm_M02660-8    4” or Larger Water Service Line
Sm_M02660-9    Pipe Insulation
Sm_M02720-1a   2’x3’ Standard Storm Drain Inlet
Sm_M02720-1b   30” Standard Storm Drain Inlet
Sm_M02720-1c   Type I Storm Drain Inlet
Sm_M02720-2    30” Standard Riser Inlet
Sm_M02720-3    Storm and Sanitary Sewer Manhole
Sm_M02720-4    Standard Straight Manhole
Sm_M02720-8a   Standard Cast Iron Cover
Sm_M02720-8b   Standard Cast Iron Cover Design
Sm_M02720-9    Standard 24” Cast Iron Ring
Sm_M02720-10   Storm Drain Service Line
Sm_M02730-2    Sanitary Sewer Service Line
Sm_M02730-3    Deep Sanitary Sewer Service Line
Sm_M02730-4    Sanitary Drop Manhole
Sm_M02730-5    Low Pressure Lateral