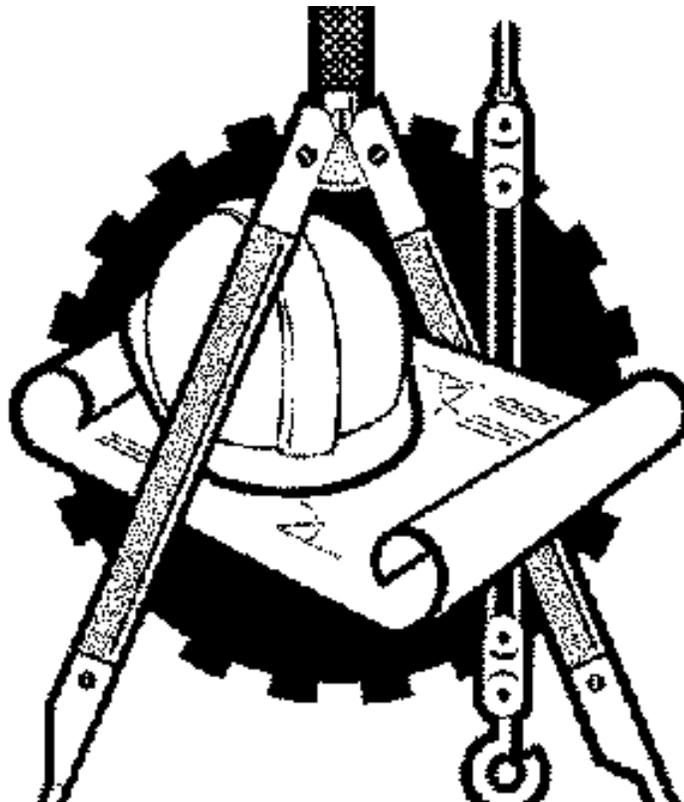




CITY OF MOUNT PLEASANT

STANDARD SPECIAL PROVISIONS & DETAILS



January - 2015

City of Mt. Pleasant
SPECIAL PROVISION
FOR
TECHNICAL SPECIFICATIONS

City of MtPleasant

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January 15

GENERAL REQUIREMENT

The 2012 MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION shall govern all technical specifications of this contract. The following parts of the contract will prevail over all other parts in the following order:

- A. Special Provisions
- B. Supplemental Specifications
- C. Project Plans and Drawings
- D. City of Mt. Pleasant Standard Special Provisions
- E. MDOT Standard Plans
- F. MDOT Standard Specifications
- G. City of Mt. Pleasant Standard Construction Specifications

The Contractor shall not take advantage of any apparent error or omission in the contract documents. If any uncertainty, inconsistency, omission, or conflict is discovered in the contract documents, the Engineer will decide as to the true intent.

City of Mt. Pleasant
SPECIAL PROVISION
FOR
LINES, LEVELS, AND SURVEYS

City of MtPleasant

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January 15

Staking by the City of Mt. Pleasant or its agent shall meet the Engineering staking requirements of Section 104.08A. The contractor shall carefully preserve all benchmarks, reference points, grade stakes, and other necessary control points and be held responsible for all errors that may result from their loss or disturbances. The engineer shall make the final determination as to what lines or grades were disturbed by the contractor.

A minimum of three (3) working days (excluding Saturdays) notice to the City Engineer is required for staking or re-staking. Re-staking will be at a rate of \$75.00 per hour with a \$150.000 minimum.

City of Mt. Pleasant
SPECIAL PROVISION
FOR
UTILITY COORDINATION

City of MtPleasant

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January 15

The contractor shall cooperate and coordinate construction activities with the owners of utilities as stated in Section 104.08 of the 2012 MDOT Standard Specifications for Construction. In addition, for the protection of underground utilities, the contractor shall follow the requirements in Section 107.12 of the 2012 MDOT Standard Specifications for Construction. Contractor delay claims, resulting from a utility, will be determined based upon Section 109.05E of the 2012 MDOT Standard Specifications for Construction.

A) General

For protection of underground utilities, the Contractor shall call the Miss Dig system at (800) 482-7171 a minimum of three (3) working days prior to excavating. Members will thus be routinely notified. This does not relieve the Contractor of the responsibility of notifying utility owners who may not be a part of the Miss Dig alert system.

B) Coordination with Utilities

During the course of the construction, the Contractor will encounter both overhead and underground utilities. The contact information of the utility company representatives are as follows:

Consumers Energy - Electric
Richard Klender
1325 Wright Avenue
Alma, MI 48801
(517) 466-4279

Charter Communication – Cable TV
Jeff Price
915 E. Broomfield Rd.
Mt. Pleasant, MI 48858
(989) 773-7090

DTE Energy/MichCon – Gas
Dave Newcomb
609 Bjornson
Big Rapids, MI 49307
(231) 592-3244

City of Mt. Pleasant – Water, Sanitary &
Storm Sewer
Jason Moore
1303 N. Franklin Ave.
Mt. Pleasant, MI 48858
(989) 779-5405 or (989) 779-5401

Frontier – Telephone
Jeff James
345 Pine Street
Alma, MI 48801
(989) 463-0392

The Contractor's attention is directed to existing underground gas mains, which are located adjacent to or near the work. The Contractor shall use extreme care when working in these areas, and shall notify DTE Energy/MichCon Gas Company at least three (3) working days in advance before beginning any excavation in these areas.

C) Relocation

If Utility relocation work is anticipated for this project, contact the appropriate utility company immediately to coordinate relocations. This will minimize delays to the Contractor's operations due to utility work.

Owners of public or private utilities will not be required to relocate utilities in order to facilitate the operations of construction equipment, unless it is determined by the Engineer that such poles or structures constitute a hazard to the public or are extremely dangerous to the Contractor's operations.

City of Mt. Pleasant

SPECIAL PROVISION
FOR

DIRECTIONAL BORE WATER MAIN MATERIALS AND CONSTRUCTION

City of MtPleasant

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January 15

A) Description

This Special Provision addresses the installation of water mains by guided boring, including connecting to existing water services or other water mains. All gate valve, gate well, and other appurtenances shall be installed using the Special Provision for Water System Materials and Construction. The Contractor will provide all labor, components, materials, tools and appurtenances necessary or proper for the performance and completion of the contract. Inspection and payment will be by the method stipulated in the contract.

Guided boring is a method of trenchless construction using a surface launched steerable drilling tool controlled from a mobile drilling frame, and includes a field power unit, mud mixing system and mobile spoils extraction system. The drilling frame differs from micro-tunneling, auger boring or pipe jacking equipment. The drilling frame is set back from an access pit that has been dug at the location of a proposed gate well (or other appurtenances), and a high-pressure fluid jet toolhead, that uses a mixture of bentonite clay and water, is launched and guided to the correct invert elevation and line required at the gate well. Using a real-time guidance system attached behind or within the toolhead, which measures inclination, roll, and azimuth, the toolhead is guided through the soil to create a pilot tunnel. Tunneling may also be performed between proposed gate wells or other appurtenances. Upon reaching the pit dug at the target location, the toolhead is removed and a reamer, with the product pipe attached, is joined to the arm swing and pulled back through the tunnel. A vacuum spoils extraction system removes any excess spoils generated during the installation. The gate wells are then completed at both locations and the surface restored to the original condition.

1) Qualifications

- i) Guided Boring Contractors shall have actively engaged in the installation of pipe using guided boring for a minimum of three years. The Contractor shall also have completed at least 5,000 feet of guided boring installations ranging from 6 inches to 24 inches in diameter, in the last year.
- ii) Field supervisory personnel employed by the Guided Boring Contractor will have at least three years' experience in the performance of this type of work.

2) Site Conditions

- i) Guided boring operations must not interfere with, interrupt or endanger the surface or activity upon the surface, and shall be located as called for on the project drawings.
- ii) Contractor must comply with all applicable jurisdictional codes and OSHA requirements.
- iii) When rock stratum, boulders, underground obstructions, or other soil conditions that impede the progress of drilling operations are encountered, the Contractor and Project Engineer will review the situation and jointly determine the feasibility of continuing drilling operations, by making adjustments or switching to an alternate construction method.

B) Materials

1) Pipe and Fittings

Restrained Joint PVC Pipe , fittings, and additional appurtenances used shall be in accordance with the Special Provision for Water System Materials and Construction.

2) Drilling Fluid

- i) Drilling fluid shall be a mixture of water and bentonite clay. The fluid shall be inert. The fluid should remain in the tunnel to ensure the stability of the tunnel, reduce drag on the pulled pipe, and provide backfill within the annulus of the pipe and tunnel.
- ii) Disposal of excess drilling fluid and spoils shall be the responsibility of the Contractor, who must comply with all relevant regulations, right-of-way, work space and permit agreements. Excess drilling fluid and spoils shall be disposed at an approved location. The Contractor is responsible for transporting all excess drilling fluid and spoils to the disposal site and paying any disposal costs. Excess drilling fluid and spoils shall be transported in a manner that prevents accidental spillage onto roadways. Excess drilling fluid and spoils will not be discharged into sanitary sewers, storm drain systems or waterways.
- iii) Drilling fluid returns (caused by fracturing or formations) at locations other than the entry and exit points shall be minimized. The Contractor shall immediately clean up any drilling fluid that surfaces through fracturing.
- iv) Mobile spoils removal equipment capable of quickly removing spoils from entry or exit pits and areas with returns caused by fracturing shall be present during guided boring operations to fulfill the requirements of paragraphs above.

- v) The Contractor shall be responsible for making provisions for a clean water supply for the mixing of drilling fluid. A permit to use water can be obtained from the Division of Public Works. No water may be taken from City fire hydrants. The Contractor shall be responsible for complying with all the requirements of that permit.

C) Construction

1) General

The Engineer must be notified immediately if any obstruction is encountered that stops forward progress of drilling operations. The Contractor and Engineer must review the situation and jointly determine the feasibility of continuing guided boring operations or switching to an alternative construction method. When it is determined that it is impossible to continue drilling operations, the Contractor will be directed how to proceed by the Project Engineer. Dewatering of pits and excavations must meet the general provisions and specifications for water main construction in effect at the City of Mt Pleasant. The type of dewatering method will be at the option of the Contractor. When water is encountered, the Contractor must provide a dewatering system of sufficient capacity to remove water, keeping any excavations free of water until the backfill operation is in progress. Dewatering shall be performed in a manner so that removal of soil particles is held to a minimum.

2) Preparation

Excavate required pits in accordance with the project drawings.

The drilling procedures and equipment shall provide protection to workers, particularly against electrical shock. As a minimum, grounding mats, grounded equipment, hot boots, hot gloves, safety glasses, and hard hats will be used by crewmembers. The drilling equipment shall have an alarm system capable of detecting electrical current. The Contractor is responsible for existing utilities, as stated under the Miss Dig System. All utilities that the boring operation may encounter shall be exposed to determine the actual depth and location. The costs of exposing utilities, whether shown on the plans or not, shall be the responsibility of the Contractor and included in the bid price for installing the new water main.

3) Guided Boring Operations

i) Equipment

- (1) The drilling equipment must be capable of placing the pipe within the planned line and grade.

- (2) The drilling equipment must have a minimum pullback rating of 35,000 lbs., a torque rating of 2,000 foot lbs., and mud flow of 24 gallons per minute.
- (3) The guidance system must have the capability of measuring inclination, roll and azimuth. The guidance system must have an independent means to ensure the accuracy of the installation. The Contractor shall demonstrate a viable method to eliminate accumulated error due to the inclinometer (pitch or accelerometer). The guidance system shall be capable of generating a plot of the borehole survey for the purpose of an as-built drawing. The guidance system must meet the following specifications.

Inclination:	Accuracy	0.06'
	Range	90°
	Repeatability	0.09
Roll:	Accuracy	0.1
	Range	0' to 360°
Azimuth:	Repeatability	0.1
	Range	0' TO 360°

4) Pilot Hole Boring

- i) The entry angle of the pilot hole and the boring process shall maintain a curvature that does not exceed the allowable bending radius of the product pipe.
- ii) Alignment Adjustments and Restarts
 - (1) The Contractor shall follow the pipeline alignment as shown on the drawings, within the specifications stated. If adjustments are required, the Contractor shall notify the Project Engineer for approval prior to making the adjustments.

(2) In the event of difficulties at any time during boring operations requiring the complete withdrawal from the tunnel, the Contractor will be allowed to withdraw and abandon the tunnel by completely filling the void and begin a second attempt at a location approved by the Project Engineer; or at the option of the Contractor and with the approval of the Engineer, the Contractor may excavate at the point of the difficulty and install the product pipe by trench method per the contract documents and technical specifications for construction. The number of access pits shall be kept to a minimum and the equipment must be capable of boring the following lengths in a single bore. The guided boring system shall have the capability of boring and installing 12-inch diameter and smaller water main in a continuous run without intermediate pits, for a minimum distance of 700 feet.

iii) Installing Product Pipe

(1) After the pilot hole is completed, the Contractor shall install a swivel to the reamer and commence pullback operations. Pre-reaming of the tunnel may be necessary and is at the option of the Contractor.

(2) Reaming diameter shall not exceed 1.4 times the diameter of the product pipe being installed.

(3) The product pipe being pulled into the tunnel shall be protected and supported so that it moves freely and is not damaged by stones and debris on the ground during installation.

(4) Pullback forces shall not exceed the allowable pulling forces for the product pipe.

(5) The Contractor shall allow sufficient length of product pipe to extend past the termination point to allow connections to adjacent pipe sections or gate valves. Pulled pipes shall be allowed 24 hours of stabilization prior to making tie-ins. The length of extra product pipe shall be at the Contractor's discretion and cost.

(6) The Contractor shall install a braided 12 gauge, blue in color, tracer wire at the same time as the product pipe. The tracer wire shall be connected to each hydrant at a bolt on the bottom of the hydrant barrel by use of a soldered connection, a crimped U-shaped connection, or a ring lug.

iv) Water Service Connections

Water service connections shall be made in accordance with the special provision for Water System Materials and Construction.

D) Testing

Testing shall be done in accordance with the special provision for Water System Materials and Construction.

E)

Measurement and Payment

Payment for the completed work for the various items shall be as described in the Special Provision for Water System Materials and Construction.

Contract Item (Pay Item)	Pay Unit
Water Main, __ inch Bored.....	Linear Foot
Water Service - Short, __inch, Bored.....	Each
Water Service - Long, __inch, Bored.....	Each

City of Mt. Pleasant

SPECIAL PROVISION
FOR

CURB AND GUTTER, CONC, DET F4

City of MtPleasant

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January 15

A) Description

Install Curb and Gutter, Conc, Det F4, Modified according to this Special Provision and as shown on the plans.

B) Materials

The materials used for this work shall meet the requirements of Section 802.02 of the 2012 Standard Specifications for Construction.

C) Construction

Construct Curb and Gutter, Conc, Det F4, Modified in accordance with the requirements of Section 802 of the 2012 Standard Specifications for Construction. The material placed directly under the Curb and Gutter, Conc, Det F4, Modified shall be 22A aggregate, and shall be included in the bid price for Curb and Gutter, Conc, Det F4, Modified, as detailed on the proposed cross-section plan sheet. Thickness of this material shall be approximately 1.5 inches for local streets and 2.25 inches for major streets.

D) Measurement and Payment

The complete work as measured for Curb and Gutter, Conc, Det F4, Modified will be paid for at the contract unit price for the following contract pay items and includes all material, equipment, and labor to complete this item

Contract Item (Pay Item)

Pay Unit

Curb and Gutter, Conc, Det F4, Modified.....

Foot

City of Mt. Pleasant
SPECIAL PROVISION
FOR
DETECTABLE WARNING SURFACE, MODIFIED

City of MtPleasant

1 of 1

January 15

A) Description

This work shall be done in accordance with the requirements of Standard Plan R-28 series and Section 803 of the 2012 Standard Specifications for Construction except that the detectable warning plate shall be an asphalt dipped Cast Iron warning plate.

B) Materials

The detectable warning plate shall be an asphalt dipped Cast Iron warning plate meeting the requirements of section 803 of the 2012 Standard Specifications for Construction.

C) Construction

This work shall be done in accordance with the requirements of Standard Plan R-28 series and Section 803 of the 2012 Standard Specifications for Construction except that the detectable warning plate shall be an asphalt dipped Cast Iron warning plate.

D) Measurement and Payment

The complete work as measured for Detectable Warning Surface, Modified will be paid for at the contract unit price for the following contract pay items and includes all material, equipment, and labor to complete this item.

Contract Item (Pay Item)	Pay Unit
Detectable Warning Surface, Modified.....	Foot

City of Mt. Pleasant

SPECIAL PROVISION
FOR

DR STRUCTURE COVER, _____ , MODIFIED

City of MtPleasant

1 of 2

January 15

A) Description

Dr Structure Cover, _____, Modified, hereinafter referred to as Cover, shall consist of materials and work as described in Section 403 of the Michigan Department of Transportation 2012 Standard Specifications for Construction except as modified herein.

B) Materials

Covers shall include geotextile fabric, frame, grate or cover and shall be of the type indicated on the plans.

1) Dr Structure Cover, CB , Modified

Catch basin cover types shall depend on their location on the plans.

- i) Catch basins covers located in Det M openings shall be model 5100Z with type M1 grate as manufactured by East Jordan Iron Works, or approved equal.
- ii) All other catch basins covers located in the curb shall be model 7000 with type M2 grate as manufactured by East Jordan Iron Works, or approved equal.
- iii) Unless otherwise indicated on the plans, catch basins covers outside of the curb shall be model 1040 with type M1 grates as manufactured by East Jordan Iron Works, or approved equal.

2) Dr Structure Cover, STM, Modified

- i) Storm drainage structure covers shall be model 1040 with type B cover as manufactured by East Jordan Iron Works, or approved equal.

3) Dr Structure Cover, SAN, Modified

- i) Sanitary drainage structure covers shall be model 1040 with type A cover as manufactured by East Jordan Iron Works, or approved equal. The preferred cover shall be stamped with the City of Mt. Pleasant logo.

C) Construction

Construct drainage structure covers according to the details on the plans and section 403 of the Standard Specifications. Drainage structure shall be wrapped with geotextile fabric as shown on the plans.

A) Measurement and Payment

This work will be measured and paid as specified in section 403 & 802 of the Standard Specifications using the following contract items (pay items).

Contract Item (Pay Item)	Pay Unit
Dr Structure Cover, CB, Modified.....	Each
Dr Structure Cover, STM, Modified.....	Each
Dr Structure Cover, SAN, Modified.....	Each

City of Mt. Pleasant

SPECIAL PROVISION
FOR

DRIVEWAY OPENING, CONC, DET M, MODIFIED

City of MtPleasant

1 of 1

January 15

A) Description

Construct Driveway Opening, Conc, Det M, Modified in accordance with the requirements of Standard Plan R-29 series and Section 802 of the 2012 Standard Specifications for Construction.

B) Materials

The materials used for this work shall meet the requirements of Section 802.02 of the 2012 Standard Specifications for Construction except that the reinforcing steel shall be eliminated.

C) Construction

Construct Driveway Opening, Conc, Det M, Modified in accordance with the requirements of Standard Plan R-29 series and Section 802 of the 2012 Standard Specifications for Construction except that the reinforcing steel shall be eliminated. The approximate 2 inches to 2.5 inches of material placed under the Construct Driveway Opening, Conc, Det M, Modified shall be 22A aggregate, and shall be included in the bid price for Construct Driveway Opening, Conc, Det M, Modified.

Measurement and Payment

The complete work as measured for Driveway Opening, Conc, Det M, Modified will be paid for at the contract unit price for the following contract pay items and includes all material, equipment, and labor to complete this item.

Contract Item (Pay Item) Pay Unit

Drive Opening, Conc, Det M, Modified..... Foot

City of Mt. Pleasant

SPECIAL PROVISION
FOR

GAS/WATER SHUTOFF COVER ADJ, CASE 1

City of MtPleasant

1 of 1

January 15

A) Description

Adjust gas and water shutoff covers according to this Special Provision and as shown on the plans.

B) Materials

The materials used for this work shall meet the requirements of the utility owning the shutoff.

C) Construction

Adjust gas and water shutoff covers in accordance with the requirements of Section 403.03 C of the 2012 Standard Specifications for Construction for drainage structures.

A) Measurement and Payment

The complete work as measured for Gas/Water Shutoff Cover, Adj, Case 1 will be paid for at the contract unit price for the following contract pay items and includes all material, equipment, and labor to complete this item

Contract Item (Pay Item)	Pay Unit
Gas/Water Shutoff Cover, Adj, Case 1.....	Each

City of Mt. Pleasant

SPECIAL PROVISION
FOR

HMA APPLICATION ESTIMATE - LOCAL STREET

City of MtPleasant

1 of 1

January 15

A) Description

This work shall be done in accordance with the requirements of section 501 of the 2012 Standard Specifications for Construction and applicable supplemental specifications and special provisions, and as specified herein. The HMA Approach bid item shall include paving of HMA Driveways and cross streets. Cross streets shall be constructed in two passes at the same cross-section as the mainline pavement, follow the procedures outlined in MDOT 501.03F4

B) Materials

The HMA leveling course and HMA Approach shall be HMA, 13A. The HMA top course shall be HMA, 36A.

The leveling course shall have a yield of 175 pounds per square yard and the binder shall be PG 56-28

The top course shall have a yield of 125 pounds per square yard, an AWI of 260, minimum, and the binder shall be PG 58-28.

HMA Approach shall be 13A. Cross streets shall be constructed in two passes, have a yield of 300 pounds per square yard, and the binder shall be PG 58-28. Driveways shall be constructed in one pass, have a yield of 220 pounds per square yard, and the binder shall be PG 58-28.

The HMA Bond Coat material shall be per Section 501.03. The uniform rate of application shall be 0.05 - 0.15 gallons per square yard.

C) Measurement and Payment.

Measurement and Payment shall be at the contract unit price for the related items of work.

City of Mt. Pleasant

SPECIAL PROVISION
FOR

HMA APPLICATION ESTIMATE - MAJOR STREET

City of MtPleasant

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January 15

A) Description

This work shall be done in accordance with the requirements of section 501 of the 2012 Standard Specifications for Construction and applicable supplemental specifications and special provisions, and as specified herein. The HMA Approach bid item shall include paving of HMA Driveways and cross streets. Cross streets shall be constructed in two passes at the same cross-section as the mainline pavement, follow the procedures outlined in MDOT 501.03F4

B) Materials

The HMA leveling course, top course, and HMA Approach shall be HMA, 13A.

The leveling course shall have a yield of 220 pounds per square yard and the binder shall be PG 56-28

The top course shall have a yield of 165 pounds per square yard, an AWI of 260, minimum, and the binder shall be PG 58-28.

HMA Approach shall be 13A. Cross streets shall be constructed in two passes, have a yield of 385 pounds per square yard, and the binder shall be PG 58-28. Driveways shall be constructed in one pass, have a yield of 220 pounds per square yard, and the binder shall be PG 58-28.

The HMA Bond Coat material shall be per Section 501.03. The uniform rate of application shall be 0.05 - 0.15 gallons per square yard.

C) Measurement and Payment.

Measurement and Payment shall be at the contract unit price for the related items of work.

City of Mt. Pleasant

SPECIAL PROVISION
FOR

MACHINE GRADING, MODIFIED

City of MtPleasant

1 of 1

January 15

A) Description

This work shall consist of all excavation, including earth, necessary to shape the subgrade to the cross-sections shown on the plans for pavements, sidewalks, curbs, drive approaches, etc., within the right-of-way of the project. The work shall include proper disposal of excavated materials. This work shall also include all embankments necessary to shape areas behind curb and gutter, around all drives and sidewalks to grade to allow for placement of topsoil.

B) Materials

This work shall conform to the requirements of Section 205 of the Michigan Department of Transportation 2012 Standard Specifications for Construction of machine grading, earth excavation, embankment and density except as modified herein.

C) Measurement and Payment

Machine Grading, Modified will be measured by length in Stations along the street centerline and will be paid for at the contract unit price per Station, which price shall be payment in full for all labor, equipment and materials, including embankment, excavation and disposal of excavated material needed to accomplish this work, on both sides of the street and any adjacent side streets to the limits shown on the plans

Suitable excavated material as determined by the Engineer may be used as fill material behind proposed curb. Use of excavated material for fill material will be considered as included in the work of Machine Grading, Modified.

The completed work as measured for Machine Grading, Modified will be paid for at the contract unit price for the following contract item (pay item).

Contract Item (Pay Item)	Pay Unit
Machine Grading, Modified.....	Station

City of Mt. Pleasant
SPECIAL PROVISION
FOR
MAINTAINING TRAFFIC

City of MtPleasant

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January 15

A) Description

Traffic shall be maintained throughout the project according to sections 104.11 and 812 of the Michigan Department of Transportation 2012 Standard Specifications and as specified herein. The Contractor shall for the safety and protection of through and local traffic, furnish, erect, and maintain traffic control devices as shown on the plans and as directed by the Engineer. The Contractor shall remove the traffic control devices in a prompt, safe, and orderly manner upon completion of the work or when directed by the Engineer.

The Contractor shall maintain access to business and residential driveways at all times as described herein.

The Contractor shall notify the Engineer a minimum of 72 business hours prior to the implementation of any detours, street closures, or lane closures.

Traffic control elements, traffic control devices, barricade lighting, barricade spacing, taper lengths, etc., shall conform to the requirements of the 2005 edition of the Michigan Manual of Uniform Traffic Control Devices as amended, unless otherwise specified herein. This includes advance warning signs, barricades and channeling devices at intersecting streets, on which traffic is to be maintained.

The Contractor is required to contact all local and state police, fire, emergency services that have jurisdiction within the construction influence area a minimum of five (5) calendar days prior to the implementation of any lane closure or detours.

Changes and/or adjustments to the maintaining traffic plans and standards may be applied as determined by the Engineer.

1) Construction Influence Area (CIA)

The CIA shall include the right-of-way of the street where work is to take place from the beginning to the end of the construction signing and inclusive of all the construction signing on the intersecting streets & detours..

B) Materials

All traffic control devices and their usage shall conform to the 2005 edition of the Michigan Manual of Uniform Traffic Control Devices as amended, and as specified as herein.

Construction signing shall be required as shown in the Maintaining Traffic plan sheets.

Signs, barricades, and plastic drums shall be cleaned over the entire surface as required by the Engineer.

1) Temporary Signs

All signs must be approved by the Engineer prior to use.

All diamond-shaped warning signs shall be 48" x 48" mounted at a 7' minimum bottom height. Distances shown between construction warning, regulatory, and guide signs shown on the plans and typical are approximate and may require field adjustment, as directed by the Engineer. All temporary signs shall be constructed with legends and symbols flush to the sign's face and not extending beyond the sign borders or edges. Temporary warning, regulatory, and guide signs not required for a particular work Operation shall be removed, completely covered, or laid down with the legs off, as directed by the Engineer.

C) Construction

The contractor shall limit street excavation activities to 300 feet at a time. The contractor's backfill and aggregate base placement shall follow closely behind, such that no more than 300 feet of road shall be without existing pavement or a minimum of four (4) inches of compacted gravel on the sub-base.

D) Residential Access

Access to driveways for local residents and businesses shall be maintained and available for use. All driveways shall be open when the contractor is not working, including all evenings, nights, Sundays, and holidays except as approved in writing by the inspector and with written notifications to the residents/owners by the contractor.

Street Closures

Streets within 300 feet (one block) of construction operations may be closed only to through traffic. All other streets and intersections shall be open to all traffic and maintained in good driving condition by the contractor at all times. Intersections shall be open to cross street traffic except when construction work is in progress in those intersections. No more than one intersection may be closed at a time.

Residential Refuse and Recycling Collection

The city contractor for trash (refuse) is Republic Services/Allied Waste, 877-698-7274, and MMI Industries, 989-773-6918, for recycling. Collection begins at 7:30 a.m. The contractor shall schedule the work to allow and provide access for refuse and recycling contractors to provide their services to the residential properties. If the refuse and recycling contractors are unable to collect materials due to construction operations, then the construction contractor shall collect and deliver the refuse and recyclable material to a cross street for collection at no cost to the City. It is the responsibility of the construction contractor to contact the refuse and recycling contractors to coordinate operations.

E) Measurement and Payment

This work will be measured and paid as specified in section 403 & 802 of the Standard Specifications using the following contract items (pay items).

Contract Item (Pay Item)	Pay Unit
Barricade, Type III, High Intensity, Lighted, Furn.....	Each
Barricade, Type III, High Intensity, Lighted, Oper.....	Each
Minor Traf Devices.....	Lump Sum
Plastic Drum, High Intensity, Furn.....	Each
Plastic Drum, High Intensity, Oper.....	Each
Sign, Type B, Temp, Prismatic, Furn.....	Square Foot
Sign, Type B, Temp, Prismatic, Oper.....	Square Foot
Traffic Regulator Control.....	Lump Sum

City of Mt. Pleasant
SPECIAL PROVISION
FOR
PRECONSTRUCTION AUDIO VIDEO RECORDING

City of MtPleasant

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January 15

A) Description

The work covered under this special provision consists of furnishing all labor, materials and equipment to provide High Definition color video recording along the entire length of the project to serve as a record of "original" conditions.

B) Equipment

All audio-video taping equipment shall be supplied and operated by a professional firm actively engaged in pre-construction audio-video recording.

C) Inspection

1) Requirements

Prior to commencing any other work, a continuous color audio-video recording shall be made of the project.

i) Coverage Area

Shall include all above ground features located within the zone of construction influence. Of particular concern are any existing faults, fractures, defects or other imperfections exhibited by any above ground features.

2) Qualifications

The audio-video and photography shall be performed by a professional, qualified, established audio-video recording firm knowledgeable in construction practices which have a minimum of one year of experience in the implementation of established inspection procedures.

3) Acceptance of Recording

The City reserves the right to reject the audio-video recording because of poor quality, unintelligible audio, or uncontrolled pan or zoom. Any recording rejected by the City shall be re-recorded at no cost to the City. Under no circumstances shall construction begin until the City has received and accepted the audio-video recording.

4) Equipment

When conventional wheeled vehicles are used for recording, the distance from the camera lens to the ground shall not be less than twelve (12) feet to insure proper perspective. In some instances, audio-video coverage will be required in areas not accessible on conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance approved by the Engineer.

i) Audio-Video Recording Media

The audio-video recording provided shall be a color cassette utilizing the VHS format and shall be compatible with the City's tape player or in a DVD format.

ii) Camera(s)

A color video camera shall be used that shall have High Definition recording capability. The camera shall be a professional quality camera acceptable to the Engineer.

5) Execution

i) Audio

Each tape shall begin with the current date, project name, project number and municipality, and be followed by the general location; i.e. name of the street or location of "cross country" line, viewing side and direction of progress.

ii) Video

To preclude the possibility of tampering or editing in any manner, all video recordings shall, by electronic means, display continuously and simultaneously generated transparent digital information to include the date and time of recording, as well as the corresponding engineering stationing numbers. The date information will contain the month, day and year. For example, 3/16/01, and shall be placed directly below the time information. The time information shall consist of hours, minutes, and seconds, separated by colons. For example, 11:25:14. This transparent information shall appear on the extreme upper left-hand third of the screen.

(1) Engineering Station Numbers

Station numbers shall be continuous, accurate, correspond to the project stationing and include the standard engineering symbols (for example, 16+50). This information shall appear in the lower half of the viewing screen.

(2) Additional Information

Below the engineering stationing, periodic transparent alphanumeric information, consisting of the name of the project, name of the area covered, direction of travel, viewing side, etc., shall appear.

iii) Audio-Video Tracks

The audio-video recording shall consist of one (1) video and two (2) audio tracks, all of which shall be recorded simultaneously. All tracks shall consist of original, live recordings and, thus, shall not be copies of other audio or video recordings. Audio track 1 shall contain the narrative commentary of the camera operator, recorded simultaneously with his fixed elevation video record of the zone of influence of construction. Audio Track 2 shall contain the narrative commentary and evaluations of the ground level remote technician whose function shall be to provide a complete circumspection of any features not adequately visible to the camera operator and to describe in detail the extent of any damage encountered. In order to maintain viewer orientation, transition from fixed camera overview to remote camera picture shall be by means of an electronic dissolve.

iv) Lighting Requirements

All taping shall be done during times of good visibility. Auxiliary lighting may be required to fill in shadow areas and/or when recording inside a building. The lighting shall be sufficient to illuminate all details in the area. Lighting shall be required upon the request of the Engineer.

v) Recording Coverage

Recording coverage shall include all surface features located within the zone of influence of construction specified on the plans and supported by appropriate audio description. Audio description shall be made simultaneously with video coverage.

(1) Coverage

Video coverage shall include, but not be limited to, all existing driveways, sidewalks, curbs, ditches, streets (including condition of paving for full width), landscaping, trees, culverts, catch basins, manholes, headwalls, retaining walls, fences, visible utilities, and all buildings located within the zone of influence. Of particular concern are any existing faults, fractures, defects, or other imperfections exhibited by the above-mentioned surface features.

(2) Houses and Buildings

Structures shall be identified visually by house or building number, when possible, in such a manner that the progress of the tape and the proposed construction may be located by reference to the houses and buildings.

(3) General

Taping shall not be done during periods of visible precipitation or when more than 10% of the ground area is covered with snow, leaves, floodwaters or debris, unless otherwise authorized by the Engineer.

(4) Rate of Speed

The rate of speed in the general direction of travel of conveyance used during taping shall not exceed 48 feet per minute. Panning rates and zoom-in, zoom-out rates shall be controlled sufficiently such that the rates will produce clarity of the object viewed during playback of the tapes.

(5) Coverage Area

The Engineer shall have the authority to designate areas that may be omitted or added for audio-video coverage.

(6) Identification

(a) Tape Cassettes and Tape Cases

Cassettes and cases shall be properly identified by tape number, location and project name and municipality in a manner acceptable to the Engineer.

(b) Records

A record of the contents of each tape shall be supplied by a sheet identifying each segment of the tape by location; i.e. roll number, street or road viewing, tape counter number, viewing side, point starting from, traveling direction and ending destination point.

A) Measurement and Payment

The complete work as measured for Preconstruction Audio Video Taping will be paid for at the contract unit price for the following contract pay item and includes all material, equipment, and labor to complete the item.

Contract Item (Pay Item)	Pay Unit
Preconstruction Audio Video Recording.....	Lump Sum

City of Mt. Pleasant
SPECIAL PROVISION
FOR
RESTORATION, MODIFIED

City of MtPleasant

January 15

A) Description

This work shall include all labor, materials and equipment to clean up and restore public and private ground to a condition equal to or better than that which existed prior to construction. This includes removal and legal disposal of all construction debris, litter, and materials.

B) Materials

1) Topsoil

Black dirt or natural surface soil, high in organic material, free from stones, brush, debris, objectionable weeds, or other litter, and approved by the City Engineer prior to spreading. The engineer may perform a soil test prior to approval. Peat material is not acceptable.

2) Fertilizer

Fertilizer shall be commercial seed starting 20-10-10 grade supplied in the manufacturer's packaging with composition clearly marked. Bulk fertilizer may be used when certified delivery slips are furnished by the Contractor, meeting section 816 of the 2012 MDOT specifications.

3) Seed

Seed material and application shall meet section 816 of the 2012 MDOT specifications, using TUF seed mixture.

4) Mulch and Adhesive

Mulch and adhesives shall meet section 816 of the 2012 MDOT specifications, for wood fiber mulch. Paper mulch or straw are not acceptable.

C) Construction

1) Preparation of Seed Bed

i) Grading

Grades on areas to be seeded shall be maintained in a true and even condition. Where the grades are not defined, they shall be established by the Contractor to blend with existing adjacent grades without irregularities and shall provide for proper drainage.

ii) Placing Topsoil

Topsoil shall be evenly spread by blade graders, or other approved methods, to a minimum depth of four inches (4"). Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions where water will stand. Topsoil shall not be placed until the subgrade has been smoothly graded and compacted, and the engineer or inspector approves the subgrade in writing.

iii) Application of Fertilizer

Fertilizer shall meet the requirements of section 812 of the 2012 MDOT specifications for Class A fertilizer.

iv) Cleanup

After completion of the above operations, the surface shall be cleared of stones, roots, brush, wire, grade stakes, and other objects that might be a hindrance to maintenance operations.

2) Seeding

TUF seed mixture meeting requirements of section 816 of the 2012 MDOT specifications shall be used on all lawn areas and adjacent backslopes. No seeding shall be done until the Engineer has inspected the seed container and has given written approval of the topsoil. Seeding for erosion control measures shall be cereal rye seed.

3) Mulching

i) Straw and Hay Mulch

As part of the seeding and fertilizing operations, wood fiber mulch shall be spread over the surface as required in section 816 of the 2012 MDOT specifications. Paper mulch is not acceptable.

ii) Mulch Adhesive

Mulch shall be held in place by a spray coating of mulch adhesive. The Contractor shall protect all traffic, signs, structures, and other objects from being marked or disfigured by the adhesive material. Fire hydrants shall be covered prior to the placement of all sprayed materials. Adhesive material shall be applied uniformly at a rate of 400 gallons per acre, sprayed simultaneously with the mulch, or a surface application of adhesive sprayed immediately following mulching.

4) Establishment of Seeded Areas

The Contractor shall be responsible for the proper care of the seeded area during the period when the grass is becoming established, and shall be responsible for a total grass cover. The acceptance of the work will not be given until grass cover is established.

i) Watering

Seeded areas shall be watered whenever excessive drying is evident during the period set for establishment of the seeded area. The Contractor shall be responsible for the proper care of the seeded areas and for the establishment of a uniform stand of grass until final acceptance of the entire work covered by the Contract.

The City has established a program to encourage residents to water the newly seeded areas, to help establish the lawn. Residents will be given a credit on their water bill for watering the newly seeded areas.

ii) Weeds

After the grass has become established, if it appears to have more than ten percent (10%) weeds, the Contractor shall spray with an approved herbicide (weed killer).

D) Measurement and Payment

Restoration, Modified shall be paid for by the square station as measured along the project centerline and will include all work necessary to restore both sides of the street. The price paid shall be payment in full for all Restoration, Modified work.

Contract Item (Pay Item)	Pay Unit
Restoration, Modified.....	Station
Restoration, Modified.....	Linear Foot

City of Mt. Pleasant
SPECIAL PROVISION
FOR

SANITARY SEWER MATERIALS AND CONSTRUCTION

City of MtPleasant

1 of 10

January 15

A) Description

The Contractor shall furnish all labor, equipment, and materials to completely construct, test, and place in operation, the sanitary sewer system as shown on the Plans and specified herein.

B) Materials

1) Service Pipe

Six-inch (6") service pipe used for riser pipe and house leads shall be constructed of the following material:

PVC conforming to D-3034 with 0.180-inch wall thickness (SDR-35). Joints and couplings shall conform to ASTM D-3212. Pipe shall have a home mark, and shall not be blue in color.

2) Sewer Main Pipe

Unless otherwise specified on the Plans or Proposal form, the Contractor shall utilize the following materials, subject to Specifications and size limitations. Sewer pipe materials may be changed only at manholes.

- i) Eight-inch (8") diameter through fifteen-inch (15") diameter pipe - Shall be SDR 35 PVC sewer pipe meeting the requirements of ASTM D-3034.
- ii) Sixteen-inch (16") diameter pipe and larger - Shall be SDR 35 PVC pipe meeting the requirements of ASTM F-679.
- iii) Joints shall meet ASTM D-3212 push on type with seating mark. Service lead connections shall be made using standard wye fittings.

3) Manholes

(a) Pre-Cast Sections

Manholes shall be constructed of circular pre-cast concrete units with circular reinforcement and shall conform to the requirements of the current Specifications for Pre-Cast Reinforced Concrete Manhole Risers and Tops ASTM C-478.

Marking of the sections shall be done within six (6) days after manufacture. Certification from the manufacturer that the manholes supplied meet the required Specifications shall be provided to the Engineer by the Contractor.

Cone sections shall be the eccentric type with a minimum depth of 12".

Joints between sections shall be rubber O-ring gasket. Mastic sealing compound will not be accepted.

Manhole connections shall be made with an integrally cast seal system, such as "Kor-N-Seal", "Lock-Joint Flexible Manhole Sleeve", or an approved equal. Connections to existing manholes (without flexible coupling) with PVC pipe shall be made using a water stop cemented to the plastic pipe.

(b) Manhole Steps

Manhole steps shall be plastic-coated steel. They shall be placed sixteen-inches (16") apart unless otherwise shown and shall be cast in the manhole walls. It will not be acceptable to grout the steps in place after the manhole section is poured.

Plastic-coated steel steps shall consist of a 3/8-inch diameter deformed steel reinforcing rod covered with a copolymer polypropylene plastic. The steel rod shall be grade 60 and conform to the ASTM A-615. The plastic shall conform to ASTM 2146-68, Type II, Grade 49108.

Steps shall also conform to the following standards:

- (i) Michigan Department of Labor Occupational Safety Standards, Part 3, Rule 341.
- (ii) ASTM C-478.
- (iii) OSHA 1910.27 G

(c) Castings

Manhole frames and covers shall be EJIW 1040 or equal. The preferred casting shall be stamped with the City of Mt. Pleasant logo, available at East Jordan Iron Works. Castings shall have a minimum clear internal opening of 24 inches.

Top of casting shall be set as follows:

- (i) Flush with paved or grass surfaces.
- (ii) Four-inches (4") below gravel road surface with eight-inches (8") of adjustment.

(d) Cement Mortar

Mortar for block and brick work in manholes and other appurtenances shall be mixed in the proportion of one (1) part Portland cement to three (3) parts sand. Hydrated lime may be added in proportions not to exceed ten percent (10%) of the volume of the cement.

(e) Adjusting Rings

Casting adjustments shall be accomplished with pre-cast concrete grade rings conforming to ASTM C478. Rings shall have an ID not less than twenty-four-inches (24") nor greater than twenty-five inches (25"), a minimum thickness of two-inches (2"), and a minimum OD of forty-inches (40").

(f) Brick and Block

Fill-in around pipes shall be accomplished with bricks and/or blocks. Brick shall be concrete confirming to ASTM C-55, Grade N. Block shall be concrete conforming to ASTM C-139.

(g) Concrete

Concrete used in manhole construction shall be transit mixed with a twenty-eight (28) day compressive strength of 3,000 psi. The approximate proportions of the mix shall be one (1) part cement, two (2) parts fine aggregate, and three (3) parts coarse aggregate. The mix shall contain six (6) sacks of cement per cubic yard with a maximum allowable slump of three and one half-inches (3 1/2").

C) Construction

1) Sewer Main

Polyvinyl chloride (PVC) pipe shall be installed according to the UniBell Plastic Pipe Association Recommended Standards and Practices, and shall conform to ASTM D2321.

The installation, handling, and storage of all pipe shall be in accordance with manufacturer's recommendations. Pipe shall be protected at all times against impact, shocks, and free fall. Stockpiling of pipe at the job site shall be in such a location as to minimize handling.

Trenches for pipe shall be excavated so that there will be a minimum clearance of six-inches (6") on each side of the barrel of the pipe and a maximum width of trench at the level of the top of the pipe of not more than 16 inches greater than the OD of the pipe 30 inch ID or smaller and not more than 24 inches greater than the OD of pipe 33 inch ID or larger. There shall be, at all times, sufficient width to permit the pipe to be laid and to permit first-class construction methods to be used. Sufficient space shall be provided in the trench to permit the joint to be properly made.

The trench bottom shall be undercut a minimum of four-inches (4") below the final location of the pipe and the trench then filled with Class II sand or crushed stone compacted with hand tampers to provide a cushion for bedding the pipe. The bedding material shall be free of stone over 1 ½ inches in size.

The trench shall be dry during the pipe laying operation. Bell holes shall be excavated so that after placement, the barrel of the pipe will have full bearing on the trench bottom. The laying of pipe shall commence at the outlet and proceed upgrade with spigot ends pointing in the direction of flow.

All pipe shall be laid to the line and grade called for on the Plans utilizing an in-line laser beam system for vertical and horizontal control. Each pipe, as laid, shall be checked by the Contractor with a suitable target to insure that this result is obtained. Vertical elevation of the invert shall, at any point, be within plus or minus 0.04 foot (1/2-inch) of plan elevation. Horizontal alignment must meet the same tolerance.

Joints shall be made in accordance with the manufacturer's requirements. The socket of the pipe last laid shall be wiped clean and the spigot end of the pipe to be laid shall then be centered and pushed home to the stop mark. The pipe shall be centered so that they will form a sewer with a uniform invert.

After the pipe is laid, Class II sand, fine gravel or crushed stone shall be placed the entire width of the trench up to the spring line of the pipe. Backfill shall be carefully tamped under the haunches of the pipe. Care shall be taken during backfilling and tamping so that the line and grade of the pipe are not disturbed. After compacting, Class II sand, fine gravel or crushed shall be placed until the entire width of the trench is filled to not less than one foot (1') above the top of the pipe. The maximum stone size for backfill material within one foot (1') of the top of pipe shall be 1 ½ inches. If sand is used for backfill around and over the pipe, it shall be thoroughly compacted with a vibratory compactor; hand compaction will not be acceptable.

The remainder of the backfilling may be done with Class II sand backfill. All backfill is to be compacted in maximum one-foot (1') lifts to a density of ninety-five percent (95%) of the maximum unit weight as determined by the modified proctor and shall contain no debris, frozen material, organic material, etc., within two feet (2') of the top of the pipe. Unless crushed stone is used as backfill around the pipe, the use of a hoe pack will not be allowed for compaction.

Main sewer line stubs for future connections shall be furnished and placed by the Contractor according to details shown on the drawings and as directed by the Engineer. The end of the stub where future connections will be made shall be properly supported on crushed stone or concrete and braced when not resting on original ground so that any settlement will not disturb the connection. The end of the main sewer line stub shall be witnessed and marked in the manner described for sanitary sewer leads.

Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for form construction, backfill compaction, and other construction methods to be followed, wherever necessary.

In case soft material is encountered in the bottom of a sewer trench or underneath a drainage structure which, in the opinion of the Engineer, is not suitable for supporting the pipe, the Engineer may order the removal of this soft material and its replacement with crushed stone, concrete or other material in order to make a suitable foundation for the construction of the sewer structure.

Where the construction is on or along the line of an existing sewer, the Contractor shall maintain sanitary sewer services by means of bypass pumping or other methods approved by the Owner.

The pumps, when used, shall be large enough to handle the peak daily flow of the pipe which is being bypassed. If flow exceeds the pump capacity, the plugs shall be pulled allowing the flow to pass through the downstream sewer. When plugs are used to control flow or for pumping, they shall be of the pneumatic type to allow for quick release without entering the manhole.

If sand bags are used to block a downstream pipe in a manhole, each bag shall be tied off with a rope to allow removal of the sand bag without entering the manhole.

Flow control shall be monitored so that surcharging of sewers, flooding of private or public property (including basements) does not occur. Any damage caused by the control of flow shall be the Contractor's responsibility to repair, correct or indemnify.

Smaller sewers with low flow, which must be temporarily blocked, shall use the bypass pumping procedure or temporary fluming to maintain flow.

The Contractor shall be responsible for any damage that may result from failure to maintain sewer flow.

2) Service Leads

i) Riser Pipe

Where shown on the Plans or where directed by the Engineer, the Contractor shall put in six-inch (6") pipe risers extending from the branch connection in the sewer up to within eleven-feet (11') of the ground surface or to a depth adequate to serve the house lead elevation shown at the property line. These pipes shall be laid up with a joint as specified, and the top pipe shall be closed with a stopper. All risers shall be laid up and held securely in place and the backfill shall be carefully placed around them so as not to disturb them. One-inch (1") crushed stone, six-inches (6") thick shall be placed under and around the "Y" branch and over it to a height of six-inches (6") above the sewer to furnish an adequate support to the riser pipe.

The top of each riser pipe shall be measured and recorded by the Contractor in the same manner as specified for measuring and marking stub connections.

ii) Sewer Leads

Sewer leads shall be installed at the locations and elevations shown on the Plans or as directed by the Engineer. Before sewer leads are installed, the Contractor shall confirm the exact location with the property owner, if property is occupied. On vacant lots, the sewer leads will generally be located at approximately the mid-point of the front lot line, unless the owner requests another location. The sewer leads shall connect to the six-inch (6") wye or six-inch (6") riser and generally extend to the street right-of-way line. All sewer leads that do not have other pipe connected to them immediately shall be fitted with suitable stoppers and braced for pressure tests.

In order to properly mark the location of every wye, riser, clean out, and sewer lead, the Contractor shall make accurate measurements of each installation before the sewer lead is backfilled. The measurements shall indicate the distance from each wye to the center of the downstream manhole. The measurement of risers, clean outs, and sewer leads shall indicate the distance from the main line sewer and to two (2) fixed reference points, i.e. fire hydrants, manholes, building corners.

The Contractor shall furnish the Engineer with a copy of these measurements immediately upon the completion of each street.

In addition to measurements, the Contractor shall furnish and place a treated two inch by four inch (2" x 4") marking stick at each lead of such length that it will reach from the lead to within six-inches (6") of the ground surface. Each marker shall be set in a vertical position and held vertical while backfilling the trench. Two (2) 16-penny common nails shall be driven into the top of each two inch by four inch (2" x 4") marking stick so the sewer lead location may be found with a magnetic locator.

iii) Tapping Existing Mains

Where existing main sewer lines are to be tapped, the Contractor shall use a pre-formed saddle approved by the Engineer. A hole shall be cored to the proper size in the main line and all rough edges smoothed to prevent obstructions. Tap shall be horizontal to forty-five (45) degrees above horizontal. No vertical taps are allowed. The exterior of the main line pipe shall be thoroughly cleaned in order to provide a prepared surface for gluing the saddle onto the main line. The Contractor shall clean the main line of all debris, which may enter during his tapping operation. The Contractor shall insure that the sewer lead does not protrude into the main.

The Contractor shall notify the Engineer prior to making any connection to the main line and shall not backfill the connection prior to approval of the Engineer. If the pipe becomes covered with water or backfill material, the Contractor shall remove the water or material to facilitate the inspection.

3) Manholes

Sanitary sewer manholes are to be constructed as shown on the detailed drawings. Pre-cast concrete manholes sections shall be installed in a plumb position.

All masonry items shall be clean and shall be thoroughly wetted by immersion, when practical to do so, just before laying. If immersion is impractical, masonry items shall be thoroughly sprinkled before lying.

All items shall be laid in a full bed of mortar, without subsequent grouting, flushing or filling and shall be thoroughly bonded. Interior joints shall not be more than 1/4-inch in width. Whole brick and block only shall be used, except to effect closures.

Mortars mixed by hand shall be prepared in a suitable clean watertight box. The ingredients, except water, shall first be thoroughly mixed dry until of uniform color; then water shall be added and the mixing continued until proper consistency and uniform texture is produced.

No re-tempered mortar or mortar that has been mixed for more than thirty (30) minutes shall be used in the work. No cement mortar shall be mixed when temperature is below thirty (30) degrees Fahrenheit without properly heating the sand and water.

All manholes shall be finished so that all visible leakage is repaired. The interior and exterior joints between manhole sections and adjusting rings shall be plastered with at least one-half-inch (1/2") thick mortar. All plastered areas shall have a brushed finish. All lift holes shall be mortared and finished. The bottom of the manhole, the flow line of the sewer, and the steps shall be clean of all mortar, concrete, dirt and other debris.

The flow channels shall be constructed with a minimum depth of 80 percent of the pipe diameter. The flow channel and manhole bottom shall be sloped to prevent accumulation of sewage and shall have a brushed finish.

No sanitary sewer leads shall be connected to a sanitary manhole. Sanitary sewer leads shall connect to the main sewer line. Backfill materials around manholes shall meet the same requirements as trench backfill for pipe that is installed under and within the zone of influence of pavement.

Where shown on the Plans, new sewers shall be connected into existing manholes. In such cases, new channels shall be constructed using 3,000 psi concrete. Where required, existing manholes shall be demolished. This work shall be included in other items of the project.

D) CLEANING AND TESTING SANITARY SEWERS

1) Cleaning

Before the sewer may be tested, the Contractor shall clean the sewers using a hydraulic system consisting of a high-pressure pump feeding water to a nozzle, which directs the water against the walls, and flow line of the pipe, dislodging the debris and flushing it toward a manhole. All debris shall be removed at the nearest downstream manhole.

2) Testing

The Contractor shall furnish all equipment and personnel to conduct an acceptance test using low-pressure air. The test shall be conducted under the supervision of the Engineer.

All stubs, sewer leads and risers shall be installed completely and securely plugged with suitable stoppers that will withstand the internal test pressures. The section of line being tested shall also be securely plugged at each manhole. All stoppers shall be adequately braced.

Low-pressure air test of installed PVC pipe shall be in accordance with the most recent Recommended Practice (Uni-B-6-79) of the UniBell Plastic Pipe Association, as well as ASTM F1417.

The completed installation of PVC sewers shall at no point have out-of-round pipe deflections greater than five percent (5%). The contractor shall provide "go-no-go" test mandrels to test the deflection of the PVC pipe. The test shall be conducted not less than at least thirty (30) days after pipe installation. Testing shall be performed by the Contractor under the supervision of the Engineer.

3) Infiltration

The maximum allowable infiltration shall not exceed 100 gallons per day per inch diameter per mile.

4) Connections

If the sewer installation fails to meet these requirements, the Contractor shall determine the source or sources of the leakage and all defective materials or workmanship shall be repaired or replaced. The completed sewer installation shall meet the requirement of the test.

E) Measurement and Payment

1) Sewer (San), __", Modified

i) Description

The work of Sewer (San), __", Modified, shall consist of excavation, removal and disposal of existing sewer pipe, furnishing and placing SDR 35 plastic sewer pipe and cap, and trench backfill, in accordance with section 402 of the 2012 MDOT Standard Specifications for Construction, MDOT Standard Plan R-83-B, and special details within the construction plans, except as modified.

ii) Method of Measurement and Basis of Payment

Sewer (San), __", Modified, will be measured in place by length in feet and will be paid for at the contract unit price which price shall be payment in full for any fittings, couplers, cap, sheeting or shoring trench walls, backfill as required and all labor, material and equipment needed to accomplish this work. Removal of existing sewer less than 12 inches in diameter will not be paid for separately, but will be included in the pay item for construction Sewer (San), __", Modified

2) Dr Structure (San), __ inch dia,

i) Description

Dr Structure (San), __ inch dia, shall consist of excavation, the furnishing and placing of pre-cast sections, concrete work, drop pipes, connection of existing and new pipes, and backfilling, in accordance with section 403 of the 2012 MDOT Standard Specifications for Construction and special details within the construction plans.

ii) Method of Measurement and Basis of Payment

Dr Structure (San), __ inch dia, will be measured and paid for by the unit each shall be payment in full for all labor, material and equipment needed to accomplish this work. This work shall include but is not limited to: excavation, backfill, concrete, reinforcing steel, waterstops, temporary sewer supports, removing portion of sewer, connecting existing and proposed sewers, construction of a manhole riser, boots, drop inlets (if required), grade rings, concrete bench and flow channel.

3) Dr Structure, Tap, __ inch

i) Description

Dr Structure, Tap, __ inch, shall consist of coring the Dr Structure at the correct elevation, location, and size utilizing a coring machine. This work shall include using a water stop, stopping all leaks and removing and reconstructing the existing flow channel, as directed by the Engineer.

ii) Method of Measurement and Basis of Payment

Dr Structure, Tap, __ inch, will be measured and paid for by the unit each shall be payment in full for all labor, material and equipment needed to accomplish this work.

Contract Item (Pay Item) Pay Unit

Sewer (San), __ inch, Modified.....	Each
Dr Structure (San), __ inch, Modified.....	Each
Dr Structure Tap (San), __ inch, Modified.....	Each

City of Mt. Pleasant
SPECIAL PROVISION
FOR
UNDERDRAIN, SUBGRADE, OPEN-GRADED, 4 INCH, MODIFIED

City of MtPleasant

1 of 1

January 15

A) Description

This work consists of constructing and installing underdrains.

B) Materials

MDOT 34G aggregate or approved 1/2" crushed aggregate
4-inch geotextile-wrapped perforated plastic pipe

C) Construction

This work shall be done in accordance with the requirements of Section 404.03 of the MDOT 2012 Standard Specifications for Construction with the follow exceptions:

- 1) Backfill from trench bottom to 2 inches above shall be MDOT 34G or approved 1/2" crushed aggregate.
- 2) The remaining trench shall be backfilled with class II sand compacted, by means of a vibratory compactor, to at least 95% of its maximum density.
- 3) Underdrain pipe will be geotextile-wrapped; backfill material will not be wrapped.
- 4) Unless otherwise specified on the plans, underdrain pipe shall be placed at an elevation such that the bottom of the pipe is at an elevation 4 feet below the top of curb elevation.

D) Measurement and Payment

This work will be measured and paid as specified in section 404.04 of the MDOT 2012 Standard Specifications with the following exception. The unit price for Underdrain, Subgrade, Open-Graded, 4 inch, Modified shall include the following:

- 1) The cost of providing the pipe and fittings with a geotextile wrap
- 2) Not the cost of providing and lining the trench with geotextile.
- 3) The cost of connecting the downstream end of the underdrain pipe to either a drainage structure or an existing underdrain pipe.

Contract Item (Pay Item)

Pay Unit

Underdrain, Subgrade, Open-Graded, 4 inch, Modified..... Foot

City of Mt. Pleasant

SPECIAL PROVISION
FOR

WATER SYSTEM MATERIALS AND CONSTRUCTION

City of MtPleasant

1 of 16

January 15

A) Description

The Contractor shall furnish all labor, equipment, and materials to completely construct, test, and place in operation, the water system as shown on the drawings and specified herein.

B) Materials

1) Water Main Pipe

i) Ductile Iron Pipe

Ductile iron pipe shall meet the requirements of ANSI/AWWA C151/A21.51. Where these specifications differ with ANSI/AWWA C151/A21.51 these specifications will prevail.

Cement Mortar Lining - Cement mortar lining of pipe shall conform to ANSI/AWWA C104/A21.4. Care shall be taken to insure that no mortar remains in the joint surface of the bell. If mortar is found in the joint surface or lining, of greater thickness than allowed, the pipe will be returned.

Length of Pipe - The minimum nominal laying length of the pipe shall be eighteen feet (18'). A maximum of twenty percent (20%) of the total number of each size of an order may be furnished as much as twenty-four inches (24") shorter than the nominal laying length; an additional ten percent (10%) may be furnished as much as six inches (6") shorter than nominal laying length.

Pipe Thickness - Ductile iron pipe shall have a wall metal thickness as follows:

6-inch pipe	0.31 inch (Class 52)
8-inch pipe	0.33 inch (Class 52)
12-inch pipe	0.37 inch (Class 52)
16-inch pipe	0.37 inch (Class 51)
20-inch pipe	0.39 inch (Class 51)

Tolerances will be as allowed in ANSI/AWWA C151/A21.51. Pipe sizes not listed above will not be approved for use as main lines in the City water system.

Coating - The inside and outside of the pipe shall be coated with a bituminous coating of either coal-tar or asphalt base one mil. thick.

Independent Tests - The supplier shall furnish reports of all tests and inspections as required in the ANSI/AWWA C151/A21.51.

ii) Polyvinyl Chloride Pipe (PVC)

Polyvinyl chloride pipe (PVC) shall be of a class and designation as shown on the proposal, Plans and/or special conditions, with a SDR of 18 to 13.5 and compound designation Class No. 12454A, ASTM D-1784. PVC pipe shall be in accordance with current AWWA Standard C-900, meet the ANSI/NSF standard 14, and be blue in color. PVC pipe sizes six to twelve inches (6" - 12") in diameter shall be Class 150, and pipe sizes greater than twelve inches (12") shall be Class 200.

A single strand of 12 gauge insulated copper wire, blue in color, shall be buried in the trench twelve inches (12") above the PVC pipe. Solder all wire splices and wrap with "Scotch 2200 Vinyl Mastic Pads". The tracer wire shall be connected to each hydrant at a bolt on the bottom of the hydrant barrel by use of a soldered connection, a crimped U-shaped connection, or a ring lug.

iii) Restrained Joint PVC Pipe (RJPVC)

Restrained Joint PVC Pipe (RJPVC) shall use a Certa-Lok™ or approved equal joint restraint system. RJPVC shall meet the above requirements for Polyvinyl Chloride Pipe except that it shall be Class 235.

iv) Water Services

Allowable sizes are one inch, two inch, four inch (1", 2", 4"), or as specified for mains. Service saddles are required at each service connection on water main.

Material for four inch (4") shall be ductile iron or polyvinyl chloride, as specified for mains. Material for one inch (1") and two (2") shall be one of the following:

(1) Type K annealed seamless copper tubing conforming to ASTM B-88.

(2) One inch (1") shall be copper tube size, polyethylene (PE) water service pipe meeting AWWA C901 specifications. Markings on the pipe shall be AWWA C901, PE 3406, ASTM D-2737, dimension ratio SDR-9 brand name, date of manufacture, nominal size, sizing type (i.e., copper tube Size (CTS)), pressure rating 160 PSI at 73 1/2°F temperature, seal or (mark) of accuracy.

- (3) Two inch (2") shall be copper tube size, polyethylene (PE) water service pipe meeting AWWA C901 specifications. Markings on the pipe shall be AWWA C901, PE 3406, ASTM D-2737, dimension ratio 7, brand name, date of manufacture, nominal size, sizing type (i.e., copper tube size (CTS), pressure rating 200 PSI at 73 1/2°F temperature, seal or (mark) of accuracy.
- v) Joints
 - (1) Cast and Ductile Iron Pipe
 - (a) Mechanical - ANSI A21.11 or AWWA C111 with rubber gaskets.
 - (b) Push-on - ANSI A21.11 or AWWA C111 with thermite welded sockets and cable.
- vi) Fittings
 - (1) Cast Iron or Ductile Iron ANSI A21.10 or AWWA C110 or C153, 250 psi working pressure through twelve inches (12") and 150 psi above. Cutting-in sleeves, Clow Corporation #F 1220 or Traverse City Iron Works #A 847 M.
 - (2) All fittings are to be mechanical joint, including bends, tees, valves, hydrants. All fittings on new water main shall be Mega Lug fittings.
- vii) Valves
 - (1) Gate - AWWA C509, full resilient wedge, non-rising stem, mechanical joint, fully bronze mounted with roller and gear operator. Waterous Series 500 or Clow RW Valve or equal. Turn counter-clockwise to open.
 - (2) Butterfly - AWWA C504, Class 150-B, cast iron short body, cast iron disc, mechanical joint, worm gear traveling nut operator for direct burial allowed only for valves larger than sixteen inches (16"). Turn counterclockwise to open.
 - (3) Boxes - Three section cast iron with lid marked "WATER":
 - (a) Upper Section - Screw on adjoining center section and full diameter throughout.
 - (b) Center Section - Minimum five inch (5") inside diameter.
 - (c) Base Section - Fit over valve bonnet and shaped round for valves through ten inches (10") and oval for twelve inches (12") and over.

(4) Hydrants

- (a) Style - Break-away traffic model by East Jordan Iron Works, Model 5 – BR. AWWA C502, open clockwise.
- (b) Size - Hydrant with eight inch (8") I.D. barrel.
- (c) Inlet – six inch (6") diameter mechanical joint.
- (d) Drain - Tapped and plugged with brass plug.
- (e) Nozzles - National Standard Thread
 - (i) Two (2) 2-1/2 inch hose nozzles.
 - (ii) One (1) 4-1/2 inch pumper nozzle.
- (f) Operating nut and nozzle cap nuts to be 1-3/4 inch square.
- (g) Burial - six feet (6') minimum or as directed on the Plans or by the Engineer. The Contractor is to verify needed fire hydrant length to provide for 22 inch port height above the ground.
- (h) Conforming to City standards.

(5) Service Fittings

- (a) Unions will not be allowed between corporation stop and the curb stop. New services and the repair of existing services shall be made so that there will be a continuous, unbroken pipe between the corporation stop and the curb stop.
- (b) Service Saddles - Double-strap bronze or brass parts, AWWA CC threads. For PVC C900 pipe, use Ford S90 or approved equivalent.
- (c) Brass Corporation Stops [With CC (AWWA) threads]
 - (i) Ford - one inch (1") F600; Mueller – one inch (1") H15000 or approved equivalent.
 - (ii) Polyethylene Pipe - Use above specified corporations with adapter. Ford C 06-44.
 - (iii) For two inch (2") Services - Ford FB 1000, Mueller P-25008

- (d) Brass Curb Stops – two inch (2") Minneapolis pattern required.
 - (i) Ford Z22-333M, Z22-444M, Z44-777M, Mueller P25155 or approved equivalent. Polyethylene pipe will require a Ford C 06-44 adapter or equal.
- (e) Curb Stop Boxes - six feet (6') burial – two inch (2") Minneapolis tapped base with 1-1/4 inch upper section riser with pentagon brass nut in cap. Mueller H10300, Ford type PL or approved equivalent.

(6) Miscellaneous

- (a) Stainless Steel Tie Rods and Clamps - Clow Corp. or Traverse City Iron Works.
- (b) Plastic Seamless Encasement Tubing
 - (i) Material - ASTM D-1248 Polyethylene, Type III, Class C, eight (8) mils thick.
 - (ii) Closing Tape – two inches (2") wide Poly-Ken #900 or Scotchwrap #50.
- (c) Tapping Sleeves
 - (i) The tapping sleeve shall be a Ford Tapping sleeve, style FAST, with a stainless steel flange and rubber coat.
 - (ii) Stainless steel tapping sleeve shall not be allowed on water mains larger than 16 inches.
 - (iii) Full circle mechanical joint cast iron shall be required on water mains larger than 16 inches.
 - (iv) All tapping sleeves must be pressure tested to 150 psi before main is tapped.

(7) Shop Drawings and Material Inspection

- (a) The Contractor shall have the City Water Department Superintendent review shop drawings and all materials to be used on the City water system prior to installation.

C) Construction

1) Water Main

The installation, handling, and storage of all pipe and appurtenances shall be according to manufacturer's recommendations. Pipe shall, at all times, be protected against impact shocks and free fall. Stockpiling of pipe and appurtenances at the site shall be in such a location as to minimize handling and prevent collecting or submergence with water.

The depth of trench shall be such that the top of the pipe to be placed therein shall not be less than six feet (6') or more than seven feet (7') below the proposed finish grade. The depth shall be increased or decreased, if so shown on the Plans or so ordered by the Engineer. Depths shall be noted on the "As Built" Plans and Daily Inspection Reports. The trench shall be of such width as will readily permit the laying, handling and assembling of the pipes in the trench and to allow thorough filling and compacting of the earth backfill, adjacent to the lower half of the pipe. All hub holes shall be excavated to an extra width and depth to allow for proper examining of the pipe and shall provide a solid bearing for the pipe, practically its full length without refilling before the pipe is laid. Blocking of the pipe will not be allowed.

The trench bottom shall be undercut three to four-inches (3"-4") below the final location of the pipe and the trench then filled with Class II sand or crushed stone compacted with hand tampers to provide a cushion for bedding the pipe. The Contractor shall provide the sand or crushed stone from off the site, except when the trench passes through well-defined strata of sand or gravel.

Trenches for pipe shall be excavated so that there will be a minimum clearance of six inches (6") on each side of the barrel of the pipe and a maximum width of trench at the level of the top of the pipe, of not more than 16 inches greater than the OD of the pipe.

There shall be, at all times, a sufficient width to permit the pipe to be laid and to permit first-class construction methods to be used. Sufficient space shall be provided in the trench to permit the joint to be properly made.

Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for placement and for other construction methods to be followed, wherever necessary.

In case soft material is encountered in the bottom of a trench or underneath a special structure, which, in the opinion of the Engineer, is not suitable for supporting the pipe or structure, the Engineer may order the removal of this soft material and its replacement with crushed stone, concrete or other material in order to make a suitable foundation for the construction of the pipe or structure.

After the pipe is laid, Class II sand, fine gravel or crushed stone shall be placed the entire width of the trench up to the spring line of the pipe. Backfill shall be carefully tamped under the haunches of the pipe. Additional sand, gravel or stone shall then be placed until the entire width of the trench is filled to not less than one foot (1') above the top of the pipe. Sand used for backfill around and over the pipe shall be thoroughly compacted with a vibratory compactor; hand compaction will not be acceptable.

The remainder of the backfilling may be done with acceptable material. All backfill, including pipe bedding, is to be compacted in maximum one-foot (1') lifts to a density of 95 percent of the maximum unit weight as determined by the modified proctor.

After the trench has been excavated as required, the pipe, fittings, valves and hydrants shall, after first being thoroughly inspected and the joints cleaned, be placed in the trench. All pipe fittings, and valves that will not be chlorinated with the new water main, shall be swabbed inside with five percent (5%) bleach (Sodium Hypochlorite) full strength before assembly and placement into the system. All pipe, fittings, valves and hydrants shall be carefully placed into the trench in such a manner as to prevent damage to them. Under no circumstances shall water main materials be dropped or dumped into the trench.

All lumps, blisters, and excess tar coating shall be removed from the bell and spigot ends of all ductile iron pipe and fittings. The outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean before the pipe is laid.

Any damage to the exterior coating of the pipe shall be repaired with an approved coating before the pipe is laid. After placing a length of pipe in the trench, the spigot end shall be lubricated and then entered into the bell and the pipe pushed to the stop mark and brought to correct line and grade. Lubricants recommended by the pipe manufacturer and approved for use on a potable water system shall be applied as recommended. Due care should be used to seat the gasket evenly in the bell at all points.

The plain end of the slip type joint is furnished with a slight taper to ease its sliding fit with the gasket when the joint is made up. When necessary to cut pipe in the field, the outside of the cut end should be tapered by filing or grinding back about 1/8-inch at an angle of about 30 degrees with the centerline of the pipe.

Cutting pipe for inserting valves, fittings, etc., shall be performed in a neat workmanlike manner, without damage to the pipe or lining, and so as to leave a smooth end at right angles to the axis of the pipe.

Ductile Iron - Cutting shall be performed with a roller or shear type cutter for pipe sizes up to 20 inches in diameter. When machine cutting is not available for cutting pipe twenty 20 inches in diameter, or larger, electric arc cutting method will be permitted, using a carbon or steel rod. Only qualified, experienced workmen shall be used for this.

Asbestos-Cement or PVC Pipe - Cutting the pipe shall be performed by hand saw, abrasive discs or with a special asbestos-cement or PVC pipe cutting tool. All piping cutting tools must be of the true cutting variety. Under no circumstances is the pipe to be cut with a roller or shear type cutting tool.

If the trench contains any water, the open ends of the pipe shall be plugged with a water tight plug. A plug shall be used during any breaks in construction to prevent any possible contamination.

Whenever it is desirable to deflect the pipe in order to form a long-radius curve or to avoid obstructions, the pipe may be deflected within the tolerances recommended by the manufacturer and approved by the Engineer. No deflections in excess of those recommended by the manufacturer shall be allowed except by utilization of standard fittings as specified herein.

i) Valve and Hydrant Operation

No valves or fire hydrants on the existing system or new system, after it is in operation within the City system, shall be operated for any purpose by the Contractor without prior permission of the City Water Superintendent. Any unauthorized operation of said valves or fire hydrants shall result in a three hundred dollar (\$300.00) fine per incident.

ii) Notification Procedure for Scheduled Water main Shutdown

A 48 hour notification is required to the Water Department and to critical users, as identified below, all others require a 24 hour notification. Notification must be in writing stating the time of shutdown and length of time water is to be off. It shall be the responsibility of the Contractor to notify, in writing, all persons affected by any shutoff in accordance with the notification procedures.

Critical users are Central Michigan University, restaurants, beauty shops, hospitals, medical care facilities, nursing homes, schools, and commercial laundries.

iii) Shutdown of Water Mains

Water mains shall not be shutdown on Mondays, Saturdays, Sundays, or holidays, and/or one (1) day on either side of the holiday unless approved in advance by the Director of Public Works or Water Superintendent. From Tuesday through Friday, water mains shall be shutdown after 9:00 a.m. and are to be placed back into service before 4:30 p.m., after notification specified in the preceding paragraph. Notification must also be given to the City Water Superintendent and the Fire Department. The City has a water main shutdown procedure and checklist which are part of this specification by reference.

2) Valve Manholes

Valves twenty 20 inches or larger shall be installed in a valve manhole. All air release valves shall be in manholes. Details and materials of construction shall be as shown on the Plans and as specified for sanitary sewer manholes. The cover shall have "WATER" cast in the top.

3) Setting Valves and Boxes

All valves shall be set at a depth to the top of pipe, from a minimum of six feet (6') to a maximum of seven feet (7') below finished grade, with the stem in a vertical position and shall be plumb. The valve box shall be set so that it will not transmit shock or stress to the valve. It shall be centered over the stem nut of the valve and shall be true and plumb. The box shall be adjusted so that the cover is flush with the finished ground surface or as directed by the Engineer. Unless otherwise specified, a valve box shall be provided for every valve.

4) Setting Fire Hydrants

Fire hydrants shall be located as shown on the Plans, or as directed by the Engineer. All hydrants shall be set plumb and to a grade which will place center of the pumper nozzle above finished grade, (E.J.I.W. 22" above finished grade), unless otherwise directed by the Engineer. At no time shall the breakaway flange be below finished grade. Sufficient barrel extensions shall be furnished and installed by the Contractor to meet this requirement. Barrel extensions shall be installed such that the breakaway flange is located at finished grade level. Barrel extensions, if needed, shall be incidental to construction.

Each hydrant shall be connected to the main by a six inch (6") branch. A six inch (6") resilient wedge gate valve with box shall be installed with a valve depth of six feet (6') minimum to seven (7') feet maximum from finished grade to top of pipe, in each hydrant connection. The hydrant and valve shall be connected to the main line tee, as shown in the City standard detail, and the steamer port on the hydrant shall face the roadside.

5) Blocking

All bends, stub ends, plugs and any other portion of the system, which may be subject to separation of joints because of water pressure, shall be securely braced or blocked. Blocking shall be concrete blocks or concrete poured in place and shall be so placed as to prevent any movement of pipe or fitting joints due to water pressure. Shape of blocks shall be in accordance with the details shown on the Plans and within the following sizes:

Bearing Area in Square Feet Against Trench Wall in Sand

Pipe Size	Tees Plugs	Hydrants 90 deg. Els	45 deg. Els	22-1/2 deg. Els	11-1/4 deg. Els
4"	2		2	1	1
6"	3		3	2	1
8"	4		6	3	1
10"	7		9	5	2
12"	9		11	6	2
14"	11		15	8	3
16"	13		20	10	3
18"	16		25	12	4
20"	20		28	14	4
24"	28		40	20	6

OTHER SOIL CONDITIONS:

Cemented Sand or Hardpan	Multiply above by 0.5
Gravel	Multiply above by 0.7
Hard Dry Clay	Multiply above by 0.7
Soft Clay	Multiply above by 2.0

Muck - secure all fittings with tie rod clamps with concrete reaction backing, the same as listed for sand conditions.

6) Water Service Connection

- i) Water service connections shall not be made prior to the water main passing the bacteriological tests.
- ii) Water service materials must meet City specifications and be one inch (1") in size, unless specified otherwise.
- iii) Each service will consist of a saddle, corporation, piping, curb stop, and curb box.
- iv) Depth shall be a minimum of six feet (6') and a maximum of seven feet (7') of cover to the finished grade of the project or development.
- v) Curb boxes shall be adjusted to finished grade.
- vi) Curb boxes shall be fully screwed onto the curb stop valve.
- vii) Pipe must be beveled and lubricated with an approved lubricant for use on potable water systems.
- viii) Curb stops are to be installed so that the key top is parallel to curb, or proposed curb, when in the off position. (i.e. Flow is to be perpendicular to curb.) Curb boxes installed in concrete or bituminous areas shall be separated from the concrete or bituminous by the use of a length of four inches (4") PVC pipe.
- ix) The Contractor will check to see if existing curb stop is in the on or off position and leave new curb stop in same position. No curb stop valve will be turned on unless there is someone in the building to ensure there are no leaks
- x) Water services, if extended past the curb stop, shall be extended straight for a minimum of six feet (6') or past the right-of-way line perpendicular to the curb or proposed curblines.
- xi) Services are to be flushed prior to backfilling.
- xii) Taps are to be on the service side of the main.
- xiii) Taps shall be horizontal to five degrees above horizontal.
- xiv) Taps shall not be made within 24 inches of any corporation stop, valve, bend, tee, or joint.
- xv) Cookies must be given to the inspector at the time of tap.

7) Water Service Reconnections

- i) The City Water Department shall be notified of any iron pipe or lead pipe water services in use (pressurized).
- ii) Except for iron or lead pipes, all reconnections shall be of the same materials as the existing service and use brass fittings.
- iii) Where iron pipe or lead pipe water services are encountered, a new one inch (1") water service connection shall be constructed, in accordance with Sec. 8.03F, Water Service Connection above.
- iv) Reconnection shall include service saddle, corporation, and piping meeting City specifications.
- v) Taps shall be on the service side of the main.
- vi) Taps shall be horizontal to 5 degrees above horizontal. .
- vii) After reconnection is made and before the service line is pressurized, the water meter shall be removed, the line flushed, and the meter reinstalled. Any stopped water meters caused by reconnection will be charged to the Contractor on a time and material basis for repair and re-installation.

8) Live Taps

All service taps shall be made live taps, including chlorination and testing taps.

D) Testing and Sterilization

1) Pressure Testing

The Contractor shall furnish equipment for the test, and the test shall be run by him under the direction of the Engineer. The test shall be made at 150 pounds per square inch hydrostatic pressure, and shall be maintained for at least two (2) hours and the leakage shall not exceed 10.45 gallons per day, per inch diameter, per mile of pipe. The City will provide a certified gauge for the test. The Contractor shall furnish all labor and all additional equipment to make the test.

All valves shall be opened such that all air in the line can be removed upon filling with water. The Contractor shall install any corporation stops necessary to allow the air to be expelled. The main shall be filled at a velocity no greater than 1 foot per second. Flushing at a minimum velocity of 3 feet per second shall be preformed prior to starting any pressure testing.

The Contractor shall run a preliminary test to determine that all air has been expelled and to check for any leakage. If any leakage should exist, the Contractor shall make the necessary repairs and perform the preliminary testing until satisfactory results are obtained. The final test shall be made in the presence of the Engineer or Water Superintendent. If the test to be witnessed by the Engineer or Water Superintendent fails, the Contractor will be billed \$75.00 per hour with a \$150.00 minimum for the additional testing. The City will provide a certified gauge for the pressure test. The Contractor shall provide any additional equipment necessary to add and measure the water necessary to maintain the hydrostatic pressure within five pounds per square inch (5 psi) of the required test pressure for the duration of the test. If the City's gauge becomes damaged while in the Contractor's possession, the Contractor will be charged for the repair/replacement of the gauge.

When the testing period is complete, the Contractor shall add and measure the water to bring the final pressure reading to the initial pressure reading. The total gallons added during the duration of the test shall not exceed the allowable leakage.

2) Sterilization

Before the mains are chlorinated, they shall be thoroughly flushed. All mains shall be chlorinated for a period of twenty-four (24) hours. The Contractor shall furnish all necessary equipment and materials and the work shall be done under the direction of the City Engineer in accordance with all local and state health department regulations. Chlorine shall be added in sufficient quantity to give a 50 PPM residual of free chlorine after a twenty-four (24) hour period. Chlorine tablets shall not be used.

After completion of the chlorine procedure, the main shall be flushed and sampled, as per Michigan Department of Public Health requirements. The first sample shall be collected 24 hours after the chlorine has been flushed out of the main. Samples shall be taken from each end of the main with additional samples taken in order to maintain a minimum of 1 sample for each 1,200 feet of main. Sample shall also be taken at the end of each branch installed. The chlorinated water flushed from the main shall not be discharged to a storm sewer or open drainage way, that would result in discharge to surface water. The chlorinated water must be discharged to a sanitary sewer, held on site, or treated, until the chlorine is removed. All requirements of the Federal Clean Water Act (CWA) must be followed.

Two consecutive samples of water, 24 hours apart, shall be taken from the main by the Water Department for bacteriological tests, at a rate established by the DPW, per test. The first sample shall be taken 24 hours after chlorine has been flushed from the main. If the results of these tests indicate safe water, the main may be placed in service. If the tests should result in unsafe conditions, the chlorination shall be repeated by the Contractor. The Contractor shall be responsible for all costs associated with necessary retesting.

E) Measurement and Payment

1) Water Main, ___ inch

i) Description

The work of Water Main, ___ inch, Modified shall consist of excavation, the furnishing and placing of the complete water main (including all fittings, testing, concrete work, disinfecting, backfilling and removal of surplus excavated material), protection and replacement or repair of existing utilities and restoration of the surface to within four inches (4") of original grade. All work shall be done in accordance with the Plans and/or Specifications.

ii) Method of Measurement and Basis of Payment

Water Main, ___ inch, Modified will be measured in place by length in feet and will be paid for at the contract unit price which price shall be payment in full for any fittings, couplers, sheeting or shoring trench walls, backfill as required and all labor, material and equipment needed to accomplish this work.

2) Water Valve ___inch

i) Description

The work of Water Valve ___ inch, shall consist of excavation, the furnishing and placing of valves, valve manholes (inc. castings), and/or boxes, as applicable. All work shall be done in accordance with the Plans and/or Specifications.

ii) Method of Measurement and Basis of Payment

Water Valve ___ inch, will be paid for by the unit each, and shall include the valve box and/or valve manhole, and casting, as well as all labor, materials, and related work as described above.

3) Hydrant Set

i) Description

The work of Hydrant Set shall consist of furnishing and installing fire hydrant, an auxiliary valve, valve box, connecting piping, fittings, thrust block, barrel extension, drainage pit, and miscellaneous appurtenances. All work shall be done in accordance with the Plans and/or Specifications.

ii) Method of Measurement and Basis of Payment

Hydrant Set shall be paid for by the unit each, and shall include the auxiliary valve, valve box, connecting piping, fittings, thrust block, barrel extension, and miscellaneous appurtenances. All work shall be done in accordance with the Plans and/or Specifications.

4) Tapping Sleeve & Valve ___ inch by ___ inch

i) Description

The work of Tapping Sleeve & Valve ___ inch by ___ inch, shall consist of furnishing and installing tapping sleeves and valves on existing mains without loss of pressure in the existing main. It shall also include the installation of a valve box or manhole, as applicable. All work shall be done in accordance with the Plans and/or Specifications.

ii) Method of Measurement and Basis of Payment

Tapping Sleeve & Valve ___ inch by ___ inch shall be paid for by the unit each, and shall include the installation of a valve box or manhole, as applicable. There will be a time and materials charge by the City if main has to be de-pressurized to pull out cookie.

5) Water Service - (Short or Long), ___inch

i) Description

The work of Water Service - (Short or Long), ___inch, shall consist of excavation, furnishing and placement of sand backfill, removal of surplus excavated material, tapping the main, furnishing and installation of service clamp or saddle, corporation stops, curb stops, curb boxes, service pipe, and fittings to connect to existing service pipe, in accordance with the Specifications. Long-side service leads shall include crossing roads. Short-side service leads are those which do not cross roads.

- ii) Method of Measurement and Basis of Payment
 Water Service - (Short or Long), ___inch, shall be paid for by the unit each, and shall include tapping the main, furnishing and installation of service clamp or saddle, corporation stops, curb stops, curb boxes, service pipe, and fittings to connect to existing service pipe, in accordance with the Specifications.
- 6) Water Service Reconnection ___ inch
 - i) Description
 The work of Water Service Reconnection ___ inch, shall consist of excavation, furnishing and placement of sand backfill, removal of surplus excavated material, tapping the main, furnishing and installation of service clamp or saddle, corporation stops, service pipe from the main to the reconnection point between the main and the existing curb stop box, and fittings to connect to existing service pipe, in accordance with the Specifications.
 - ii) Method of Measurement and Basis of Payment
 Water Service Reconnection ___ inch, shall be paid for by the unit each, and shall include tapping the main, furnishing and installation of service clamp or saddle, corporation stops, service pipe, and fittings to connect to existing service pipe, in accordance with the Specifications

Contract Item (Pay Item)	Pay Unit
Water Main, ___ inch.....	Linear Foot
Water Valve ___inch.....	Each
Hydrant Set.....	Each
Tapping Sleeve & Valve ___ inch by ___ inch.....	Each
Water Service - (Short or Long), ___inch.....	Each
Water Service Reconnection ___ inch.....	Each
Water Valve, Rem.....	Each
Water Main, ___ inch Cut & Cap.....	Each

City of Mt. Pleasant
SPECIAL PROVISION
FOR

SEWER CLEANING AND TV INSPECTION OF SEWER PIPELINE

City of MtPleasant

1 of 9

January 15

A) General

1) Description

- i) This section includes cleaning of existing sewers and removal of debris, and internal television (TV) inspection of sewers.

(1) Clean existing sewer pipelines.

(2) Inspect sewer interior using color closed-circuit television (CCTV) camera, and document inspection on DVD with audio location and date information, DVD title information, and continuous tape counter. Provide hard copy and digital copy of inspection logs. All inspections and reports shall be performed in accordance with Pipeline Assessment and Certification (PACP) Standards

(3) Additional TV inspections may be required at other stages of operation, to meet requirements specified in Field Quality Control article.

- ii) The onsite operator is required to have PACP certifications and a minimum of 5 years of experience prior to the start of the work. Certification number shall be listed on reports.

2) Submittals

- i) Quality Assurance: Submit one example DVD of previous sewer inspection and lateral inspection work that shows operational and structural defects in sewers and laterals complete with audio commentary and inspection log(s). Prior to submittal, finalize the DVD to prevent re-recording.

(1) DVD and inspection logs will be reviewed to determine if quality of CCTV image is acceptable, and if defects were properly identified and documented according to the Owners requirements.

(2) Modify equipment and/or inspection procedures to achieve report material of acceptable quality.

(3) Do not commence Work prior to approval of report material quality by Owner. Upon acceptance, report material shall serve as standard for remaining work.

- ii) Inspection Logs: Unless otherwise indicated, submit inspection logs both digital and hard copy using PACP format that include the following as a minimum:
 - (1) Project title
 - (2) Name of City
 - (3) Time of day
 - (4) Street Name
 - (5) Manhole to manhole pipe section
 - (6) Pipe segment length
 - (7) Pipe material
 - (8) Compass direction of viewing
 - (9) Direction of cameras travel
 - (10) Pipe depth
 - (11) Operator name
 - (12) Tape counter reading at beginning and end of each manhole to manhole pipe segment.
 - (13) PACP defect codes shall be used and will be recorded on electronic media and a copy of such records will be supplied to the Owner.
 - (14) Digital photographs of the pipe condition and all defects shall be taken by the Contractor.
 - (15) All other requirements of NASSCO PACP Standards shall be followed.
 - iii) DVDs: Submit completed DVDs after cleaning and rehabilitation. Prior to submittal, finalize the DVD to prevent re-recording. DVDs must be in a readable format with standard viewing software such as Windows Media Player, and if a specific program is needed, provide a read only version of the software used. Provide separate MPEG video files for each section (manhole to manhole). Submit for preapproval
 - iv) Maintain copy of all inspection documentation (DVDs, databases, and logs) for duration of Work and warranty period.
- 3) Contractors responsibilities incidental to the project:
- i) Removal and replacement of landscape borders, fences (including posts)
 - ii) Care and Protection of all Trees and tree branches
 - iii) Restoration of all out lawn areas disturbed
 - iv) Required cleanups if a backup is caused by (as determined by the owner) the Contractors operations resulting in sewage in buildings or residential homes. Any claims by the homeowner determined to be the responsibility of the contractor shall be covered by the contractor or under the contractors insurance at replacement value.
 - v) Contractor shall notify all affected residents in writing with a door hanger a minimum of 48 hours prior to cleaning and taping mainline sewers and laterals.

B) Material and Equipment

- 1) DVD: 120 minute minimum, high-quality color, type DVD-R, DVD-RW, or DVD+R.

- i) Audio portion of composite DVD shall be sufficiently free from electrical interference and background noise to provide complete intelligibility or oral report.
 - ii) Store in upright position with temperature range of 45 to 80 degrees F (7 to 27 degrees C) in an appropriate CD or DVD case to prevent scratches.
 - iii) Identify each disk with tape labels showing Community name, Contractors name and each manhole to manhole pipe segment of sewer line represented on DVD or provide and index or table of contents if more than one segment is on the disk. Owner will provide a base map of the system for manhole numbering.
- 2) Television Inspection Camera(s): Equipped with rotating head, capable of 90-degree rotation from horizontal and 360-degree rotation about its centerline.
- i) Minimum Camera Resolution: 3000 line of vertical resolution in the side view and a minimum of 500 lines in the perspective view.
 - ii) Camera Lens: Minimum of 185 degree viewing angle, with automatic or remove focus and iris control.
 - iii) Front Mounted pan and tilt/zoom camera (40:1 Optical/Digital Zoom)
 - iv) Cameras shall be intrinsically safe and operative in 100 percent humidity conditions.
 - v) Lighting Intensity: Remote-controlled and adjusted to minimize reflective glare.
 - vi) Lighting and Camera Quality: Provide clear, in-focus picture of entire inside periphery of sewer.
- 3) Footage Counter: Measures distance traveled by camera in sewer and lateral, accurate to plus or minus 1 foot in 1,000 feet
- 4) DVD Titling: Each segment shown on the DVD should have its own Chapter titles with the beginning and end point of the pipe segment.
- 5) High Velocity Cleaning Equipment
- i) High velocity cleaning equipment is to be capable of producing a flow rate of 65 gals/minute at 2000 psi of pressure, complete with the following:
 - i. Selection of nozzles capable of effectively scouring and removing grease from the sewer pipe wall and transporting debris in all sizes of the sewers to be cleaned.
 - ii. Water tank.
 - iii. Auxiliary engines.
 - iv. Pumps.
 - v. Approved backflow prevention devise and approved water meter for filling water tank from a hydrant.
 - vi. Provide special nozzles if deterioration of any pipe walls are discovered in order to prevent pipe collapse or additional pipe wall deterioration. Notify Owner

immediately if these conditions exist.

6) Debris Removal Equipment

- i) Vacuum unit(s) used for removing sewer debris to be complete with the following:
 - i. Positive displacement pumps or fans producing a minimum 25 cubic feet per second of air movement.
 - ii. Storage tank.
 - iii. Minimum 6 inch diameter suction hoses attached to a hydraulic boom.
- ii) Configure the storage tank to allow the liquid portion of the debris to be returned to the sewer.

7) Communication Equipment

- i) Equip cleaning crews with cellular telephones and a suitable communication system linking all crewmembers.

8)

C) Sewer flow requirements:

- 1) Do not exceed depth of flow shown in Table 1 for respective pipe sizes as measured in manhole when performing TV inspection.
- 2) When depth of flow at upstream manhole of sewer line section being worked is above maximum allowable for TV inspection, reduce flow to level shown in Table 1, by plugging or blocking of flow, or by pumping and bypassing of flow as specified.

TABLE 1

Maximum Depth of Flow for TV Inspection

Nominal Pipe Diameter	Maximum Depth of Flow
6" – 10"	20% of pipe diameter
> 12"	25% of pipe diameter

D) Sequence of work:

Perform Work in the following sequence:

- A. Clean sewer lines in accordance with requirements of this Section.
- B. Repeat TV inspection in the same direction as previous inspection, after cleaning of sewer lines has been performed.

E) Sewer cleaning:

- 1) Notify the owner of the location where sewer cleaning will be done one full day before starting the cleaning work at that location. Deliver notices to residents and businesses as directed by the Owner.
- 2) Clean sewers completely of debris including sludge, dirt, sand, gravel, rocks, bricks, grease and other solid and semi-solid materials removed from the sewer by the equipment identified in the Material and Equipment section of this special provision.
- 3) Remove grease deposits on pipe walls to within 0.5 inch of the inside surface of the pipe wall or as directed by the Owner.
- 4) Take necessary precautions to ensure that no flooding of public or private property occurs during sewer cleaning. Reduce pressure of cleaning equipment as directed by the Owner.
- 5) Start the cleaning operation with the upstream sewers in the system and proceed downstream with the direction of flow.
- 6) Clean all contributing upstream sewers before proceeding with cleaning downstream sewers.
- 7) The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned.
- 8) The NASSCO Jetter Code of Practice shall be consulted as a guide for the selection of different type nozzles and recommended pressure applications for various cleaning requirements.
- 9) Advise the Owner immediately when pipe material or backfill material is observed during the cleaning of a sewer. The Owner will direct one of the following operations be performed.
 - i) Complete or attempt to complete cleaning of the sewer.
 - ii) Suspend cleaning operations and inspect the sewer.
 - iii) Simultaneously clean and inspect the sewer.
- 10) The method and amount of Heavy Cleaning shall be pre-approved by the Owner before work begins. Heavy cleaning shall include anything more than 3 passes of cleaning as well as cutting of roots and removal of debris beyond what would normally be encountered in the given type of sewer main.

F) Removal of equipment that becomes lodged in a sewer:

- 1) Advise the Owner immediately if equipment becomes lodged in a sewer. Attempt to remove equipment that is lodged using whatever means are necessary for at least 4 hours. Advise the Owner if the equipment cannot be freed after 4 hours and mark the position on the surface over the sewer where the equipment is lodged.

- 2) The Contractor will arrange to have an excavation made to the top of the sewer where the equipment is lodged within 48 hours of notification the equipment cannot be freed.
- 3) Be present during the excavation and once the top of the sewer is exposed and the excavation is secured remove the top of the sewer pipe and retrieve the equipment lodged in the sewer.
- 4) The Contractor will arrange to have the sewer repaired after removal of the equipment that was lodged.
- 5) Clean and remove backfill and debris that may have entered the sewer during removal of the equipment and subsequent repair of the sewer.
- 6) The cost of all this work will be the Contractors responsibility and incidental to the project

G) Debris removal:

- 1) Continuously remove debris from the downstream manhole during sewer cleaning. Do not allow debris to be passed into the downstream sewer unless approved by the Owner.
- 2) Decant or dewater debris removed from sewers and legally dispose of solid and semi-solid debris at the City waste water treatment plant. Coordinate dump location at City waste water plant with waste water supervisor. Return decanted or dewatered liquid to the sewer of origin as soon as possible.
- 3) Coordinate dump location at City Waste Water Plant with the plant Supervisor.

H) Flow control:

- 1) Undertake flow control measures such as off peak work, plugging, use of sewer cleaning equipment to lower downstream flow levels or plugging and bypass pumping if sewer flows are hampering effective sewer cleaning.
- 2) Provide the Owner with at least 48 hours' notice and proposed method of flow control before undertaking flow control measures.
- 3) Use sewer plugs to stop or reduce sewer flow that tether to and are removable from the ground surface.
- 4) Monitor flow levels upstream of a plugged sewer at all times to ensure flooding of public or private property does not occur.
- 5) Demonstrate that off peak work, plugging, sewer cleaning equipment, or a combination of methods cannot effectively reduce the flow levels to the specified maximum before requesting the use of bypass pumping.

- 6) Provide the Owner with information on capacity of pumping equipment for review before setting up by-pass pumping.
- 7) Remove plugs placed in sewers and re-establish normal flow when directed by the Owner.
- 8) Provide additional by-pass pumping equipment when directed to do so by the Owner.
- 9) Provide approved traffic ramps for by-pass pumping discharge hoses where crossing roadways and traffic lanes and locate where directed and approved by the Owner.
- 10) This work shall be incidental to the project.

I) Water supply for sewer cleaning:

- 1) The Owner will select the hydrant(s) that will be used for a water supply for sewer cleaning. Coordinate the location with the water department.
- 2) The Owner will supply water required to the Contractor at a NO charge.

J) Inspection requirements:

- 1) Access: The Owner shall have access to observe monitor and other operations at all times.
- 2) DVD Commentary: Record the following information on audio track of inspection DVD: narrative of location, direction of view, manhole numbers, pipe diameter and material, date, time of inspection, and location of laterals and other key features.
 - i) DVD shall visually display this information at beginning and end of each manhole-to-manhole pipe segment.
 - ii) DVD between manholes shall visually display length in feet from starting point of given segment.
- 3) Sewer Identification: DVD and inspection documentation shall include sewer line and manhole identifiers shown on Drawings provided by the Owner.
- 4) Image Perspective: Camera image shall be down center axis of pipe when camera is in motion.
 - i) Provide 360-degree sweep of pipe interior at points of interest, to more fully document existing condition of sewer.
 - ii) Points of interest may include, but are not limited to the following: defects, cracks, voids, joints connections, encrustations, mineral deposits, debris, sediment, and any location determined not to be clean or part of an improper line installation, and defects in liner that include, but are not limited to bumps, folds, tears, and dimples.
 - iii) Cabling system employed to transport camera and transmit its signal shall not obstruct camera's view.
- 5) Sewer Reach Length: Physically measure and record length of each sewer reach from centerline of its terminal manholes.

- 6) Inspection Rate: Camera shall be pulled through sewer in either direction, but both inspections are to be in the same direction. Maximum rate per of travel shall be 30 feet (9 m) per minute when recording.

K) Field quality control:

- 1) The Owner will review DVD's and logs to ensure compliance with requirements listed in this specification.
- 2) If sewer line, in sole opinion of the Owner, is not adequately clean, it shall be recleaned and CCTV-inspected by Contractor and no additional cost.
- 3) All Inspection logs and reports will comply with NASSCO PACP Standards.

L) Acceptance of work:

- 1) Submit required video inspections of sewer and lateral cleaning, solid debris cutting and intruding sewer service removal to the Owner for review and determination if work performed is acceptable. The Owner will review the inspection videos within 20 days of submission.
- 2) Perform remedial work for sewer and cleaning, cutting of solid debris and removal of intruding sewer services and a re-inspection for the locations where the work was determined by the Owner as not being acceptable.

M) Measurement and Payment

- 1) Cleaning the Sanitary Sewer and Storm Sewer (up to three passes) will be measured and paid for by the lineal foot.
- 2) Televising, including reports, for the Sanitary Sewer and Storm Sewer will be measured and paid for by the lineal foot
- 3) Heavy Cleaning will be paid by the foot for the entire run where it is required. Heavy Cleaning will be paid in addition to the regular pay item for the given size of pipe. Approval by the City is required before this work is done.
- 4) Final Report will be paid for on a Lump Sum basis.
- 5) Construction signing and barricades: Incidental
- 6) Flag control: Incidental
- 7) Maintaining traffic: Incidental
- 8) The Catch basin Lead pay item will be used in place of the regular cleaning and televising pay item on storm sewer that is 12" or less in diameter and shorter the 50 feet that connect catch basins or inlets to the wider storm water collection system.

Contract Item (Pay Item)	Pay Unit
Sewer Cleaning, Sanitary, 6-12 inch.....	Lft
Sewer Cleaning, Sanitary, 14-18 inch.....	Lft
Sewer Cleaning, Sanitary, 24 inch.....	Lft
Sewer Cleaning, Sanitary, 42 inch.....	Lft
Sewer Cleaning, Catch basin Lead.....	Lft
Sewer Cleaning, Storm, 6-12 inch.....	Lft
Sewer Cleaning, Storm, 14-18 inch.....	Lft
Sewer Cleaning, Storm, 21-32 inch.....	Lft
Sewer Cleaning, Storm, 36-54 inch.....	Lft
Sewer Cleaning, Storm, 60-84 inch.....	Lft
Sewer Televising, Sanitary, 6-12 inch.....	Lft
Sewer Televising, Sanitary, 14-18 inch.....	Lft
Sewer Televising, Sanitary, 24 inch.....	Lft
Sewer Televising, Sanitary, 42 inch.....	Lft
Sewer Televising, Catch basin Lead.....	Lft
Sewer Televising, Storm, 6-12 inch.....	Lft
Sewer Televising, Storm, 14-18 inch.....	Lft
Sewer Televising, Storm, 21-32 inch.....	Lft
Sewer Televising, Storm, 36-54 inch.....	Lft
Sewer Televising, Storm, 60-84 inch.....	Lft
Sewer Heavy Cleaning, Sanitary.....	Lft
Sewer Heavy Cleaning, Storm.....	Lft

City of Mt. Pleasant
SPECIAL PROVISION
FOR

CURED IN PLACE PIPE (CIPP)

City of MtPleasant

1 of 8

January 15

A) Description

It is the intent of this specification to provide for the reconstruction of pipelines by the installation of a resin-impregnated flexible tube, which is formed to the original conduit. The resin is cured using hot water or steam within the tube. The Cured-In-Place Pipe (CIPP) will be continuous and tight fitting.

B) Product, Manufacturer/Installer Qualification Requirements

Since sewer products are intended to have a 50 year design life, and in order to minimize the Owner's risk, only proven products with substantial successful long term track records will be approved. All trenchless rehabilitation products and installers should be pre-approved prior to the formal opening of proposals.

Products and Installers seeking approval must meet all of the following criteria to be deemed Commercially Acceptable:

- 1) For a Product to be considered Commercially Proven, a minimum of 500,000 linear feet or 2,000 manhole-to-manhole line sections of successful wastewater collection system installations in the U.S. must be documented to the satisfaction of the Owner to assure commercial viability. In addition, at least 50,000 linear feet of the product should have been in successful service within the State for a minimum of five years. Upon request, contractor shall provide information, including contact person, to verify compliance with above requirements.
- 2) For an Installer to be considered as Commercially Proven, the Installer must satisfy all insurance, financial, and bonding requirements of the Owner, and must have had at least 5 (five) years active experience in the commercial installation of the product bid. In addition, the Installer must have successfully installed at least 50,000 feet of the product bid in wastewater collection systems. Acceptable documentation of these minimum installations must be submitted to the Owner.
- 3) Sewer rehabilitation products submitted for approval must provide Third Party Test Results supporting the long term performance and structural strength of the product and such data shall be satisfactory to the Owner. Test samples shall be prepared so as to simulate installation methods and trauma of the product. No product will be approved without independent third party testing verification.

- 4) The rehabilitation manufacturing process shall operate under a quality management system which is third-party certified to ISO 9000 or other internationally recognized organization standards. Proof of certification shall be required for approval.

C) Materials

- 1) Tube - The sewn Tube shall consist of one or more layers of absorbent non-woven felt fabric and meet the requirements of ASTM F1216 or ASTM F1743, Section 5. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections.
 - i) The wet out Tube shall have a uniform thickness that when compressed at installation pressures will meet or exceed the Design thickness.
 - ii) The Tube shall be sewn to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during inversion. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be utilized.
 - iii) The outside layer of the Tube (before wet out) shall be coated with an impermeable, flexible membrane that will contain the resin and facilitate monitoring of resin saturation during the resin impregnation (wet out) procedure.
 - iv) The Tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the Tube that may cause delamination in the completed CIPP. No dry or unsaturated layers shall be evident.
 - v) The wall color of the interior pipe surface of CIPP after installation shall be a light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.
 - vi) Seams in the Tube shall be stronger than the non-seamed felt.
 - vii) The outside of the Tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 ft. Such markings shall include the Manufacturers name or identifying symbol.

- 2) Resin - The resin system shall be a corrosion resistant polyester, vinyl ester, or epoxy and catalyst system that when properly cured within the tube composite meets the requirements of ASTM F1216 and ASTM F1743, the physical properties herein, and those which are to be utilized in the Design of the CIPP for this project. The resin shall produce CIPP which will comply with the structural and chemical resistance requirements of this specification.

D) Structural Requirements

- 1) The CIPP shall be designed as per ASTM F1216, Appendix X.1. The CIPP design shall assume no bonding to the original pipe wall.
- 2) Results from long-term testing for flexural creep of the CIPP pipe material are to be used to determine the Long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (Tube and Resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D-790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Values in excess of 50% will not be applied unless substantiated by qualified third party test data. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in Design.
- 3) The Enhancement Factor 'K' to be used in 'Partially Deteriorated' Design conditions shall be assigned a value of 7. Application of Enhancement (K) Factors in excess of 7 shall be substantiated through independent test data.
- 4) The layers of the completed CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If separation of the layers occur during testing of field samples, new samples will be cut from the work. Any reoccurrence may cause rejection of the work.
- 5) The cured pipe material (CIPP) shall conform to the structural properties, as listed below.

MINIMUM PHYSICAL PROPERTIES

Cured Composite

<u>Property</u>	<u>Test Method</u>	<u>min. per ASTM F1216</u>
Modulus of Elasticity	ASTM D-790 (short term)	250,000 psi
Flexural Stress	ASTM D-790	4,500 psi

- 6) The required structural CIPP wall thickness shall be based as a minimum, on the physical properties in Section 18.05E and in accordance with the Design Equations in the appendix of ASTM F 1216, and the following design parameters:

Design Safety Factor	2.0
Retention Factor for Long-Term Flexural Modulus to be used in Design (as determined by Long-Term tests described in paragraph 18.05B)	1% - 60%
Ovality*	2%
Enhancement Factor, k	See Section D.3
Groundwater Depth (above invert)*	See Special Conditions
Soil Depth (above crown)*	See Special Conditions
Soil Modulus**	Psi
Soil Density**	120 pcf
Live Load**	H20 Highway
Design Condition (partially or fully deteriorated)***	***

* Denotes information which can be provided here or in inspection video tapes or project construction plans. Multiple line segments may require a table of values.

** Denotes information required only for fully deteriorated design conditions.

*** Based on review of video logs, conditions of pipeline can be fully or partially deteriorated.

(See ASTM F1216 Appendix) The Owner will be sole judge as to pipe conditions and parameters utilized in Design.

- 7) Refer to the attached Dimensional Ratio table for specific pipe section requirements, based on the pipe condition, depth, ovality, etc. as computed for the conditions shown, using ASTM F 1216 Design Equations.
- 8) Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.

E) Testing Requirements

- 1) Chemical Resistance - The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical testing requirements.
- 2) Hydraulic Capacity - Overall, the hydraulic profile shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.
- 3) CIPP Field Samples - When requested by the Owner, the Contractor shall submit test results from field installations in the USA of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in Section 18.05E have been achieved in previous field applications. Samples for this project shall be made and tested as described in Section 18.10A.

F) Installation Responsibilities for Incidental Items

- 1) It shall be the responsibility of the Owner to locate and designate all manhole access points open and accessible for the work, and provide rights of access to these points. If a street must be closed to traffic because of the orientation of the sewer, the Owner shall institute the actions necessary to do this for the mutually agreed time period. The owner shall also provide free access to water hydrants for cleaning, inversion and other work items requiring water.
- 2) Cleaning of Sewer Lines - The Contractor, when required, shall remove all internal debris out of the sewer line that will interfere with the installation of CIPP. The Owner shall also provide a dump site for all debris removed from the sewers during the cleaning operation. Unless stated otherwise, it is assumed this site will be at or near the sewage treatment facility to which the debris would have arrived in absence of the cleaning operation. Any hazardous waste material encountered during this project will be considered as a changed condition.
- 3) Bypassing Sewage - The Contractor, when required, shall provide for the flow of sewage around the section or sections of pipe designated for repair. The bypass shall be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the flow. The Owner may require a detail of the bypass plan to be submitted.

- 4) Inspection of Pipelines - Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by close circuit television. The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of CIPP into the pipelines, and it shall be noted so that these conditions can be corrected. A video tape and suitable log shall be kept for later reference by the Owner.
- 5) Line Obstructions - It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the inversion process, that was not evident on the pre-bid video and it cannot be removed by conventional sewer cleaning equipment, then the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered as a separate pay item.
- 6) Public Notification - The Contractor shall make every effort to maintain service usage throughout the duration of the project. In the event that a service will be out of service, the maximum amount of time of no service shall be 8 hours for any property served by the sewer. A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:
 - i) Written notice to be delivered to each home or business the day prior to the beginning of work being conducted on the section, and a local telephone number of the Contractor they can call to discuss the project or any problems which could arise.
 - ii) Personal contact with any home or business, which cannot be reconnected within the time stated in the written notice.
- 7) The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing and curing the CIPP.

G) Installation

1) CIPP installation shall be in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with the following modifications:

- i) Resin Impregnation - The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be used. To insure thorough resin saturation throughout the length of the felt tube, the point of vacuum shall be no further than 25 feet from the point of initial resin introduction.

After vacuum in the tube is established, a vacuum point shall be no further than 75 feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular as possible. A roller system shall be used to uniformly distribute the resin throughout the tube. If the Installer uses an alternate method of resin impregnation, the method must produce the same results. Any alternate resin impregnation method must be proven.

- ii) Tube Insertion – The wet out tube shall be positioned in the pipeline using either inversion or a pull-in method. If pulled into place, a power winch should be utilized and care should be exercised not to damage the tube as a result of pull-in friction. The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.
- iii) Temperature gauges shall be placed inside the tube at the invert level of each end to monitor the temperatures during the cure cycle.
- iv) Curing shall be accomplished by utilizing hot water or steam in accordance with the manufacturer's recommended cure schedule.

H) Reinstatement of Branch Connections

- 1) It is the intent of these specifications that branch connections to buildings be reopened without excavation, utilizing a remote controlled cutting device, monitored by a video TV camera. The Contractor shall certify he has a minimum of 2 complete working cutters plus spare key components on the site before each inversion. Unless otherwise directed by the owner or his authorized representative, all laterals will be reinstated to not less than 90 percent capacity and have a smooth edge. No additional payment will be made for excavations for the purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

I) Inspection

- 1) CIPP samples shall be prepared and physical properties tested in accordance with ASTM D5813, Section 7, ASTM F1216 or ASTM F1743, Section 8, using either method proposed. The flexural properties must meet or exceed the values listed in Table 1 of the applicable ASTM.
- 2) Wall thickness of samples shall be determined as described in paragraph 6.3.3 of ASTM D5813 or paragraph 8.1.6 of ASTM F1743. The minimum wall thickness at any point shall not be less than 87½% of the design thickness as calculated in paragraph 18.05F of this document.
- 3) Visual inspection of the CIPP shall be in accordance with ASTM F1743, Section 8.6.

J) Clean-Up

- 1) Upon acceptance of the installation work and testing, the Contractor shall restore the project area affected by the operations to a condition at least equal to that existing prior to the work.

K) Measurement and Payment

City of Mt. Pleasant
SPECIAL PROVISION
FOR

MANHOLE REHABILITATION

City of MtPleasant

1 of 8

January 15

A) Description

The work covered under this special provision consists of furnishing all labor, equipment, and materials necessary for manhole rehabilitation to stop inflow, infiltration, and exfiltration; repair voids; restore structural integrity; and provide protection against corrosion. A monolithic, fiber-reinforced, structurally enhanced, cementitious-based liner material is spray applied to the wall and bench surfaces of the manhole.

B) Product, Manufacturer/Installer Qualification Requirements.

- 1) Product Data: Submit manufacturer's product data, including physical properties, surface preparation, repair, application, curing, and field quality control.
- 2) Manufacturer Qualifications:
 - i) Material Qualifications: Minimum of five year history of being used for rehabilitation of sanitary sewer manholes.
 - ii) Manufacturer Qualifications: Submit list of a minimum of ten manhole rehabilitation projects completed during past three years.
- 3) Applicator Qualifications: Submit qualifications or applicator.
 - i) Certification stating applicator is factory trained and approved by manufacturer in application of the specified products.
 - ii) List of recently completed manhole rehabilitation projects, including project name and location, names of owner and engineer, and description of products used, substrates, and application procedures.

C) Delivery, Storage and Handling

- 1) Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- 2) Storage:
 - i) Store materials in accordance with manufacturer's instructions.
 - ii) Keep containers sealed until ready for use.
 - iii) Store materials in a cool dry environment.
- 3) Handling: Protect materials during handling and application to prevent damage.

D) Environmental Conditions

- 1) Do not apply materials if ambient temperature is below 40 degrees F.
- 2) Do not apply materials to frozen surfaces or if freezing is expected within substrate within 24 hours after application.
- 3) Keep mix temperature at time of application below 90 degrees F.
- 4) Do not exceed water temperature of 80 degrees F.

E) Materials

- 1) General:
 - i) Materials from single manufacturer.
 - ii) Materials compatible with substrate and with each other.
 - iii) Materials approved by manufacturer.
- 2) Patching Material: Rapid-setting, fiber-reinforced, high-early-strength, corrosion-resistant, hand-mixed and hand-applied, calcium aluminate based cementitious material, or approved equal.
 - i) Cement: Calcium aluminate cement.
 - ii) Minimum Compressive Strength, ASTM C 109: 1,400 psi at 6 hours.

- iii) Minimum Bond, ASTM C 321: 145 psi at 28 days.
 - iv) Applied Density: 105 plus or minus 5 pounds per cubic foot.
 - v) Shrinkage, ASTM C 596: 0 percent at 90 percent relative humidity.
- 3) Infiltration Control Material: Rapid-setting, high-early-strength, hand-applied, cementitious material.
- i) Compressive Strength, ASTM C 109: 400 to 600 psi at 1 hour; 1,800 to 2,400 psi at 24 hours.
 - ii) Expansion, ASTM C 827: 0.10 percent.
 - iii) Sulfate Resistance, ASTM C 267: No weight loss after 15 cycles; 2,000 ppm; test continuing.
 - iv) Freeze/Thaw Resistance, ASTM C 666, Method A: 100 cycles.
 - v) Pull-Out Strength, ASTM C 234: 14,000 pounds.
- 4) Cementitious Grout: Cementitious grout, volume stable.
- i) Minimum Compressive Strength, ASTM C 109: 250 psi at 28 days.
- 5) Storm Sewer Manhole Liner Material: Fiber reinforced, spray-applied, cementitious mortar.
- i) Minimum Compressive Strength, ASTM C 109: 9,000 psi at 28 days.
 - ii) Minimum Tensile Strength, ASTM C 496: 900 psi at 28 days.
 - iii) Minimum Flexural Strength, ASTM C 78: 1400 psi at 28 days.
 - iv) Shrinkage, ASTM C 596: 0 percent at 28 days, 90 percent relative humidity.
 - v) Minimum Bond, ASTM C 952: 2,000 psi at 28 days.
 - vi) Applied Density: 133 plus or minus 5 pounds per cubic foot.
 - vii) Freeze/Thaw Resistance, ASTM C 666, Method A: 100 cycles, no visible damage.
 - viii) Factory Blended: Requires only addition of water at site.

- ix) Minimum Cement Content: 50 percent of total weight bag.
 - x) Dry Bulk Density: 74 to 76 pounds per cubic foot.
 - xi) Fiber Requirement: 1/2 to 5/8 inch alkaline-resistant fiberglass rods.
- 6) Sanitary Sewer Manhole Liner Material: Fiber-reinforced, spray-applied, cementitious mortar.
- i) Cement: 100 percent pure fused calcium aluminate clinker and calcium aluminate cement.
 - ii) Minimum Compressive Strength, ASTM C 109: 8,000 psi at 28 days.
 - iii) Shrinkage, ASTM C 596: 0 percent at 28 days, 90 percent relative humidity.
 - iv) Minimum Tensile Strength, ASTM C 496: 800 psi at 28 days.
 - v) Minimum Flexural Strength, ASTM C 78: 1,200 psi at 28 days.
 - vi) Minimum Bond, ASTM C 952: 2,000 psi at 28 days.
 - vii) Applied Density: 150 plus or minus 5 pounds per cubic foot.
 - viii) Freeze/Thaw Resistance, ASTM C 666, Method A: 100 cycles, no visible damage.
 - ix) Factory Blended: Requires only addition of water on site.
 - x) Dry Bulk Density: 88 to 92 pounds per cubic foot.
 - xi) Fiber Reinforcement: 1/2 to 5/8 inch alkaline-resistant fiberglass rods.
- 7) Water: Clean and potable. Test non-potable water in accordance with ASTM C 94.

F) Surface Preparation

- 1) Examine surfaces to receive manhole rehabilitation. Notify the City Inspector in writing if surfaces are not acceptable. Do not begin surface preparation, repair, or application until unacceptable conditions have been corrected.
- 2) Prepare surfaces in accordance with manufacturer's instructions.

- 3) Protection: Place covers over invert to prevent extraneous material from entering sewer lines.
- 4) Cleaning: Clean manhole walls and bench by using a minimum of 1,500 psi water spray to remove contaminants, dirt, debris, and other foreign materials.
- 5) Remove loose, unsound, and protruding brick, mortar, and concrete.
- 6) Inspection by Engineering Aide: Before application of each material, surfaces to be sprayed or coated will be inspected by the Engineer. Correct defects or deficiencies identified by the Engineering Aide before application of subsequent material.
- 7) Voids: Repair and fill voids greater than 2 inches in depth with patching material. Apply patching material in accordance with manufacturer's instructions.
- 8) Active Leaks:
 - i) Stop active leaks with patching material or infiltration control material. Apply material in accordance with manufacturer's instructions.
 - ii) Install weep holes as required to localize infiltration during application of patching material or infiltration control material.
 - iii) Plug weep holes after application with infiltration control material before application of liner material.
 - iv) Severe Infiltration: Drill as required to pressure grout using a cementitious or chemical grout. Apply grout in accordance with manufacturer's instructions.
- 9) Advance Notice: Give the City Inspector a minimum of 3 days advance notice of start of application.

G) Invert Repair

- 1) Remove loose and unsound materials and wash walls, after surface preparation is complete.
- 2) Repair bench, invert, or service line using patching material. Apply in accordance with manufacturer's instructions.

- 3) Repair inverts with visible damage, where infiltration is present, or when vacuum testing is specified.
- 4) Apply patching material to invert, after blocking flow through manhole and thoroughly cleaning invert.
- 5) Uniformly trowel patching material onto damaged invert at a minimum thickness of 1/2 inch at invert. Extend out onto bench of manhole sufficiently to tie into liner material.
- 6) Ensure finished invert surfaces are smooth and free of ridges.
- 7) Reestablish flow in manhole after a minimum of 30 minutes after application of patching material.

H) Application of Liner Material

- 1) Apply liner material in accordance with manufacturer's instructions.
- 2) Equipment: Spray apply liner material using approved equipment designed and manufactured by material manufacturer for the specific application.
- 3) Mixing:
 - i) Mix liner material with water in accordance with manufacturer's instructions.
 - ii) Discharge prepared mix into hopper.
 - iii) Continue mixing as liner material is continuously sprayed.
- 4) Cleaning: Ensure surface is clean and free of foreign material.
- 5) Saturated Surface: Ensure surface is damp and totally saturated with water without noticeable free water droplets or running water, just before application of liner material.
- 6) Spraying: Spray apply liner in 1 or more passes from bottom of wall to bottom of frame to form a structurally enhanced monolithic liner.
 - i) Minimum Total Thickness: 1/2 inch.

7) Finishing:

- i) Trowel surface of sprayed liner material to relatively smooth finish. Do not over trowel.
- ii) Apply brush finish to trowel finished surface.

8) Follow manufacturer's instructions whenever more than 24 hours have elapsed between applications.

9) Application to Bench:

- i) Remove wood covers.
- ii) Spray bench with liner material mixed in accordance with manufacturer's instructions.
- iii) Spray apply liner material to produce a gradual slope from walls to invert to form a structurally enhanced monolithic liner. Minimum thickness at invert of 1/2 inch.
- iv) Round full circumference of intersection of wall and bench to a uniform radius.

I) Curing

1) Cure materials in accordance with manufacturer's instructions.

2) Exposure:

- i) Minimize exposure of applied materials to sunlight and air movement.
- ii) Cover structure if time between applications of additional coats is to be longer than 15 minutes.
- iii) Do not expose finished materials to sunlight or air movement for longer than 15 minutes before covering or closing access.
- iv) Shade manhole while rehabilitation is in process in hot and arid climates.

3) Concrete Curing Compound:

- i) Apply concrete curing compound if relative humidity is less than 70 percent within manhole.

- ii) Apply curing compound in accordance with manufacturer's instructions.
- 4) Cure Time: Allow a minimum of eight hours cure time before subjecting manholes to flows.

J) Field Quality Control

- 1) Inspection by the Engineering Aide or the waiver of inspection of any portion of the work shall not relieve the Contractor of responsibility to perform the work as specified.
- 2) Field Quality Control Testing: Performed by the Engineering Aide at Contractor's expense.
- 3) Compressive Strength Test:
 - i) Cast four 2 inch cubes each day or from each pallet of material.
 - ii) Label, package, and mail cubes to manufacturer.
 - iii) Manufacturer shall test cubes for compressive strength in accordance with ASTM C 109 and submit test results to the Contractor and Engineer.
- 4) Leaks: Visually verify absence of leaks.

K) Protection

- 1) Do not allow traffic for a minimum of 24 hours after final application of liner material.

L) Measurement and Payment

This work will be measured and paid using the following contract items (pay items).

Contract Item (Pay Item)	Pay Unit
Storm MH Rehab, 2.5' Dia and Less, Modified.....	Lft
Storm MH Rehab, 2.6' Dia to 4.5' Dia, Modified.....	Lft
San MH Rehab, 2.6' Dia to 4.5' Dia, Modified.....	Lft
San MH Rehab, 4.6' Dia to 5.5' Dia, Modified.....	Lft

City of Mt. Pleasant
SPECIAL PROVISION
FOR

HMA ULTRA-THIN

City of MtPleasant

1 of 4

January 15

A) Description

This special provision provides acceptance testing requirements for use on HMA Ultra-Thin Overlay mixture.

B) Materials

The HMA and materials shall meet the following requirements:

- 1) Bond Coat. The bond coat material will be emulsified asphalt conforming to the requirements of Section 904 of the Michigan Department of Transportation (MDOT) 2012 Standard Specifications for Construction, Type SS1h.
- 2) HMA Ultra-Thin Overlay. The Ultra Thin HMA Overlay shall be composed of a mixture of aggregate, asphalt binder, and if required, mineral filler, as listed in Table 1.

Table 1 - HMA Ultra-Thin Overlay Mixture Requirements

Parameter	Low Volume Comm. ADT <380	Medium Volume Comm. ADT 380 - 3400	High Volume Comm. ADT >3400
Marshall Air Voids %	4.5	4.5	5.0
VMA % (min.) based on Gsb	15.5	15.5	15.5
Fines/Binder % Max.	1.2	1.4	1.4
Flow (0.01 in.)	8-16	8-16	8-16
Stability Min. (lbs)	1200		

- 3) Aggregate Gradation and Physical Properties. The combined gradation of the aggregate portion of the mixture, including the mineral filler, shall be within the limits of Table 2. The physical properties of the combined aggregates shall meet the criteria of Table 3.

Table 2 - HMA Ultra-Thin Overlay Aggregate Gradation

Sieve Size	Total Passing Percent by Weight
½ inch	100
3/8 inch	99-100
No. 4	75-95
No. 8	55-75
No. 30	25-45
No. 200	3-8

Table 3 - HMA Ultra-Thin Overlay Aggregate Physical Requirements

Parameter	Low Volume Comm. ADT <380	Medium Volume Comm. ADT 380 - 3400	High Volume Comm. ADT >3400
Percent Crush (min.)	50%	75%	95%
Angularity Index (MTM 118) (min.)	2.5	3.0	4.0
L.A abrasion loss (max.)	40	35	35
Aggregate Wear Index (AWI)	(a)	(a)	(a)
AWI of 220 is required for projects with less than or equal to 2000 ADT, projects with ADT greater than 2000 the minimum AWI requirement is 260.			

In addition, the sum of the shale, siltstone, ochre, coal, clay-ironstone and particles which are structurally weak or are found to be non-durable in service shall not exceed 8.0 percent.

- 4) Performance Graded (PG) Asphalt Binder. Binder selection is based on present day two-way commercial ADT as listed in Table 4. The PG binder shall meet all the requirements in Section 904 of the 2012 MDOT Standard Specifications for Construction.

Table 4 - Asphalt Binder Selection for HMA Ultra-Thin Overlay

Low Volume Comm. ADT <380	Medium Volume Comm. ADT 380 - 3400	High Volume Comm. ADT >3400
PG 64 -22*	PG 64 -28P**	PG 70-22P*
* In areas North of M-46, May use PG 58-28 (Low) or PG 70-28P (High)		
** May use another "readily available" polymer modified (P) grade.		

C) Construction

- 1) Bond Coat Application. The bond coat material will be applied to completely cover the prepared surface at a rate of 0.11 - 0.15 gal/yd².
- 2) Mixture Application Rate. The target application rate shall be 83 lb/yd², unless specified by the engineer to address special circumstances.
- 3) Mix Design. The Contractor shall submit to the Owner a complete mix design for review prior to the start of production.
- 4) Quality Control. The Contractor shall provide and follow a Quality Control (QC) plan for the Ultra Thin HMA Overlay that will maintain adequate QC for production and construction processes applicable to this specification and the contract documents. For QC purposes, the Contractor must perform at least one QC test per day for gradation, AC content, and air voids, and is allowed to take informational cores for application rates. The Owner shall be provided a copy of the QC plan for review, prior to mix production and placement. After the job-mix-formula is established, the aggregate gradation and the binder content of the HMA mixture furnished for the work shall be maintained within the Range 1 uniformity tolerance limits permitted for the job-mix-formula specified in Table 5. However, if deviations are predominantly either below or above the job-mix-formula, the Owner may

order alterations in the plant to bring the mixture to the job-mix-formula. If two consecutive aggregate gradations on one sieve, or binder contents as determined by the QC tests, are outside Range1 but within Range 2 tolerance limits, the Contractor shall suspend all operations. Contract time will continue during these times when the plant is down. Before resuming any production, the Contractor shall propose, for the Owner's approval, all necessary alterations to the materials or plant so that the job-mix-formula can be maintained. The Owner, after evaluating for effects on AWI and mix design properties, will approve or disapprove such alterations.

Table 5 – Uniformity Tolerance Limits (for QC and Acceptance)

PARAMETER	* Range 1	Range 2
Air Voids**	± 1.0	± 2.0
Binder Content	± 0.40	± 0.50
% Passing # 8 and Larger Sieves	± 5.0	± 8.0
% Passing # 30 Sieve	± 4.0	± 6.0
% Passing # 200 Sieve	± 1.0	± 2.0
* This range allows for normal mixture and testing variations. The mixture shall be proportioned to test as closely as possible to the Job-Mix-Formula.		
** Air Void limits apply to QC testing and are optional for Acceptance testing.		

- 5) **Crushed Particle Content.** The crushed particle content of the aggregate used in the HMA mixture shall not be more than 10 percentage points above or below the crushed particle content used in the job-mix-formula nor less than the minimum specified for the aggregate in the project documents.
- 6) **Density.** Thoroughly compact the mixture immediately after placement using the number of rollers method.
 - i) **Number of Rollers Method.** The number of compactive and finish rollers used shall be as specified in Table 6 based on the square yards per hour of Ultra Thin HMA Overlay being placed.

Table 6 – Number of Rollers Required based on Placement Rate

Average Laydown Rate, square yards per hour	Number of Rollers Required	
	Compaction Rollers	Finish Rollers
Less than 800	1	1*
801 – 2000	1	1
2001 – 5500	2	1
5501 – 7200	3	1

*The compaction roller may be used as the finish roller also.

D) Acceptance Sampling and Testing. Acceptance sampling and testing may be performed by the Owner. Each day of production, a minimum of two samples will be obtained for each mix

type. Acceptance testing will be performed at the frequency specified by the Owner. No less than three samples shall be obtained for each mix type.

E) Rejected Mixtures. If for any one mixture, two consecutive aggregate gradations on one sieve or binder contents as determined by acceptance tests exceed the uniformity tolerance of Range 2 under Table 5, or do not meet the minimum requirements for crushed particle content specified in the project documents, the mixture will be rejected. If such mixtures are placed in a pavement, the remaining portions of the failing acceptance samples (split sample) will be sent to an independent Laboratory to confirm the acceptance test results. If the Laboratory's results do not confirm the acceptance test results, then no price adjustments will be made for the mixture involved. If the Laboratory's results confirm the acceptance test results and if, in the Owner's judgment, the defective mixture can remain in place, the contract unit price for the defective mixture involved, as determined from acceptance tests, will be decreased on the following basis: The contract unit price for material outside of Range 2 will be decreased 25 percent.

The Owner may take into account the Contractor's QC test results when making acceptance decisions and price adjustments.

F) Measurement and Payment. The completed work as measured will be paid for at the contract unit price for the following contract item:

G) Measurement and Payment

This work will be measured and paid as specified in section 403 & 802 of the Standard Specifications using the following contract items (pay items).

Contract Item (Pay Item)	Pay Unit
HMA, Ultra-Thin, Low Volume.....	Ton
HMA, Ultra-Thin, Medium Volume.....	Ton
HMA, Ultra-Thin, High Volume.....	Ton
HMA, Ultra-Thin, Mix, Special.....	Ton

City of Mt. Pleasant
SPECIAL PROVISION
FOR
OVERBAND CRACK FILL, MODIFIED

City of MtPleasant

1 of 1

January 15

A) Description

Overband Crack Fill, Modified, shall consist of materials and work as described in Section 502 of the Michigan Department of Transportation 2012 Standard Specifications for Construction except as modified herein.

B) Materials

Materials for Overband Crack Seal, Modified, shall meet the requirements of section 502 of the Michigan Department of Transportation 2012 Standard Specifications

C) Construction

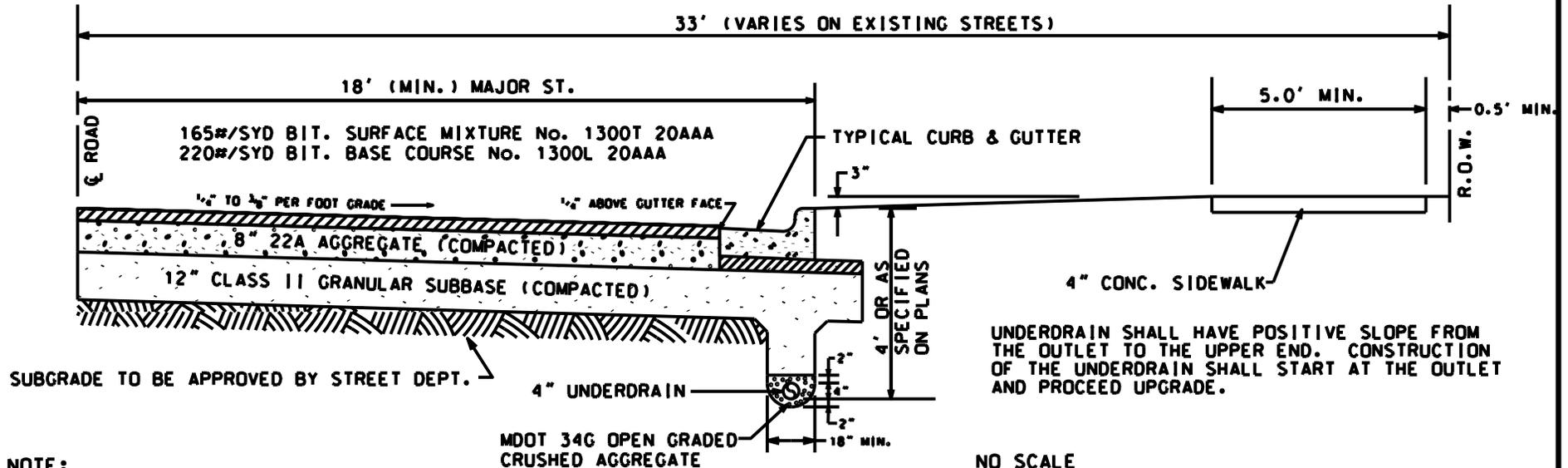
The method of construction for Overband Crack Seal, Modified, shall meet the requirements of section 502 of the Michigan Department of Transportation 2012 Standard Specifications.

D) Measurement and Payment

The unit price shall include all documentation, materials, equipment, and labor necessary for the preparation and filling of cracks and for any corrective action and temporary traffic markings required.

Contract Item (Pay Item)	Pay Unit
Overband Crack Fill, Modified.....	Pound

 HATCHED AREA UNDER THE CURB SHALL BE 22A AGGREGATE & SHALL BE INCLUDED IN THE CURB PRICE.



NOTE:

SUBGRADE, SUBBASE, BASE MATERIAL, SHAPE, COMPACTION IS TO BE APPROVED IN WRITING BY THE STREET DEPARTMENT PRIOR TO PLACING THE NEXT LAYER OF MATERIAL.

NEW STREET SHALL NOT BE ACCEPTED BY THE CITY UNTIL A PERIOD OF 12 MONTHS HAS PASSED FROM THE COMPLETION OF THE STREET. THE DEVELOPER SHALL BE RESPONSIBLE FOR ANY REPAIRS FOR A PERIOD OF 2 YEARS.

THERE MAY BE SOME VARIATIONS IN SIZE OF STREET DUE TO EXISTING STREETS. ANY VARIATIONS ARE SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.

WHERE A CLAY SUBGRADE OR HIGH GROUND WATER EXISTS UNDERDRAIN WILL BE REQUIRED. UNDERDRAIN MATERIAL SHALL MEET CITY SPECIFICATION.

UTILITY & OTHER TRENCHES & CROSS-CUTS SHALL BE BACKFILLED WITH GRANULAR MATERIAL CLASS II IN LIFTS NOT TO EXCEED 1 FOOT AND COMPACTED IN PLACE TO 95% (CONTROLLED DENSITY METHOD).

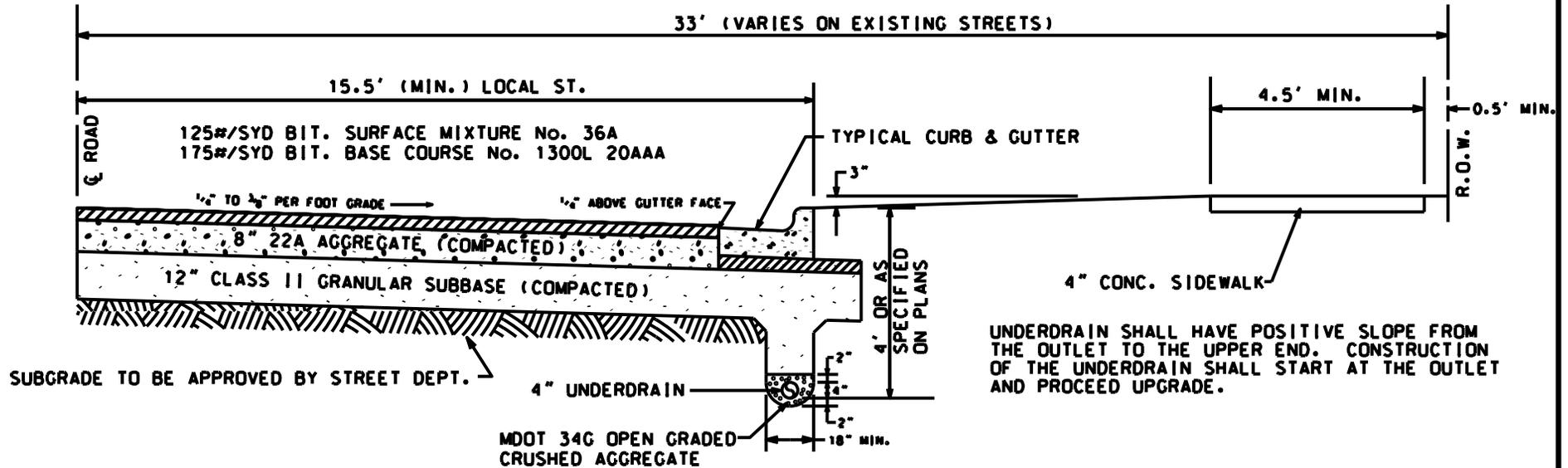
CURB & GUTTER SHALL BE MDOT - F4 MODIFIED - NO REINFORCING STEEL & CONCRETE SHALL BE 3500 PSI CONCRETE WITH LIMESTONE AGGREGATE WITH 5% +/- 1% ENTRAINED AIR.

NO SCALE

DETAIL 1

CITY OF MT. PLEASANT - TYPICAL MAJOR ST. CROSS SECTION

 HATCHED AREA UNDER THE CURB SHALL BE 22A AGGREGATE & SHALL BE INCLUDED IN THE CURB PRICE.



UNDERDRAIN SHALL HAVE POSITIVE SLOPE FROM THE OUTLET TO THE UPPER END. CONSTRUCTION OF THE UNDERDRAIN SHALL START AT THE OUTLET AND PROCEED UPGRADE.

NOTE:

NO SCALE

SUBGRADE, SUBBASE, BASE MATERIAL, SHAPE, COMPACTION IS TO BE APPROVED IN WRITING BY THE STREET DEPARTMENT PRIOR TO PLACING THE NEXT LAYER OF MATERIAL.

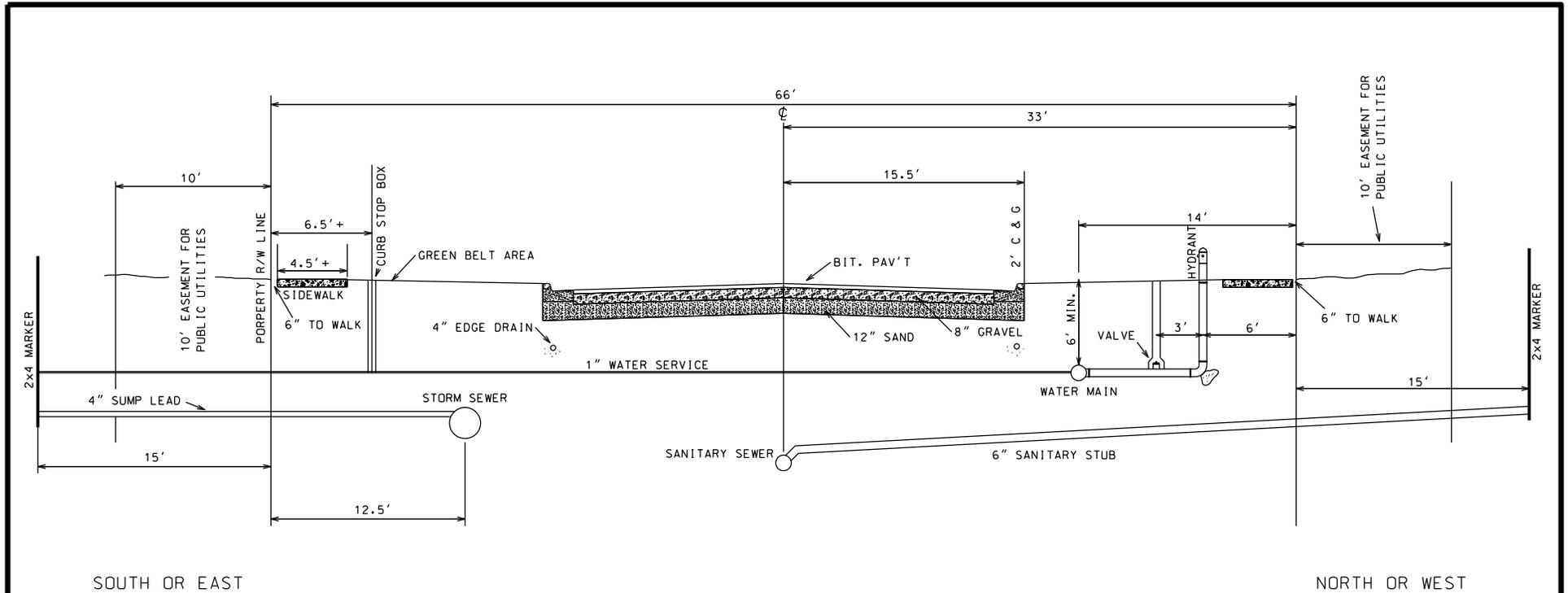
NEW STREET SHALL NOT BE ACCEPTED BY THE CITY UNTIL A PERIOD OF 12 MONTHS HAS PASSED FROM THE COMPLETION OF THE STREET. THE DEVELOPER SHALL BE RESPONSIBLE FOR ANY REPAIRS FOR A PERIOD OF 2 YEARS.

THERE MAY BE SOME VARIATIONS IN SIZE OF STREET DUE TO EXISTING STREETS. ANY VARIATIONS ARE SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.

WHERE A CLAY SUBGRADE OR HIGH GROUND WATER EXISTS UNDERDRAIN WILL BE REQUIRED. UNDERDRAIN MATERIAL SHALL MEET CITY SPECIFICATIONS.

DETAIL 2

CITY OF MT. PLEASANT - TYPICAL LOCAL ST. CROSS SECTION



SERVICE LEADS ARE TO EXTEND 15' INTO LOTS OF NEW SUBDIVISION TO AVOID DAMAGE TO PUBLIC UTILITIES WHEN MAKING CONNECTION.

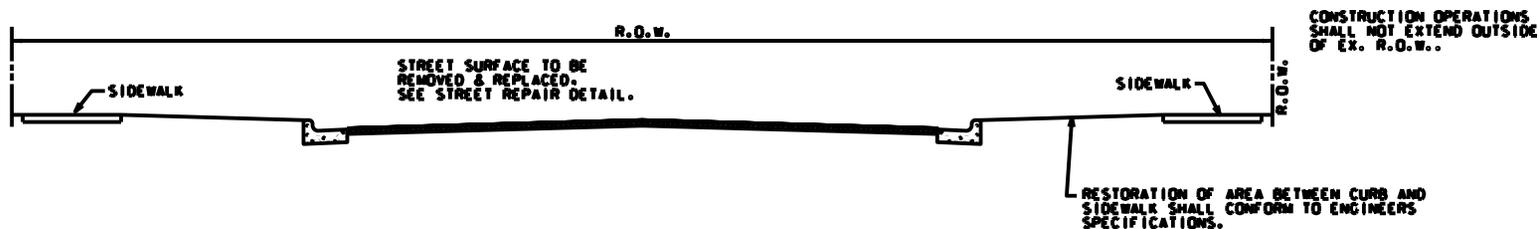
MAINTAIN 10' HORIZ. & 18" VERTICAL CLEARANCE BETWEEN WATER & SEWER

NEW PLATS

DETAIL 3

CITY OF MT. PLEASANT - TYPICAL UTILITY LOCATIONS.

NO SCALE



NOTE:

- CURB AND GUTTER SHALL BE REMOVED FROM JOINT TO JOINT AS A MINIMUM AND SHALL BE REPLACED BY CONTRACTOR.
- EACH LEAD TO SERVE ONLY ONE HOUSE.
- PIPE MUST BE OF SUFFICIENT DIAMETER TO CARRY THE ESTIMATED VOLUME OF DISCHARGE. MINIMUM PIPE SIZE PERMITTED IS 4" I.D..
- PIPE MUST BE ONE OF THE FOLLOWING:
 1. CAST IRON W/ RUBBER TYPE GASKET OR LEADED JOINTS;
 2. CAST IRON NO HUB PIPE W/ NEOPRENE STAINLESS COUPLING;
 3. DUCTILE IRON W/ RUBBER TYPE GASKET, SLIP JOINTS, OR MECHANICAL JOINT;
 4. VITRIFIED CLAY TILE W/ASTM C425 JOINTS;
 5. P.V.C. PLASTIC, SCHEDULE 40 OR BETTER.
- CLEANOUTS SHALL BE PLACED EVERY 100' OF STRAIGHT RUN AT EACH 90° BEND, AND AT EVERY OTHER 45° BEND.

- THE METHOD OF EXCAVATION, PLACING OF PIPE, JOINTING, TESTING, AND BACKFILLING SHALL CONFORM TO THE REQUIREMENTS OF THE DIVISION OF PUBLIC WORKS
- NO WORK SHALL BEGIN WITHOUT FIRST RECEIVING A WRITTEN PERMIT FROM THE D.P.W..
- NO SEWER LEAD SHALL BE COVERED UNTIL AFTER IT HAS BEEN INSPECTED AND APPROVED BY AUTHORIZED PERSONNEL OF THE D.P.W. (24 HOUR NOTICE REQUIRED).
- PROPERTY DISTURBED DURING REPLACEMENT SHALL BE RESTORED TO PREVIOUS OR BETTER CONDITION.

DETAIL 4

CITY OF MT. PLEASANT-TYPICAL SERVICE LEAD RE-CONNECTION

NOTES:

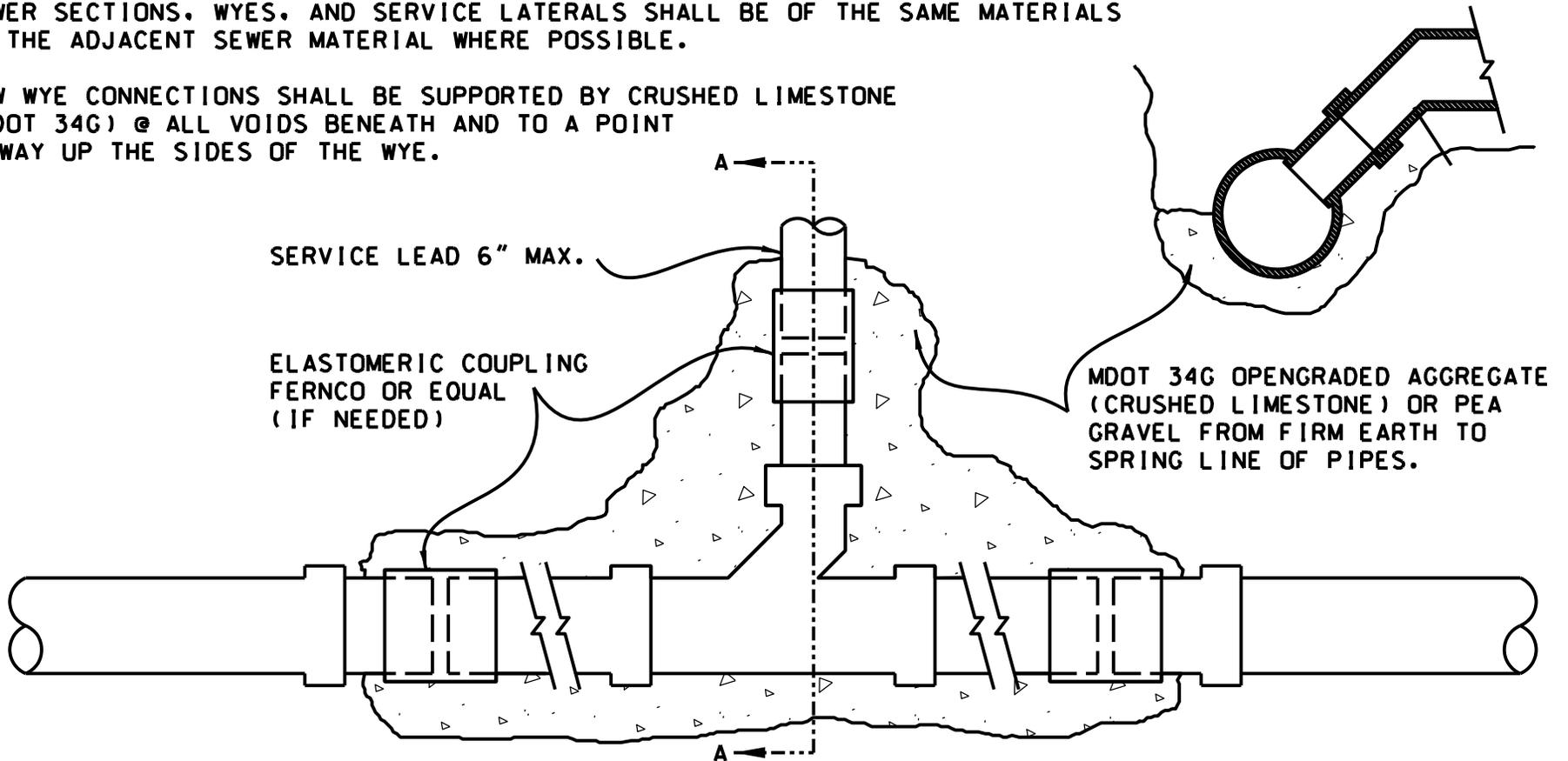
RUBBER COUPLINGS SHALL BE AN ELASTOMERIC COUPLING COMPLETE W/ 300 SERIES STAINLESS STEEL TENSION BANDS ALL MEETING THE REQUIREMENTS OF ASTM C425.

SEWER SECTIONS, WYES, AND SERVICE LATERALS SHALL BE OF THE SAME MATERIALS AS THE ADJACENT SEWER MATERIAL WHERE POSSIBLE.

NEW WYE CONNECTIONS SHALL BE SUPPORTED BY CRUSHED LIMESTONE (MDOT 34G) @ ALL VOIDS BENEATH AND TO A POINT $\frac{1}{2}$ WAY UP THE SIDES OF THE WYE.

NO SCALE

SECTION A - A



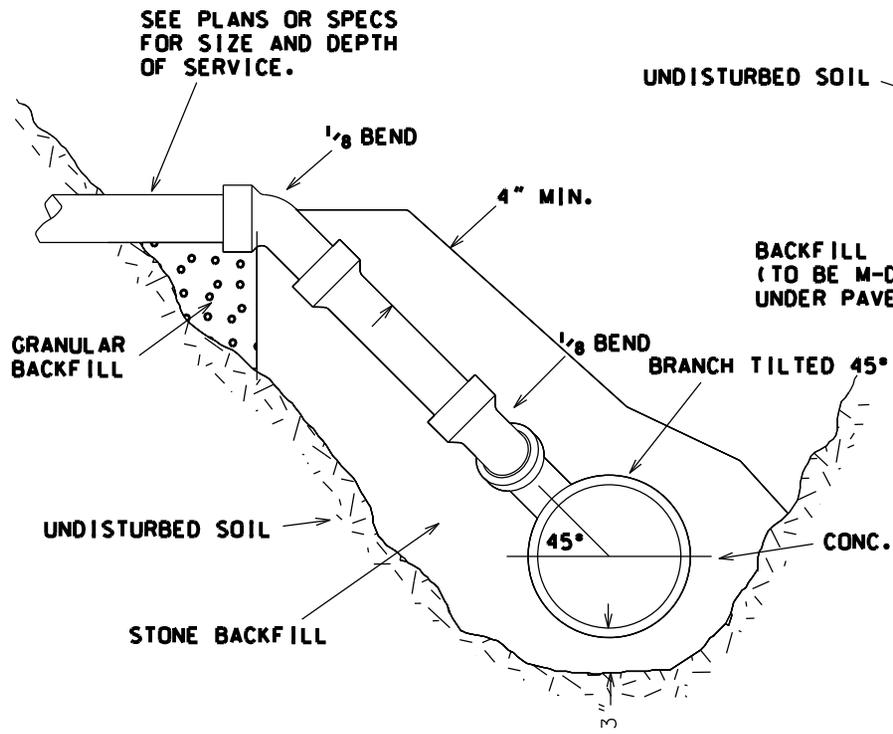
DETAIL 5
CITY OF MT. PLEASANT - TYPICAL WYE INSERTION

NO SCALE

TYPICAL CONNECTION

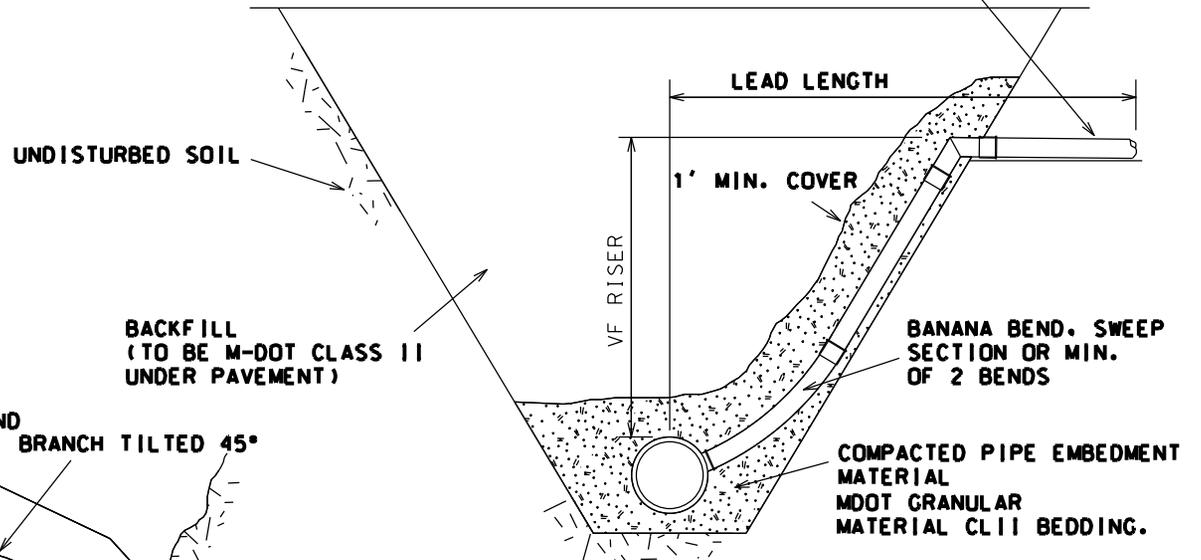
MIN. OF A $\frac{1}{4}$ " PER. FT OF FALL FOR 4" PIPE

MIN. OF A $\frac{1}{8}$ " PER. FT OF FALL FOR 6" PIPE



MAIN RISER FOR VIT. CLAY PIPE

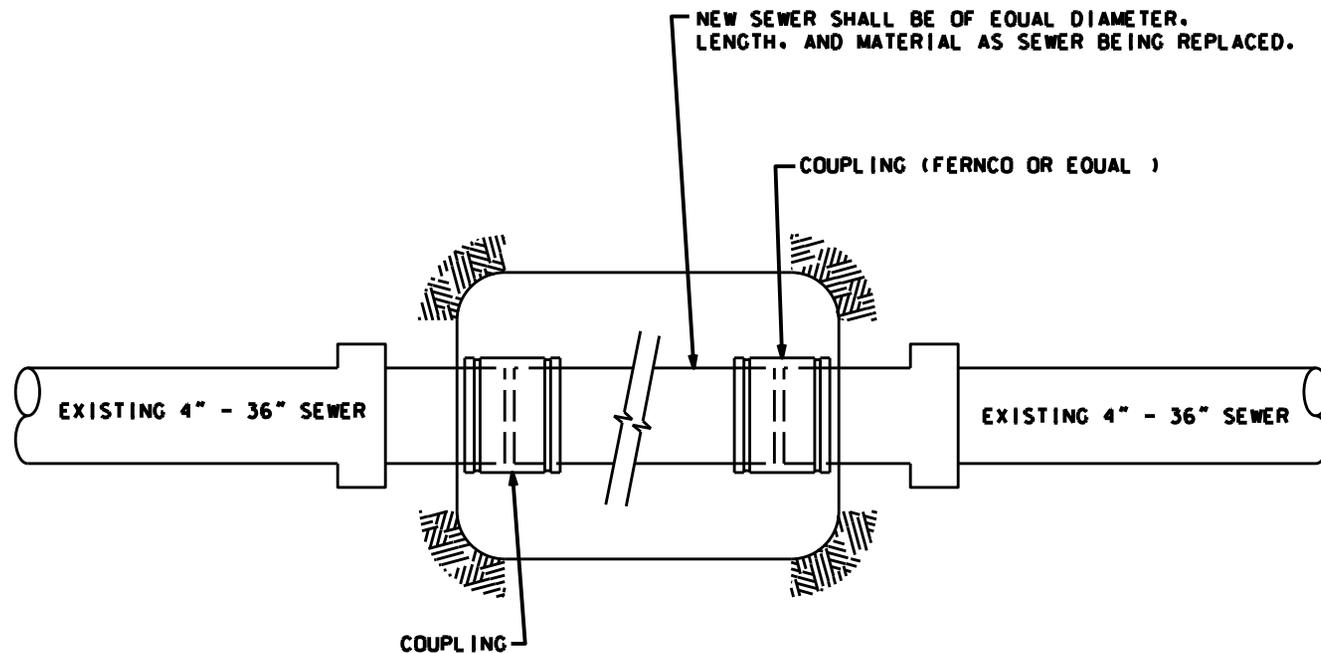
SEE PLANS & SPECS FOR SIZE AND DEPTH OF SERVICE.



MAIN RISER FOR PVC

DETAIL 6

NO SCALE



NOTE:

- COUPLINGS SHALL BE AN ELASTOMERIC COUPLING COMPLETE WITH 300 SERIES STAINLESS STEEL TENSION BANDS. ALL MEETING THE REQUIREMENTS OF ASTM C-425.

- NEW SEWER SHALL BE SUPPORTED BY UNDISTURBED SOIL OR CRUSHED LIMESTONE (MDDT 34G) @ ALL VOIDS BENEATH AND TO A POINT 1/2 WAY UP THE SIDES OF THE PIPE.

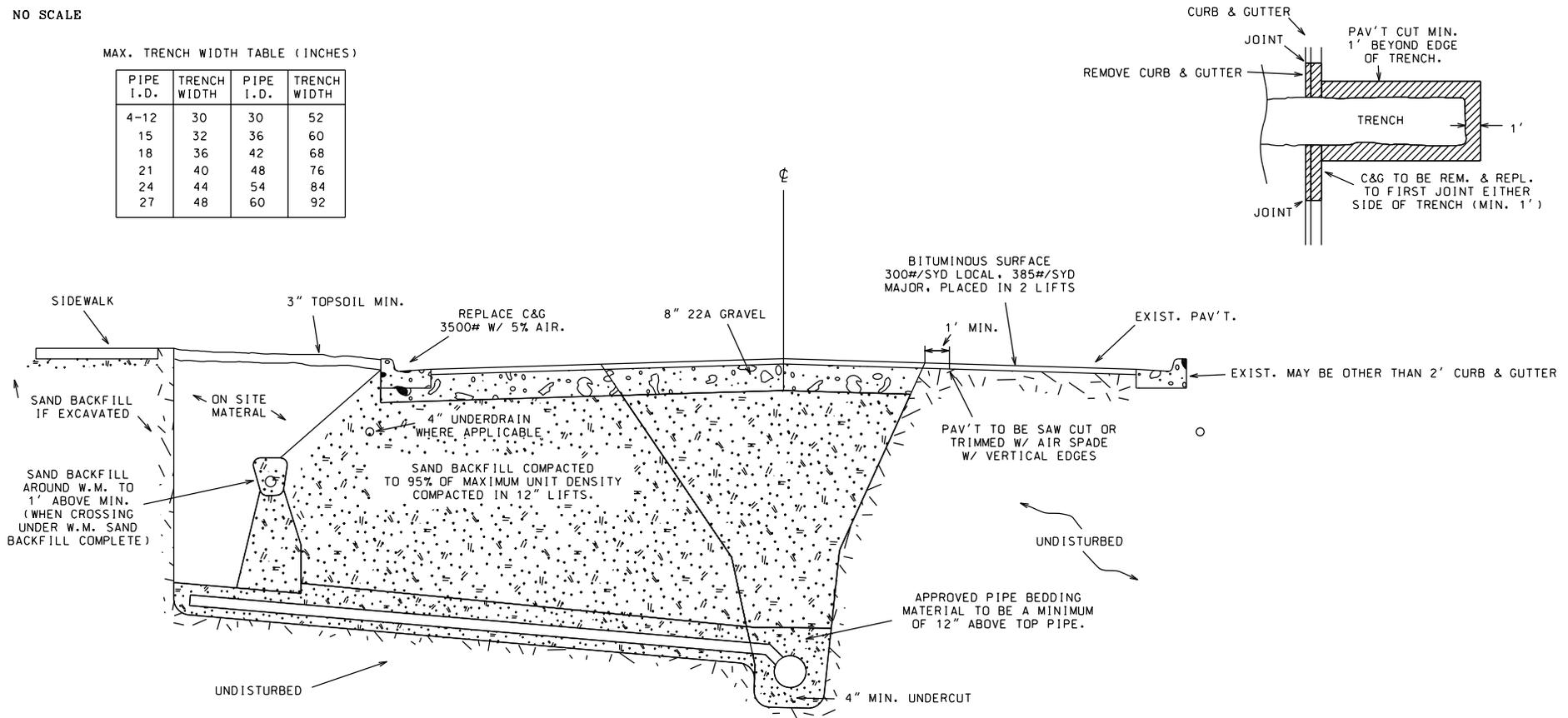
DETAIL 7

CITY OF MT. PLEASANT - TYPICAL SEWER SECTION REPLACEMENT

NO SCALE

MAX. TRENCH WIDTH TABLE (INCHES)

PIPE I.D.	TRENCH WIDTH	PIPE I.D.	TRENCH WIDTH
4-12	30	30	52
15	32	36	60
18	36	42	68
21	40	48	76
24	44	54	84
27	48	60	92



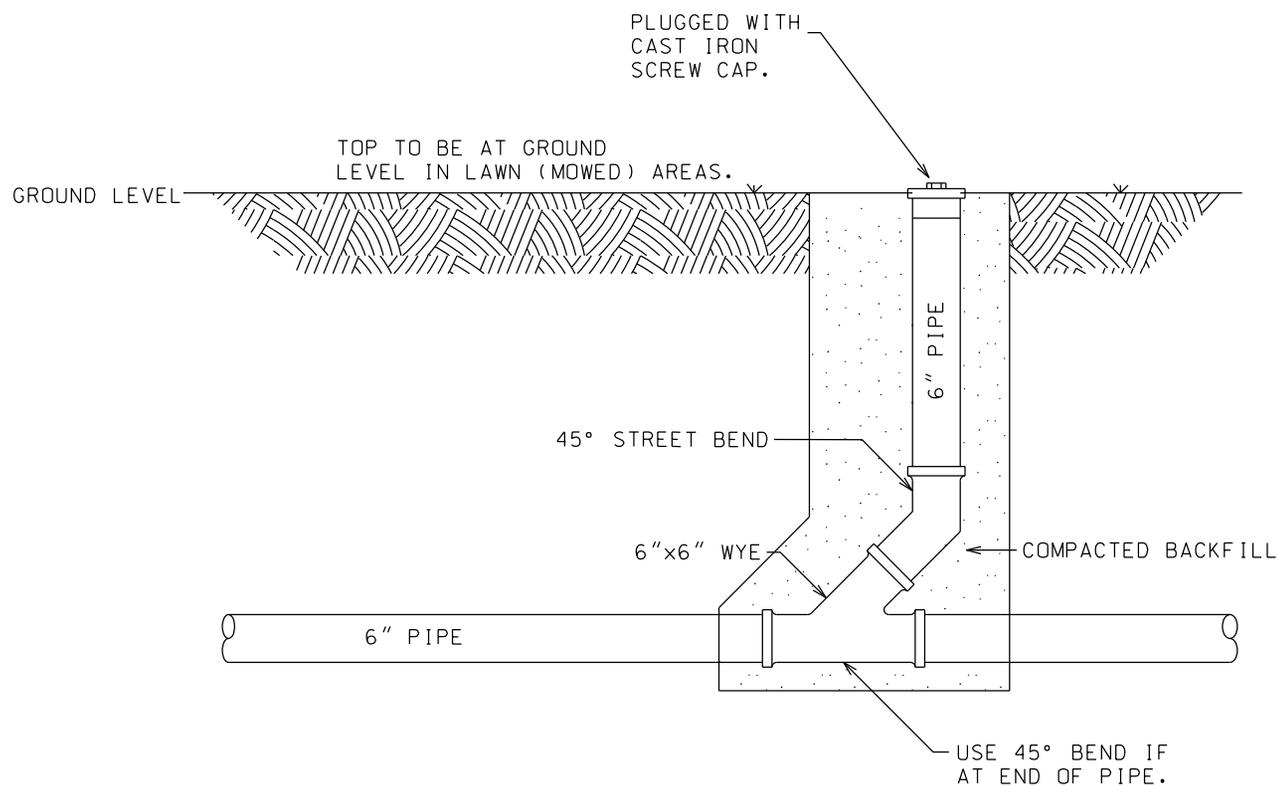
NOTE:

NO PERSON SHALL COVER ANY TRENCH UNTIL APPROVED BY THE CITY INSPECTOR OR ENGINEER.

72 HOURS PRIOR TO EXCAVATION CALL MISS DIG 1-800-482-7171

CITY OF MT. PLEASANT -- TYPICAL BACKFILL AND ROAD REPAIR DETAIL 8

NO SCALE



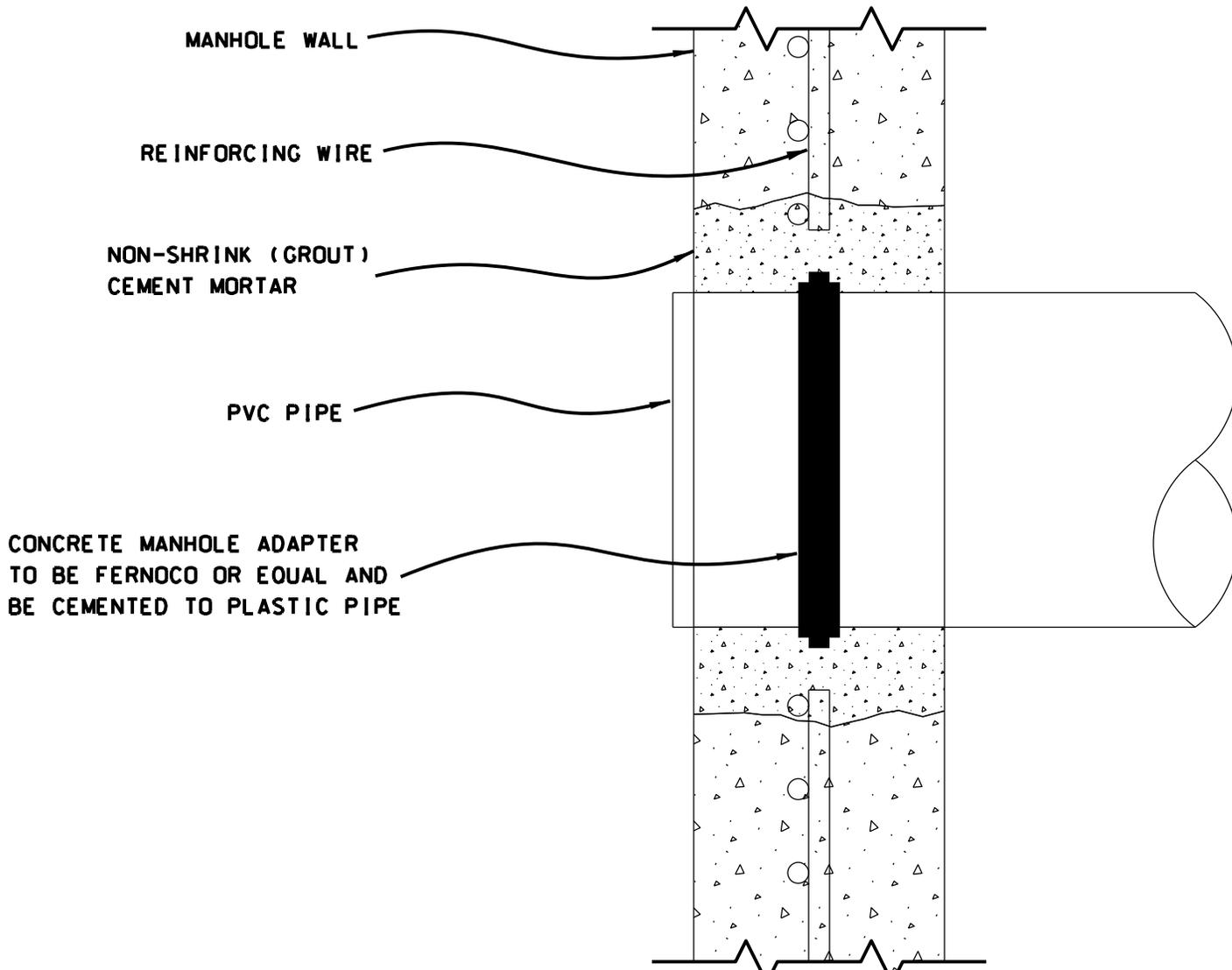
NOTE:
6" PIPE IS TYPICAL FOR SANITARY LEAD
4" PIPE IS TYPICAL FOR SUMP LEAD

DETAIL 9

CITY OF MT. PLEASANT - TYPICAL SEWER SERVICE CLEAN-OUT

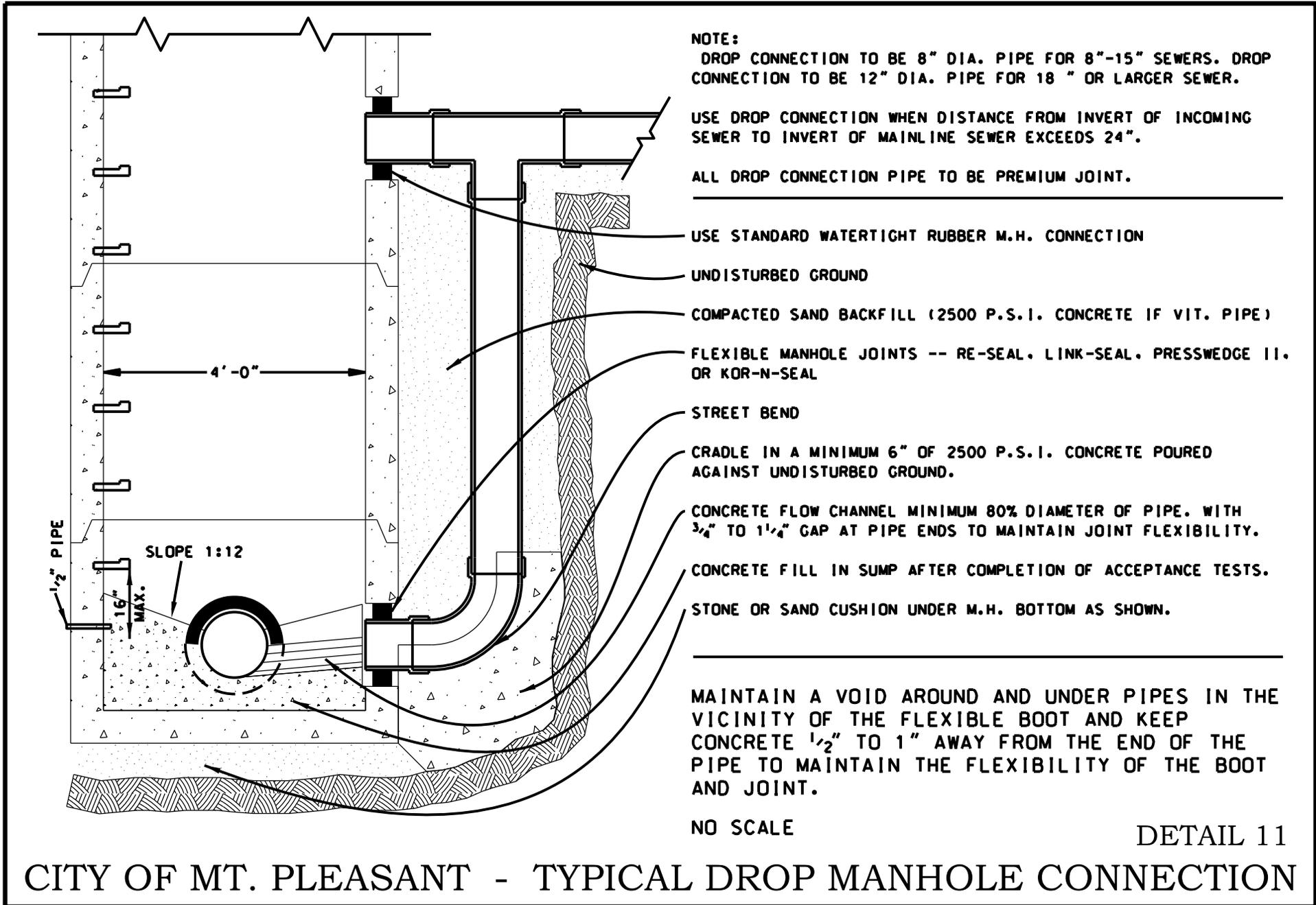
S.L.B. 4/7/00

NO SCALE



DETAIL 10

CITY OF MT. PLEASANT - TYPICAL PVC PIPE
CONNECTION TO EXISTSTING MANHOLE



NOTE:
 DROP CONNECTION TO BE 8" DIA. PIPE FOR 8"-15" SEWERS. DROP CONNECTION TO BE 12" DIA. PIPE FOR 18" OR LARGER SEWER.

USE DROP CONNECTION WHEN DISTANCE FROM INVERT OF INCOMING SEWER TO INVERT OF MAINLINE SEWER EXCEEDS 24".

ALL DROP CONNECTION PIPE TO BE PREMIUM JOINT.

USE STANDARD WATERTIGHT RUBBER M.H. CONNECTION

UNDISTURBED GROUND

COMPACTED SAND BACKFILL (2500 P.S.I. CONCRETE IF VIT. PIPE)

FLEXIBLE MANHOLE JOINTS -- RE-SEAL, LINK-SEAL, PRESSWEDGE II, OR KOR-N-SEAL

STREET BEND

CRADLE IN A MINIMUM 6" OF 2500 P.S.I. CONCRETE POURED AGAINST UNDISTURBED GROUND.

CONCRETE FLOW CHANNEL MINIMUM 80% DIAMETER OF PIPE. WITH 3/4" TO 1 1/4" GAP AT PIPE ENDS TO MAINTAIN JOINT FLEXIBILITY.

CONCRETE FILL IN SUMP AFTER COMPLETION OF ACCEPTANCE TESTS.

STONE OR SAND CUSHION UNDER M.H. BOTTOM AS SHOWN.

MAINTAIN A VOID AROUND AND UNDER PIPES IN THE VICINITY OF THE FLEXIBLE BOOT AND KEEP CONCRETE 1/2" TO 1" AWAY FROM THE END OF THE PIPE TO MAINTAIN THE FLEXIBILITY OF THE BOOT AND JOINT.

NO SCALE

DETAIL 11

CITY OF MT. PLEASANT - TYPICAL DROP MANHOLE CONNECTION

NO SCALE

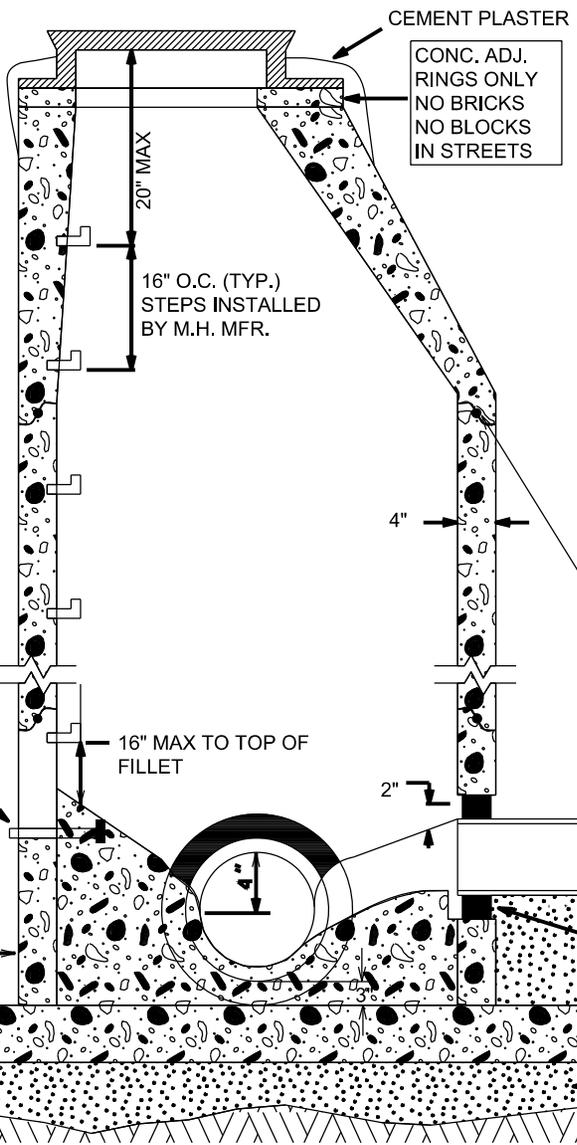
SANITARY MH COVER SHALL BE EJIW 1040 A FRAME OR APPROVED EQUAL COVER "A" IS SOLID MH COVER AND BE STAMPED W/ THE CITY OF MT PLEASANT LOGO

FOR STORM SEWERS USE EJIW 1040 B COVER (HAS HOLES)

BURY IN GRAVEL STREETS 4" MIN ADJUSTMENT 8" IN GRAVEL ST.

CEMENT PLASTER ALL JOINTS AND LIFT HOLES 1/2" THICK - FEATHER TO 0" TO 6" FROM JOINT OR HOLE INSIDE & OUTSIDE

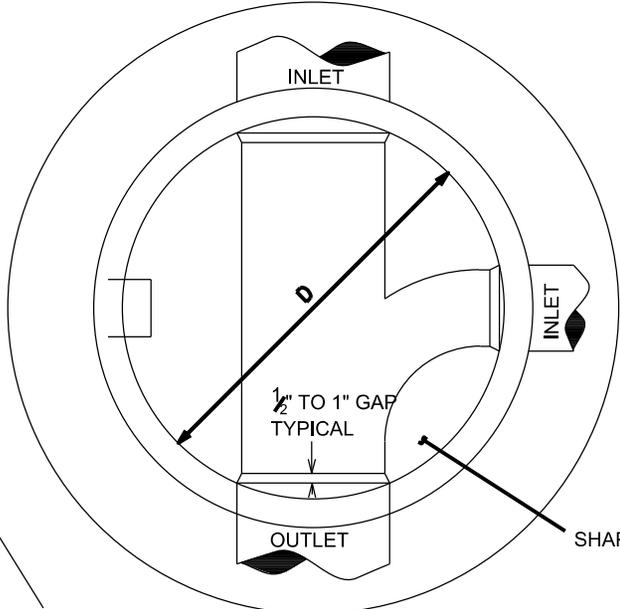
WET DOWN STRUCTURE SO MORTAR WILL STICK.



WRAP ENTIRE CASTING AND ADJUSTING RINGS WITH 24" MIN WIDTH GEOTEXTILE FABRIC, MINIMUM 1' OVERLAP.

CEMENT PLASTER
CONC. ADJ.
RINGS ONLY
NO BRICKS
NO BLOCKS
IN STREETS

D - MANHOLE DIA.
8" - 24" SEWER D = 4'-0"
27"-33" SEWER D = 5'-0"
36"-48" SEWER D = 6'-0"
MANHOLE TEE WILL BE ALLOWED ON SAN. SEWER OVER 48" DIA.



PRECAST CONCRETE MANHOLE ASTM C478-"O"- RING JOINTS PER ASTM C-443

TEST PIPE TO BE 1/2" DIA. NON-CORROSIVE PIPE INSTALLED AT TIME OF M.H. INSTALLATION.

SHAPED CONCRETE FILLET TO BEGIN AT 80% OF HEIGHT AND SLOPE UPWARDS TO WALL, A MIN. OF 2". PRECAST MONOLITHIC BOTTOM SECTION MAY BE USED IF SET ON 3" OF STONE.

FLEXIBLE M.H. JOINTS - RESEAL, KOR - N - SEAL ETC.

USE STANDARD WATERTIGHT RUBBER M.H. JOINTS
STORM MANHOLES DO NOT REQUIRE PREMIUM PIPE CONNECTIONS

COMPACTED SAND

CITY OF MT. PLEASANT

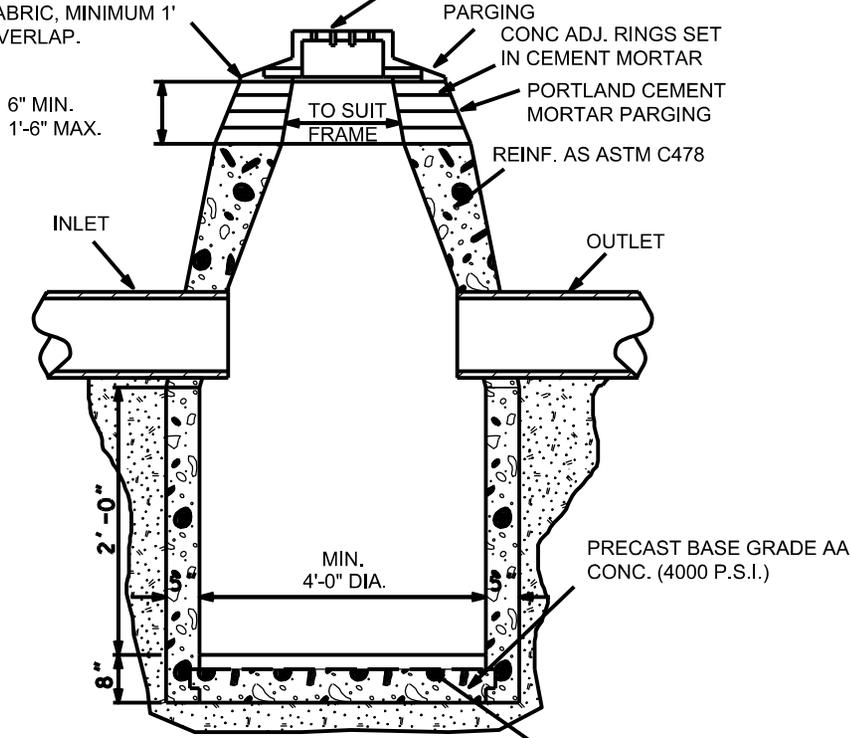
DETAIL 12
TYPICAL MANHOLE DETAIL

WRAP ENTIRE CASTING AND ADJUSTING RINGS WITH 24" MIN. WIDTH GEOTEXTILE FABRIC, MINIMUM 1' OVERLAP.

C.B. FRAME & COVER SET ON MORTAR BED.

CATCH BASIN SHALL BE USED PRIOR TO ANY ENTRY OF RUNOFF INTO A STORM SEWER MAIN

C.B. FRAME & COVER SET ON MORTAR BED.



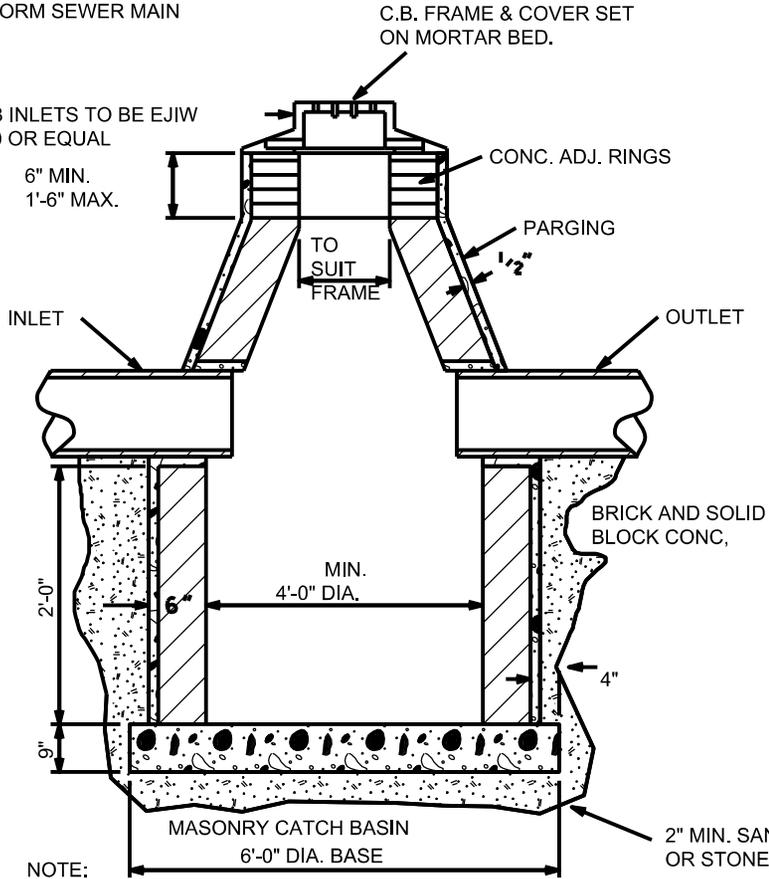
PRECAST CATCH BASIN

NOTE:

CATCH BASIN FRAME & GRATE SHALL BE CITY OF MT. PLEASANT STANDARD EJIW #7000 OR EQUAL AND SHALL BE STAMPED WITH THE SHAPE OF A FISH AND THE WORDS "DUMP NO WASTE!" AND "DRAINS TO RIVER".

PRECAST CONC. BASES MAY BE USED IN LIEU OF CAST IN PLACE BASES DETAILED. PRECAST BASES SHALL BE 8" THICK, GRADE AA CONC. (4000 P.S.I.) W/4"x4" W4xW4 W.W.F. PLACED 3" BELOW TOP OF BASE. PRECAST BASES SHALL BE SET LEVEL ON A SAND CUSHION, MIN. THICKNESS 2"

CURB INLETS TO BE EJIW #7000 OR EQUAL



NOTE:

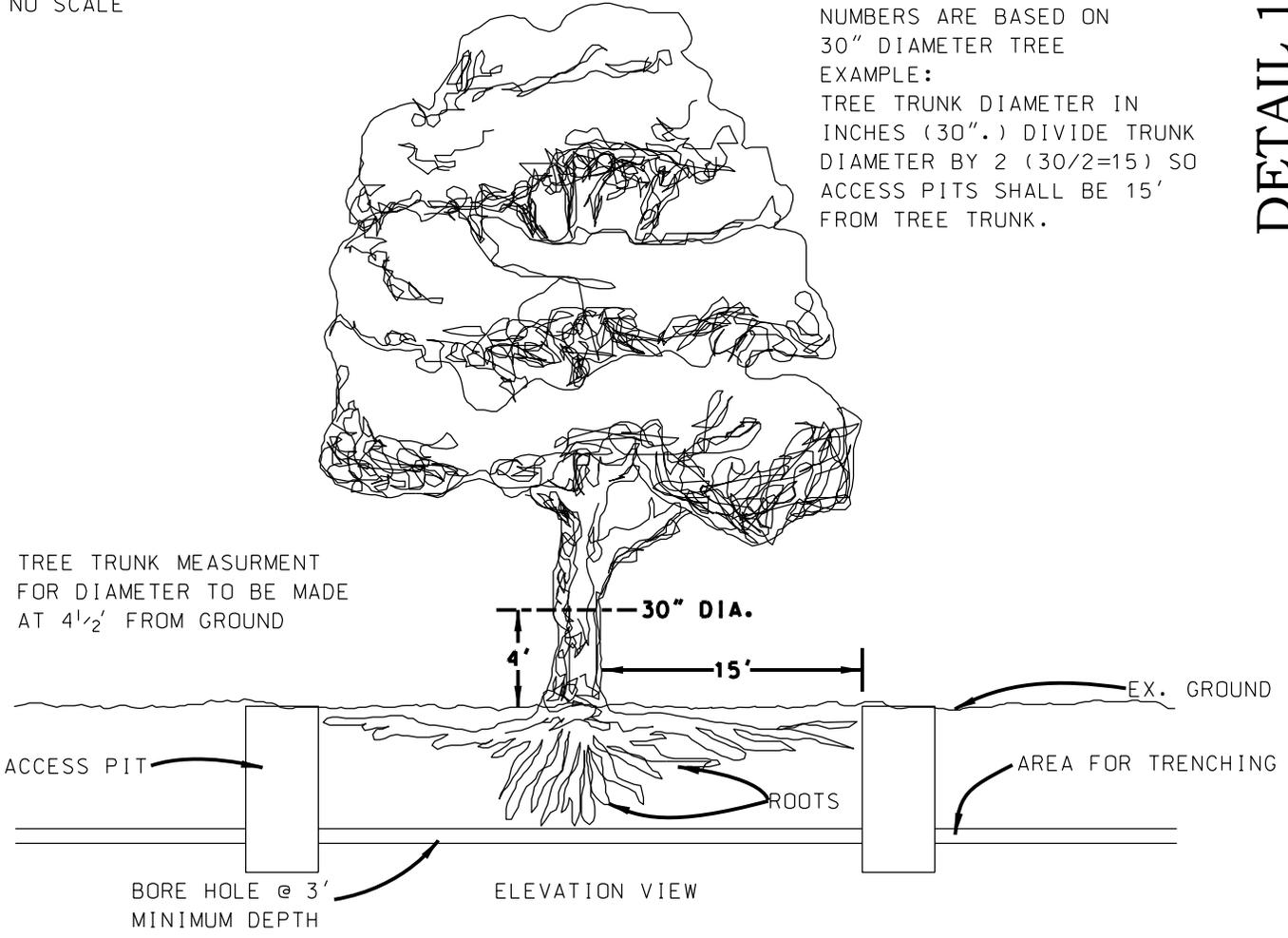
EXISTING C.B. LEAD SIZES VARY. STEPS SHALL BE INSTALLED IN ALL 4' DIAMETER STRUCTURES MORE THAN 4' DEEP AND SHALL BE PLACED AT 16" INTERVALS AND OF APPROVED CITY DESIGN.

PARGING OVER MASONRY ON EXTERIOR SURFACES SHALL BE 1:2 CEMENT MORTAR, ONE COAT.

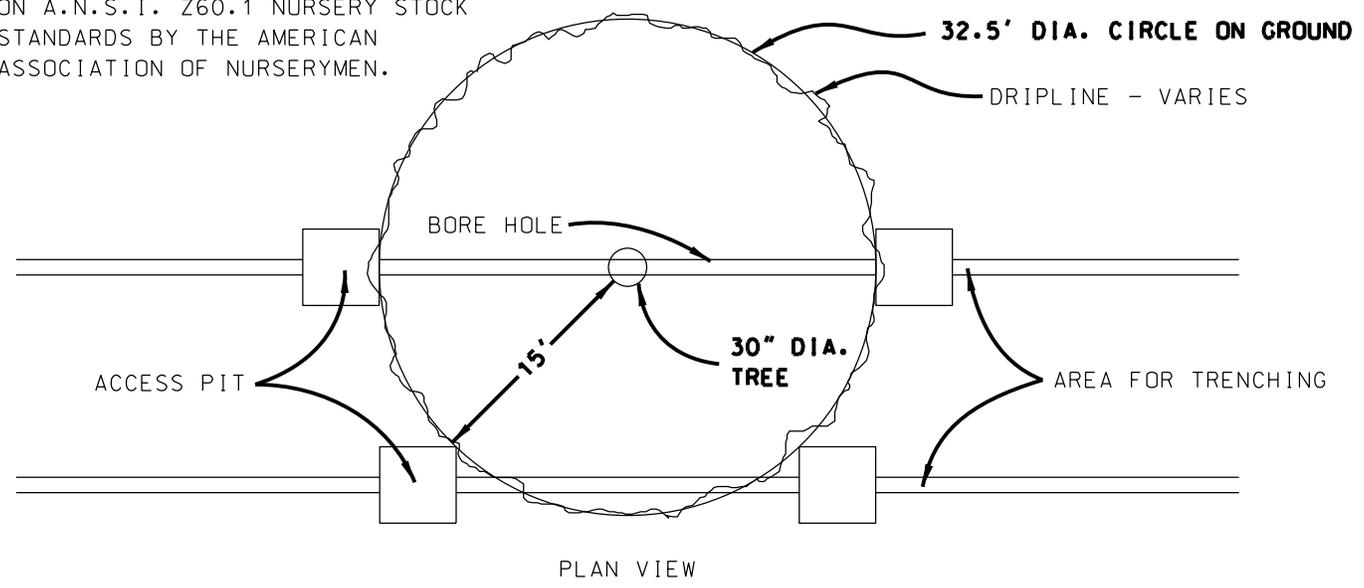
DETAIL 13

REV 12/15/00
NO SCALE

NUMBERS ARE BASED ON
30" DIAMETER TREE
EXAMPLE:
TREE TRUNK DIAMETER IN
INCHES (30".) DIVIDE TRUNK
DIAMETER BY 2 (30/2=15) SO
ACCESS PITS SHALL BE 15'
FROM TREE TRUNK.

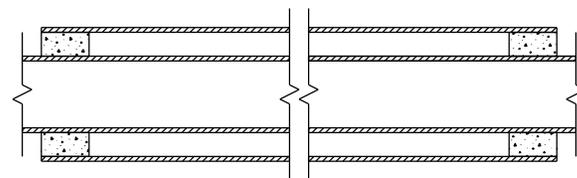
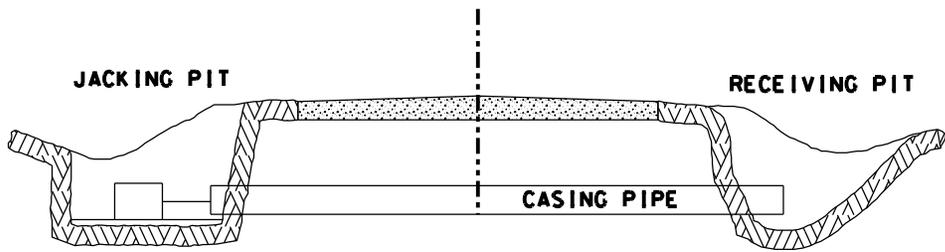


THESE RECOMMENDATIONS ARE BASED
ON A.N.S.I. Z60.1 NURSERY STOCK
STANDARDS BY THE AMERICAN
ASSOCIATION OF NURSEYMEN.

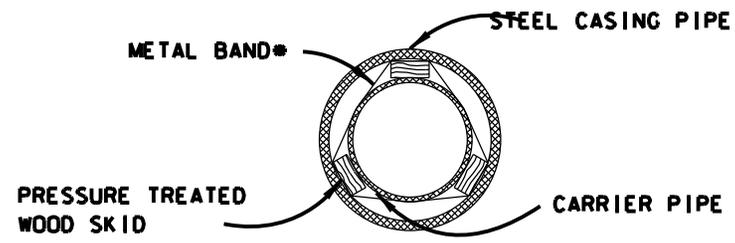
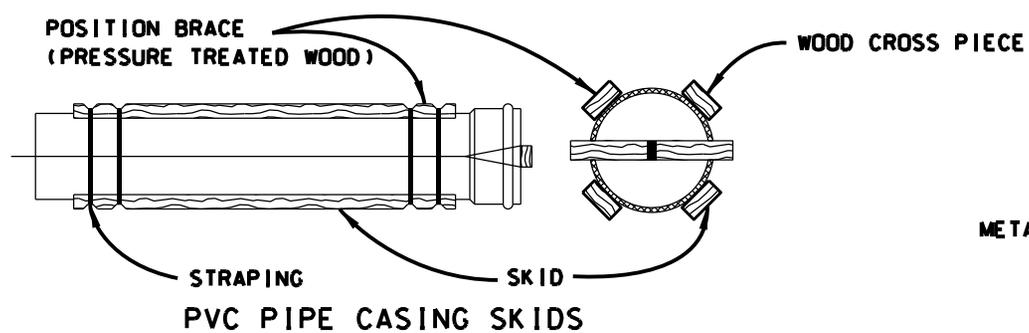


CITY OF MT. PLEASANT - TREE BORING DETAIL

REV 12/15/00
NO SCALE



CONSTRUCT A WATERTIGHT MASONRY WALL (MIN. 8" LENGTH) BETWEEN CASING AND CARRIER PIPE AT BOTH ENDS.



VIT. PIPE CASING SKIDS

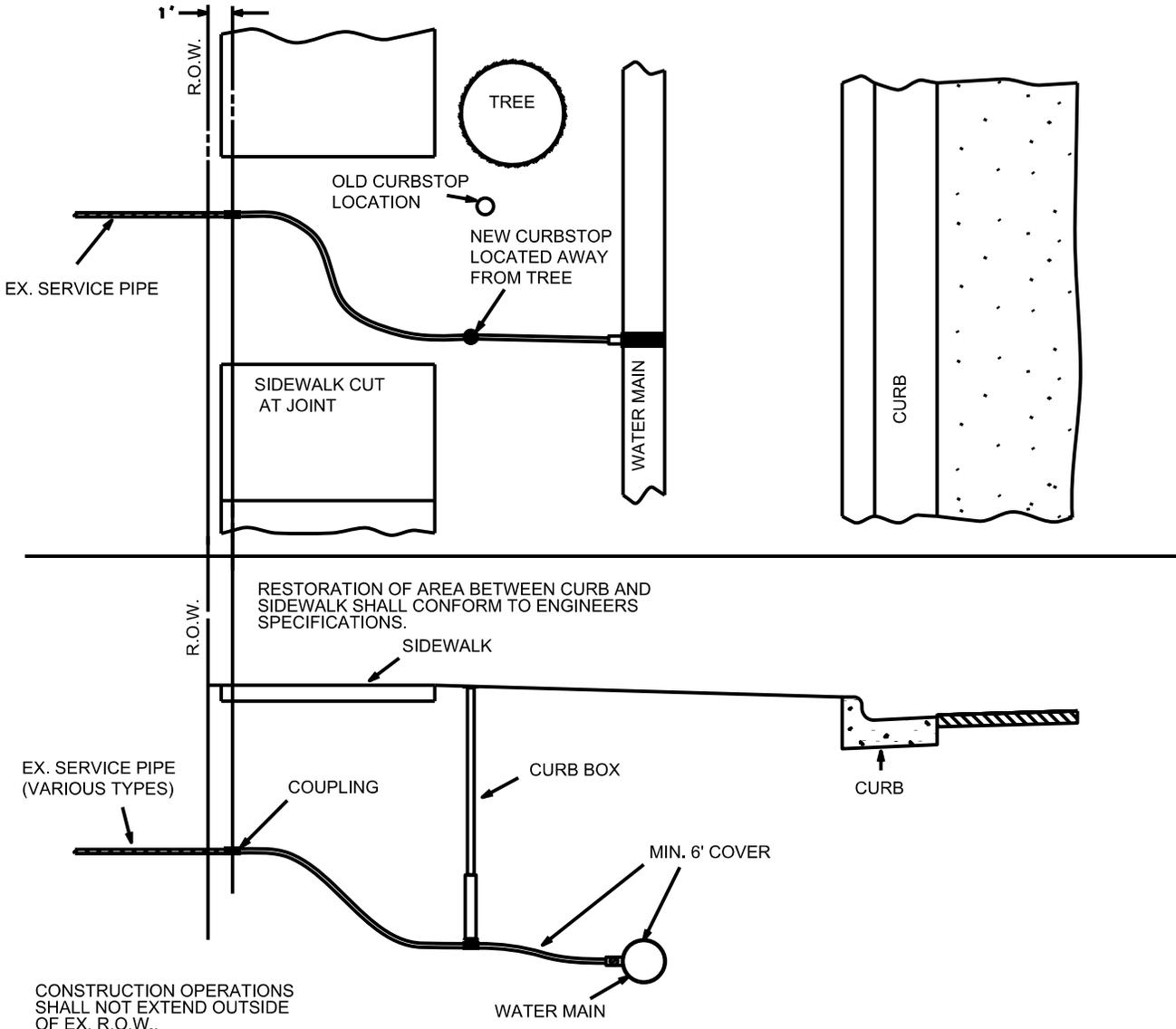
*OR AS RECOMMENDED BY CARRIER PIPE SUPPLIER.

FOR ADDITIONAL SPECIFICATIONS AND INFORMATION SEE SECTION 8 OF CITY STANDARD CONSTRUCTION SPECIFICATIONS.

DETAIL 15

CITY OF MT. PLEASANT - TYPICAL BORING & JACKING DETAIL

NO SCALE



- NOTE:
- CURB AND GUTTER SHALL BE REMOVED FROM JOINT TO JOINT AS A MINIMUM AND SHALL BE REPLACED BY CONTRACTOR.
 - EACH SERVICE TO SERVE ONLY ONE HOUSE.
 - WATER SERVICE PIPE SHALL BE OF TYPE AND SIZE SPECIFIED IN THE CITY OF MT.PLEASANT STANDARD SPECIFICATION BOOK.
 - THE METHOD OF EXCAVATION, PLACING OF PIPE, JOINTING, TESTING, AND BACKFILLING SHALL CONFORM TO THE REQUIREMENTS OF THE DIVISION OF PUBLIC WORKS
 - NO WORK SHALL BEGIN WITHOUT FIRST RECEIVING A WRITTEN PERMIT FROM THE D.P.W..
 - NO WATER SERVICE SHALL BE COVERED UNTIL AFTER IT HAS BEEN INSPECTED AND APPROVED BY AUTHORIZED PERSONNEL OF THE D.P.W. (24 HOUR NOTICE REQUIRED).
 - PROPERTY DISTURBED DURING REPLACEMENT SHALL BE RESTORED TO PREVIOUS OR BETTER CONDITION.

DETAIL 16

CITY OF MT. PLEASANT-TYPICAL WATER SERVICE RE-CONNECTION

NO SCALE

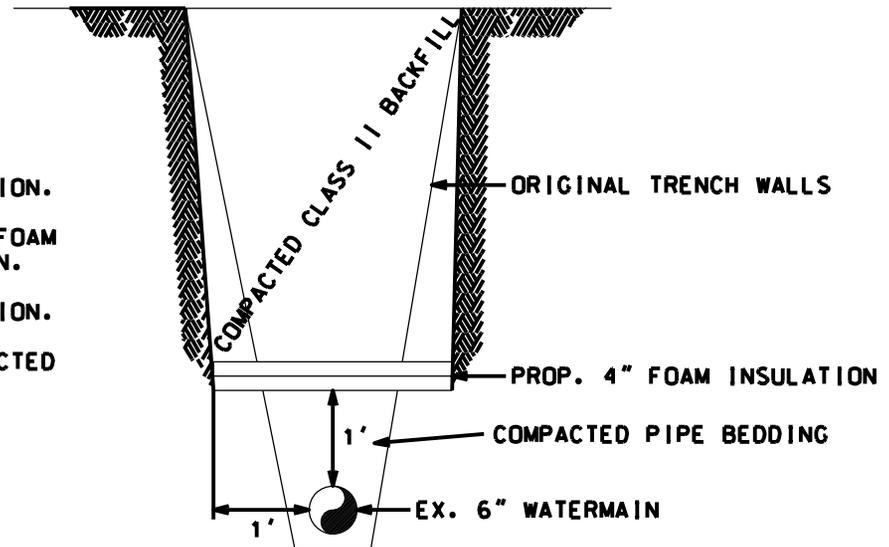
NOTES:

BASE FOR INSULATION TO BE LEVELED AND COMPACTED TO PREVENT CRACKING AND BREAKING OF THE INSULATION.

INSULATION TO CONSIST OF (2) 2" SHEETS OF STYROFOAM 40 HIGH LOAD BRAND FOAM NON-ABSORBANT INSULATION.

JOINTS TO BE OVERLAPPED BY TOP LAYER OF INSULATION.

INSULATE WATERMAINS AS SHOWN ON PLAN OR AS DIRECTED BY THE ENGINEER.

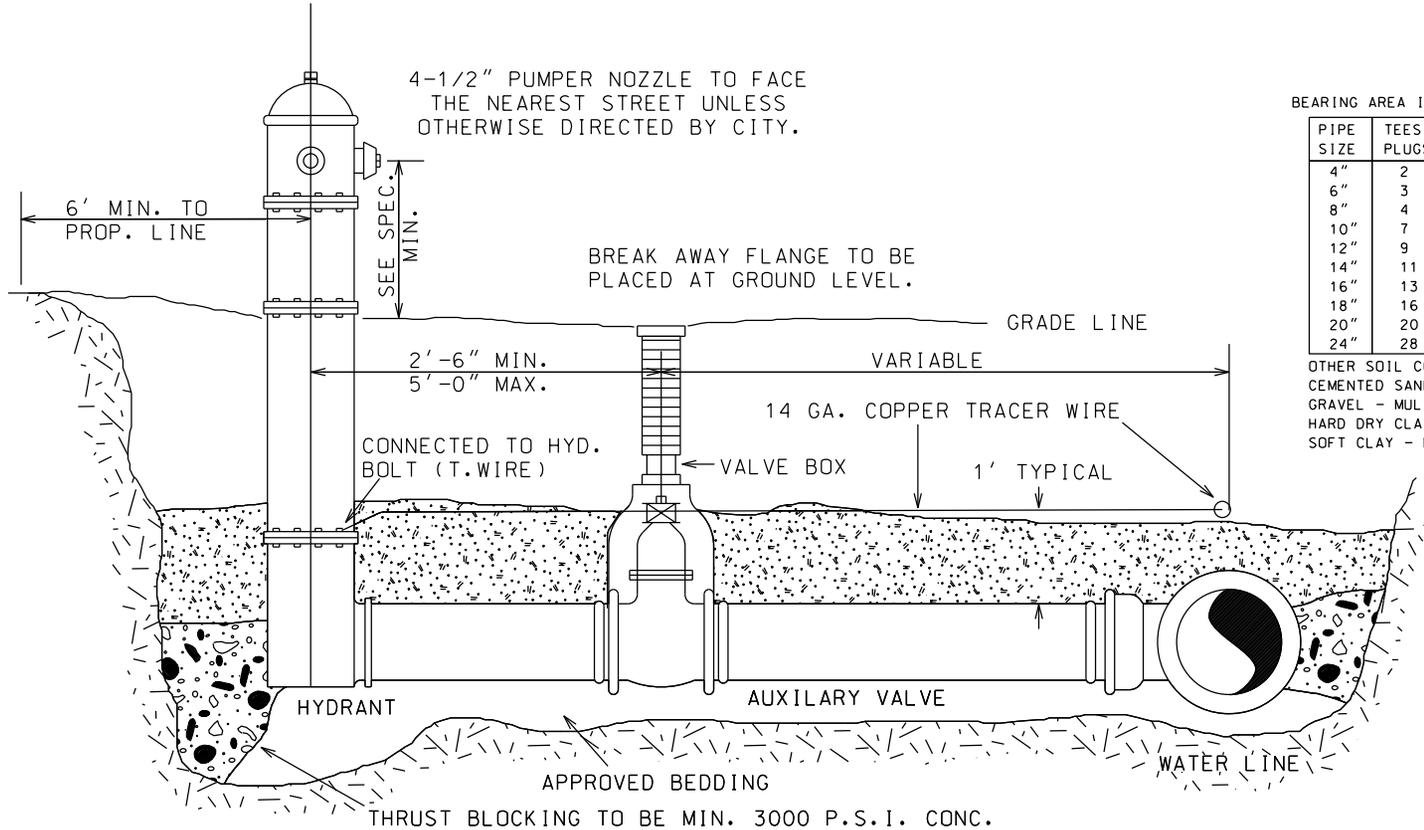


DETAIL 17

CITY OF MT. PLEASANT - TYPICAL WATERMAIN INSULATING DETAIL

NO SCALE

DRAWN: J.E.M
REVISED: 12-15-00



BEARING AREA IN SQ. FT. AGAINST TRENCH WALL IN SAND:

PIPE SIZE	TEES PLUGS	HYDRANTS 90° ELS	WYES 45° ELS	BEARING AREA IN SQ. FT. AGAINST TRENCH WALL IN SAND:	
				22.5° ELS	11.25° ELS
4"	2	2	1	1	1
6"	3	3	2	1	1
8"	4	6	3	2	1
10"	7	9	5	3	2
12"	9	11	6	3	2
14"	11	15	8	5	3
16"	13	20	10	6	3
18"	16	25	12	7	4
20"	20	28	14	8	4
24"	28	40	20	11	6

OTHER SOIL CONDITIONS:
CEMENTED SAND OR HARDPAN - MULTIPLY ABOVE BY 0.5
GRAVEL - MULTIPLY ABOVE BY 0.7
HARD DRY CLAY - MULTIPLY ABOVE BY 0.7
SOFT CLAY - MULTIPLY ABOVE BY 2.0

HYDRANTS TO BE BREAK-AWAY, TRAFFIC MODEL BY EAST JORDAN IRON WORKS OR TRAVERSE CITY IRON WORKS; AWWA C502, MECHANICAL JOINT, OPENING CLOCKWISE, WITH PLUGGED DRAIN OUTLET AND 1 3/4 INCH OPENING NUT & WITH 2 2 1/2 INCH HOSE NOZZLES AND 1 4 1/2 INCH PUMPER NOZZLE.

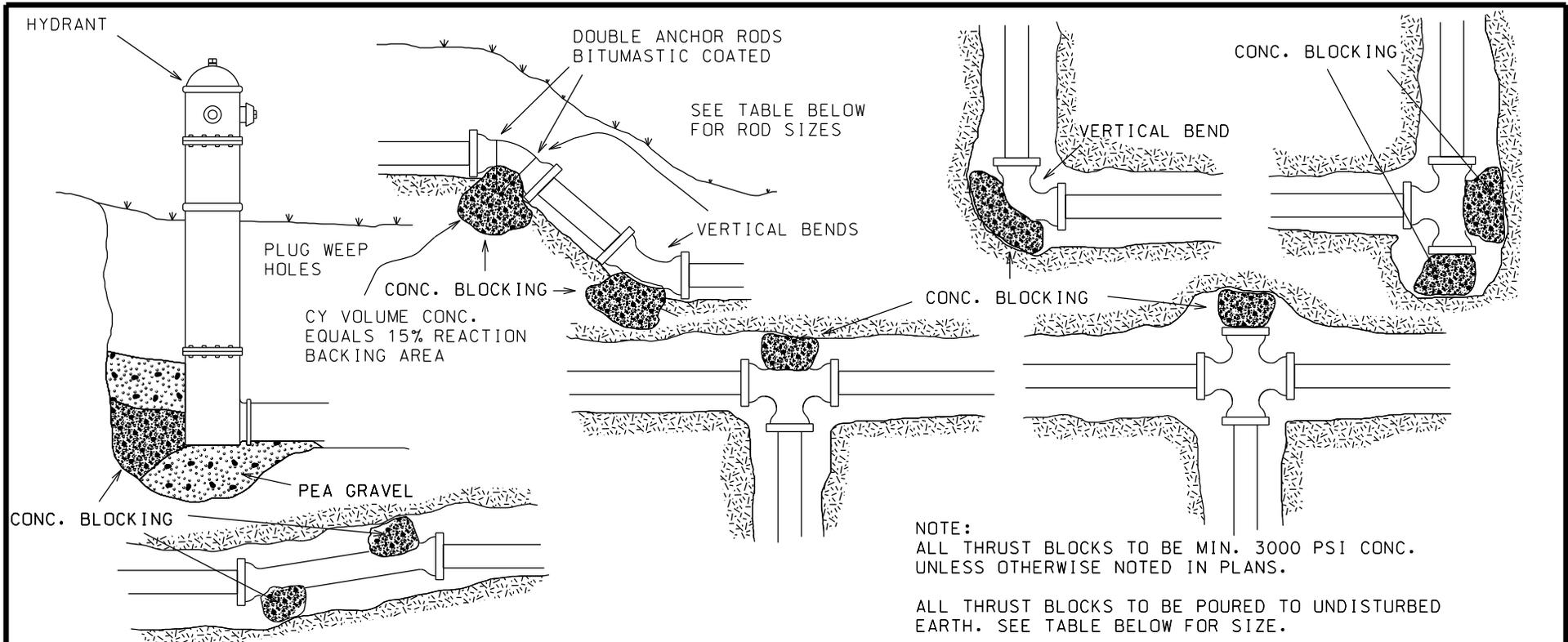
GATE VALVES TO BE AWWA C-509 MECHANICAL JOINTS, RESILIENT WEDGE, NONRISING STEM, WATEROUS SERIES 500 OR APPROVED EQUAL. TURN COUNTER CLOCKWISE TO OPEN.

DEPTH OF BURY, 6 FEET MINIMUM TO 7 FEET MAXIMUM. BARREL EXTENSION, WHERE REQUIRED TO MEET THE MINIMUM PORTHEIGHT SHALL BE INSTALLED SUCH THAT BREAK-AWAY FLANGE IS AT FINISHED GRADE LEVEL.

FOR ADDITIONAL SPECIFICATIONS SEE SECTION 8 OF CITY STANDARD CONSTRUCTION SPECIFICATIONS.

DETAIL 18

CITY OF MT. PLEASANT -- TYPICAL FIRE HYDRANT & VALVE LOCATION



NOTE:
ALL THRUST BLOCKS TO BE MIN. 3000 PSI CONC.
UNLESS OTHERWISE NOTED IN PLANS.

ALL THRUST BLOCKS TO BE POURED TO UNDISTURBED
EARTH. SEE TABLE BELOW FOR SIZE.

KEEP CONCRETE CLEAR OF ALL BOLTS & JOINTS.

PIPE SIZE	ROD SIZE
4" TO 6"	#4
8" TO 10"	#6
12"	#8
20" TO 24"	#10

BEARING AREA IN SQ. FT. AGAINST TRENCH WALL IN SAND:

PIPE SIZE	TEES PLUGS	HYDRANTS 90° ELS	WYES 45° ELS	22.5° ELS	11.25° ELS
4"	2	2	1	1	1
6"	3	3	2	1	1
8"	4	6	3	2	1
10"	7	9	5	3	2
12"	9	11	6	3	2
14"	11	15	8	5	3
16"	13	20	10	6	3
18"	16	25	12	7	4
20"	20	28	14	8	4
24"	28	40	20	11	6

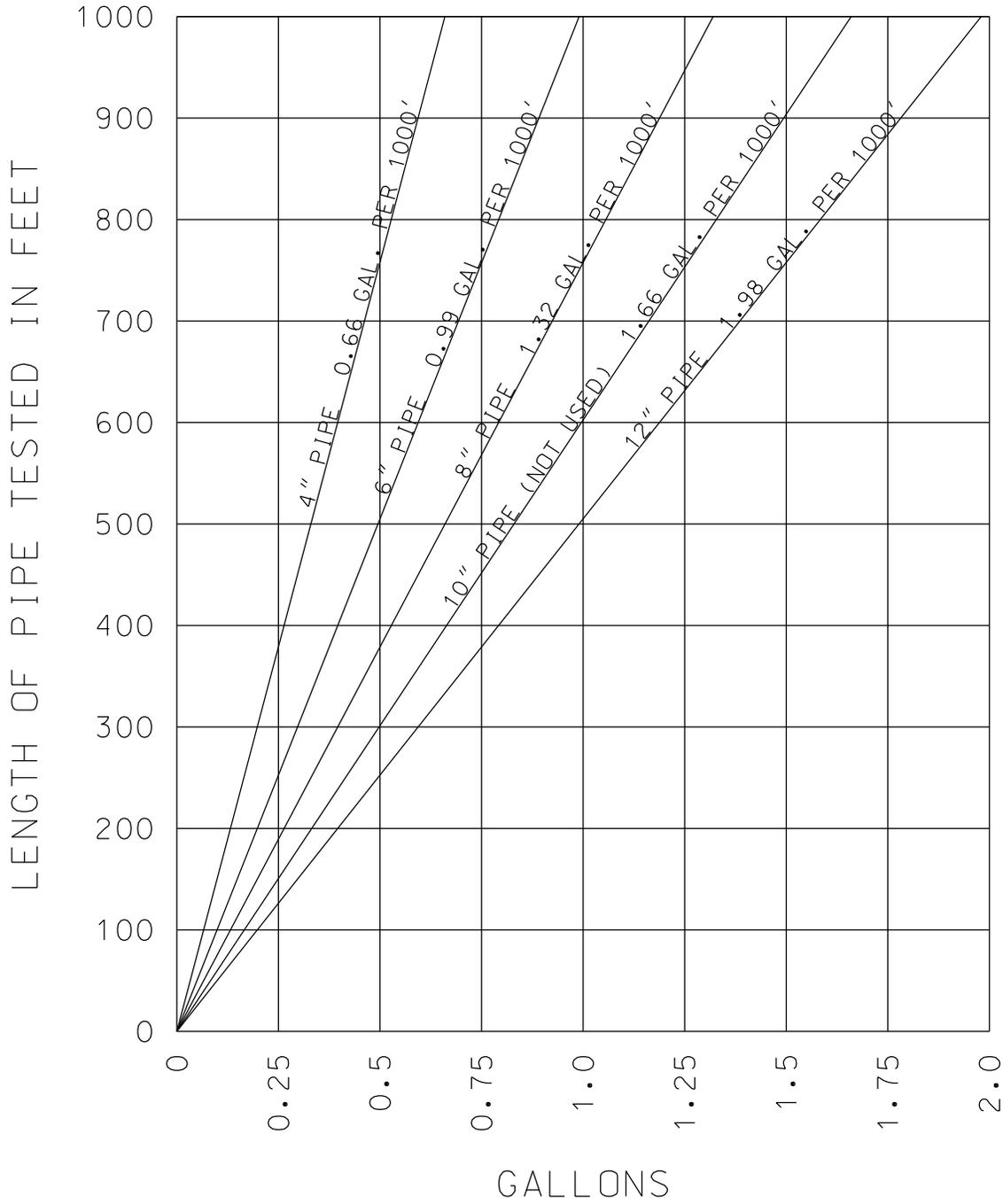
NO SCALE

OTHER SOIL CONDITIONS:
CEMENTED SAND OR HARDPAN - MULTIPLY ABOVE BY 0.5
GRAVEL - MULTIPLY ABOVE BY 0.7
HARD DRY CLAY - MULTIPLY ABOVE BY 0.7
SOFT CLAY - MULTIPLY ABOVE BY 2.0

DETAIL 19

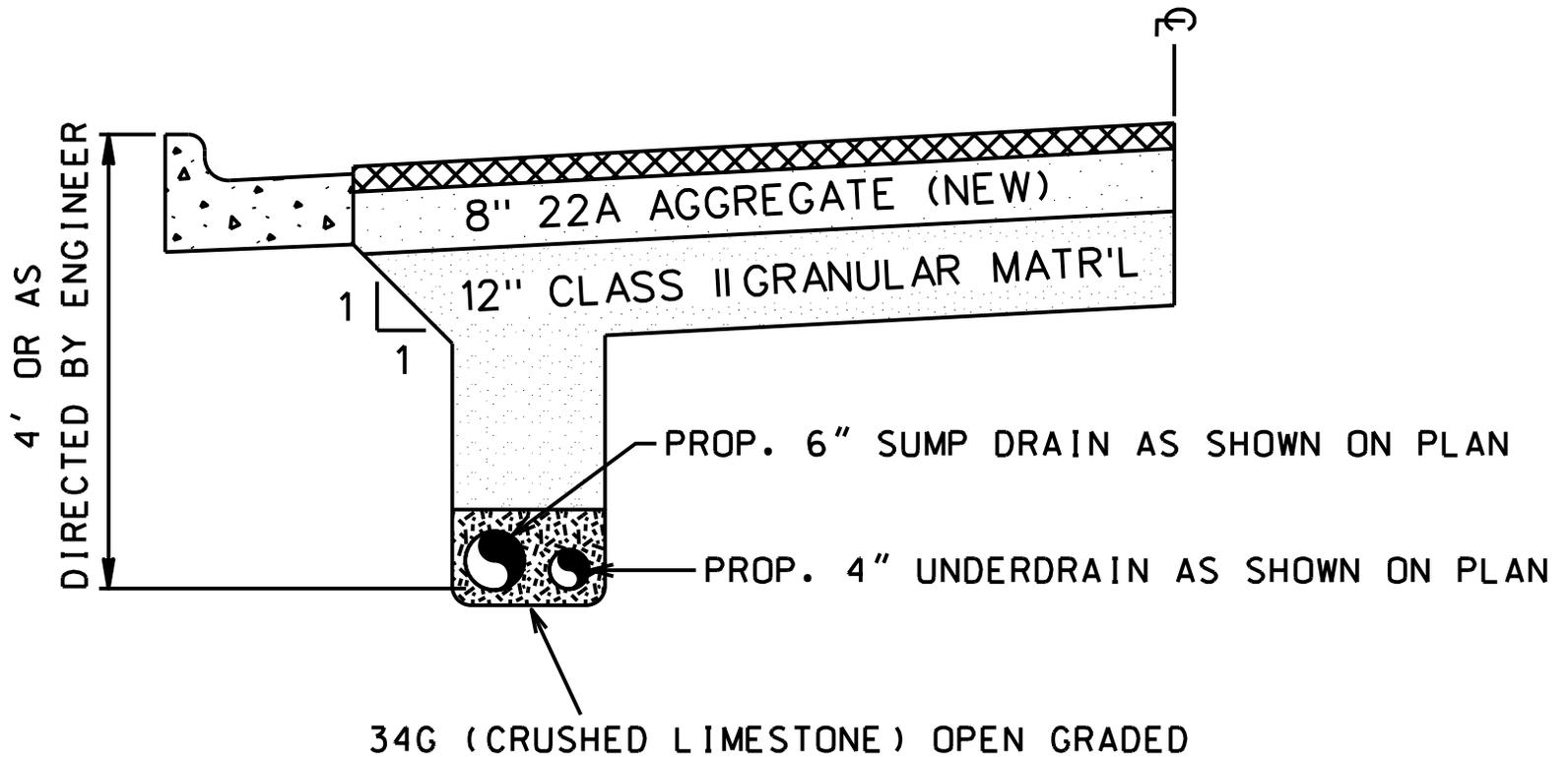
CITY OF MT. PLEASANT -- TYPICAL LOCATION OF THRUST BLOCKS

2 HOUR PVC WATER MAIN TEST ALLOWABLE LEAKAGE



ALLOWABLE WATER MAIN LEAKAGE AWWA C-900
 10.45 GAL. PER INCH DIA. PER MILE PER 24 HOURS
 0.1649 GAL. PER INCH DIA. PER 1000' PER 2 HOURS

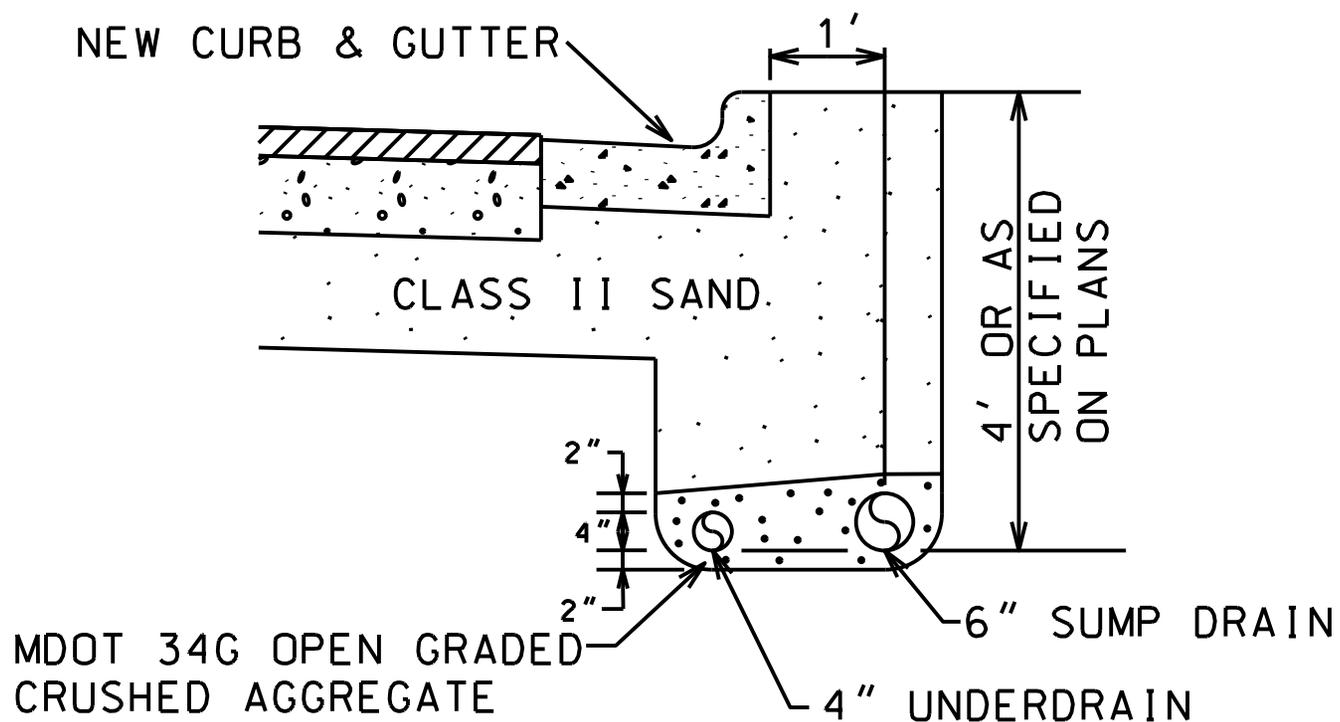
EXAMPLE: 528' OF 6" PIPE
 MAX. LOSS = $528 / 1000 * 6 * 0.1649 = 0.522$ GAL.



DETAIL 21

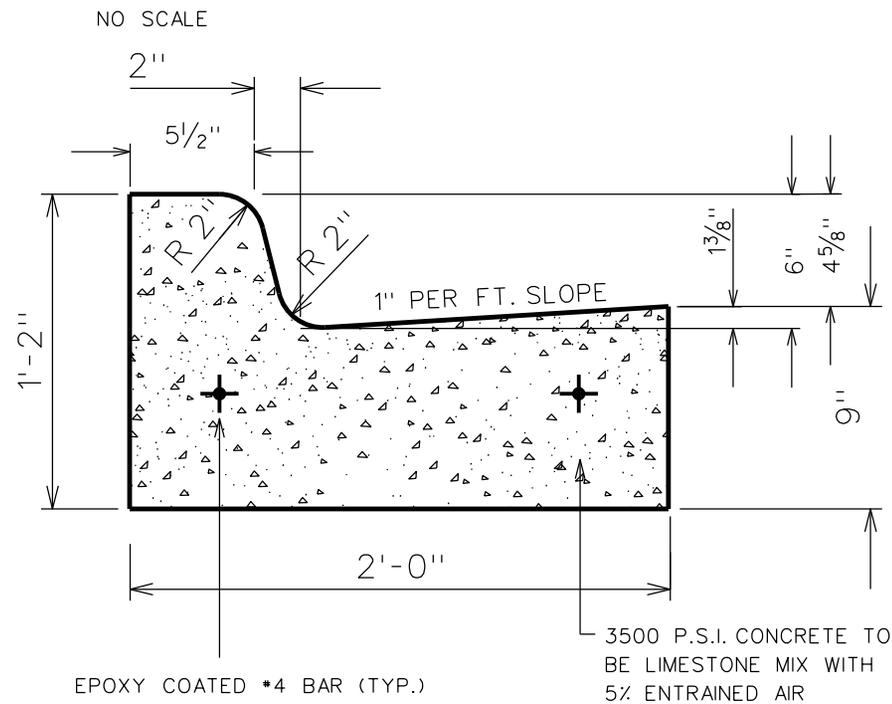
CITY OF MT. PLEASANT - TYPICAL SUMP AND UNDER DRAIN DETAIL FOR EXISTING CURB & GUTTER

NO SCALE



DETAIL 22

CITY OF MT. PLEASANT - TYPICAL SUMP AND UNDER DRAIN DETAIL FOR NEW CURB & GUTTER



TYPICAL CURB DETAIL EQUALS M.D.O.T. F4

NOTE:

A. EXPANSION JOINTS SHALL:

1. BE PLACED AT ALL SPRING LINES AND POINTS OF CURVATURE AND POINTS OF TANGENCY.
2. BE PLACED A MINIMUM OF EVERY 100 LINEAL FEET INTERVAL.
3. BE PLACED AT EXPANSION JOINTS IN ABUTTING PAVEMENT.
4. BE PLACED AT LOCATIONS SHOWN IN OTHER DETAILS AND TYPICAL DRAWINGS FOR HANDICAP RAMPS, SIDEWALKS, CONCRETE DRIVEWAY APPROACHES AS SHOWN ON THE PLANS AND/OR AS DIRECTED IN THE FIELD BY THE INSPECTOR OR ENGINEER.
5. BE PLACED AT ENDS OF PREVIOUSLY POURED CURB, IF PREVIOUS POUR WAS MADE 30 MINUTES OR MORE PRIOR TO THE CURRENT POUR (THIS INCLUDES AT BOTH ENDS OF CURB AND GUTTER REPLACEMENT ABUTTING EXISTING CONCRETE).

EXPANSION MATERIAL SHALL EXTEND THE FULL DEPTH AND WIDTH OF STRUCTURE WITH NO CONCRETE BRIDGING BETWEEN THE SEPARATED CONCRETE.

B. CONTRACTION JOINTS

(USED ONLY IF SECTION IS STEEL REINFORCED)

1. CONTRACTION JOINTS SHALL BE PLACED OPPOSITE AND IN LINE WITH CONTRACTION JOINTS IN ABUTTING CONCRETE PAVEMENT.

C. PLANE OF WEAKNESS JOINTS SHALL:

1. BE PLACED UNIFORMLY (10 FT. MAX.) BETWEEN CONTRACTION AND/OR EXPANSION JOINTS.
2. BE PLACED AT STRUCTURES SUCH AS VALVES, POLES AND MANHOLES WHEN THESE STRUCTURES ARE WITHIN OR WITHIN A PORTION OF THE CURB AND GUTTER.

D. ALL CURB AND GUTTER IS TO HAVE A 4 INCH MIN. CLASS II SAND OR 22A AGGREGATE BASE (ON CITY CONTRACTS BASE IS INCIDENTAL TO CURB AND GUTTER PRICE).

E. ALL DRIVEWAY CUTS ARE TO HAVE THE BACK EDGE OF CURB A MIN. OF 1" ABOVE THE FLOW LINE OF THE GUTTER. AT LOCATIONS WHERE THE DRIVEWAY SLOPES AWAY FROM THE CURB THEN A HIGHER BACK OF CURB AT THE DRIVEWAY OPENINGS MAY BE REQUIRED TO KEEP AS MUCH WATER AS POSSIBLE FROM DRAINING ON TO THE DRIVEWAY. THE RECOMMENDED MAX. HEIGHT IS 2 INCHES.

F. WHITE PIGMENTED LIQUID CURING COMPOUND ASTM C309, TYPE 1-D, CLASS B VEHICLE, RATE OF 1 GALLON PER 200 SQ. FEET IS TO BE APPLIED TO ALL EXPOSED CONCRETE AS SOON AS FREE WATER LEAVES THE SURFACE.

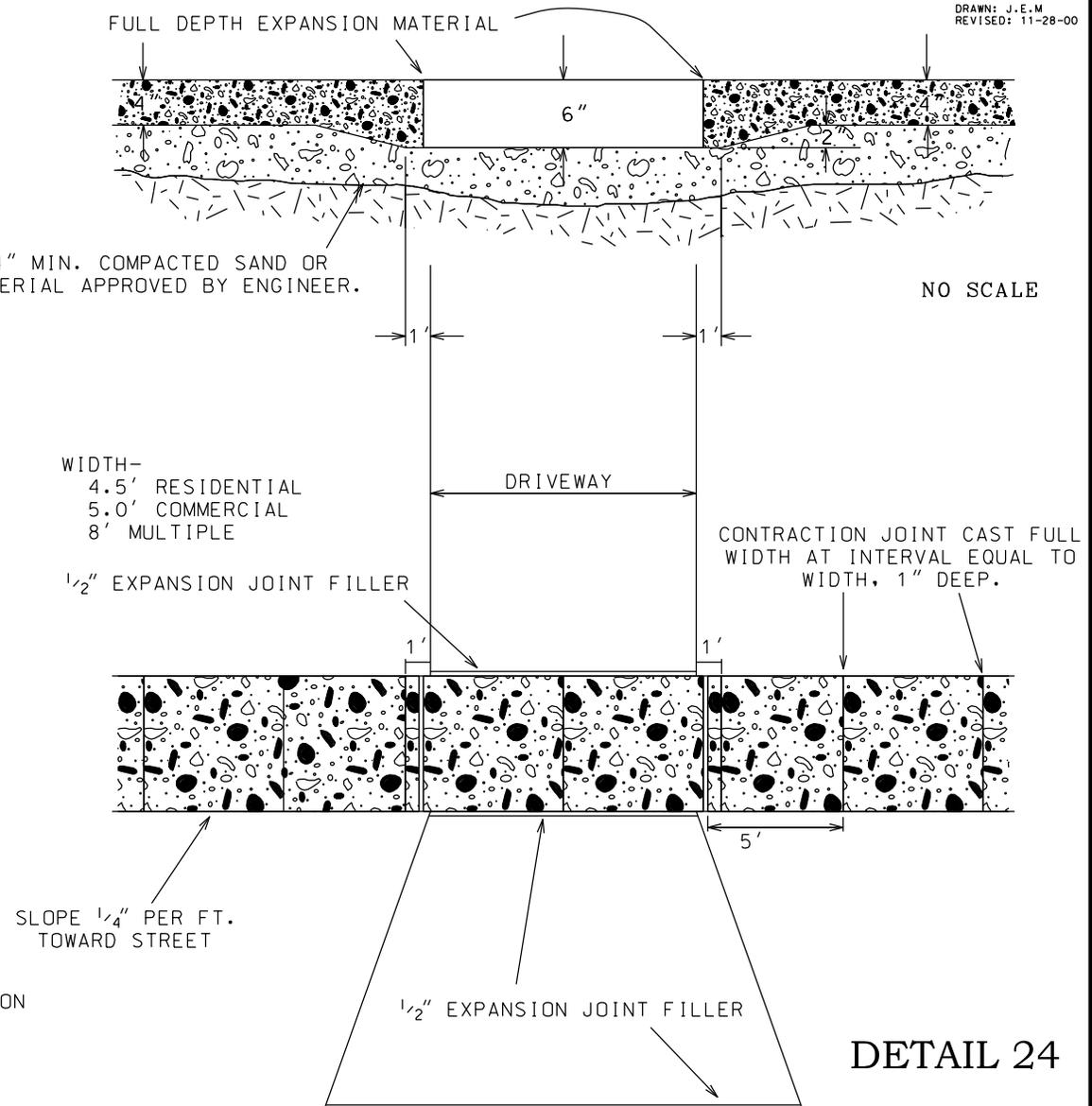
DETAIL 23

CITY OF MT. PLEASANT - TYPICAL CURB AND GUTTER

DRAWN: J.E.M
REVISED: 11-28-00

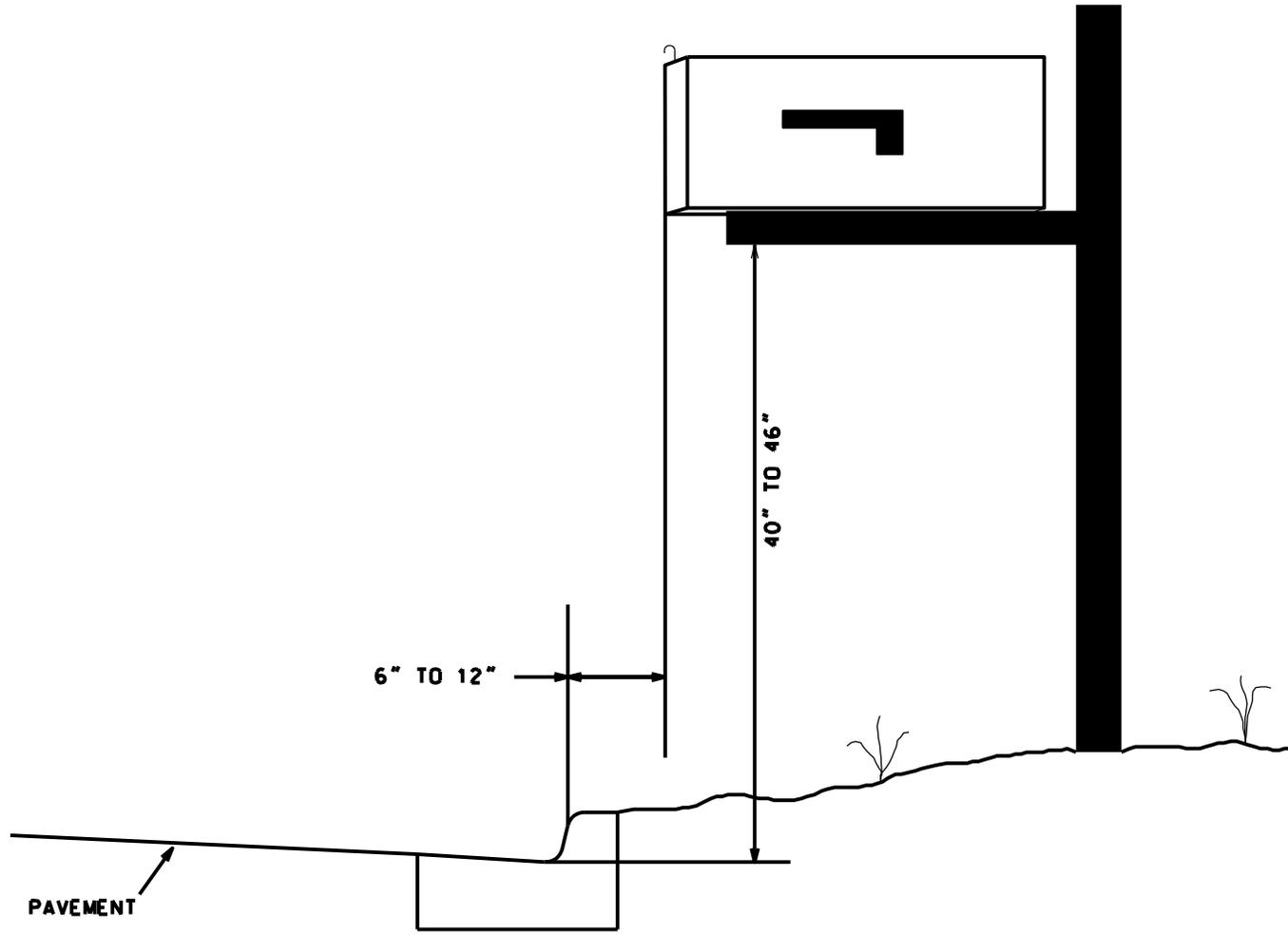
NOTE:

- FOR SIDEWALK WIDTH SEE CITY ENGINEER IF EXISTING SIDEWALK DIFFERS.
- 1/2 " EXPANSION JOINT (FILLER) MATERIAL TO BE PLACED AT ALL POINTS WHERE NEW CONCRETE ABUTS EXISTING CONCRETE.
- CONCRETE - CLASS A 3500 P.S.I. 5%±-1%, AIR ENTRAINED - 6 SACKS/CU. YD. 4" SLUMP. MAXIMUM. LIMESTONE AGG.
- 1" EXPANSION JOINT FILLER TO BE PLACED AT 50' MAXIMUM INTERVALS (FULL DEPTH)
- SIDEWALKS TO BE A MINIMUM OF 4" IN DEPTH EXCEPT AT DRIVEWAYS WHERE DEPTH SHALL BE INCREASED TO 6" AS SHOWN IN DETAIL, AT RIGHT.
- ALL VALVES SHALL BE SEPARATELY BOXED OUT WITH EXPANSION JOINT FILLER.
- CURING COMPOUND SHALL BE APPLIED AT A RATE OF 1 GALLON PER 200 S.F. OF SURFACE IMMEDIATELY AFTER FREE WATER HAS LEFT THE SURFACE.
- CONCRETE SURFACE SHALL BE LIGHTLY BROOMED IN A TRANSVERSE DIRECTION PRIOR TO CURING.
- ALL FRESH CONCRETE SHALL BE PROTECTED FROM THE ELEMENTS, BY THE CONTRACTOR FOR NOT LESS THAN 3 DAYS.
- NEW SIDEWALKS TO BE 1/2 ' OFF PROPERTY LINE UNLESS MATCHING TO EXISTING WALK.
- FOR ADDITIONAL SPECIFICATIONS AND INFORMATION SEE SECTION 12 OF THE CITY STANDARD CONSTRUCTION SPECIFICATIONS.



CITY OF MT. PLEASANT -- TYPICAL SIDEWALK DETAIL

NO SCALE



CITY OF MT. PLEASANT

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TYPICAL MAIL BOX PLACEMENT

DETAIL 26