2024
STREET CONSTRUCTION SPECIFICATIONS

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SECTION 1.00 - GRADING

1.01 CLEARING AND GRUBBING (2101)

All clearing and grubbing shall be performed in accordance with and the basis of payment shall be made as per Section 2101 of the current Minnesota Department of Transportation Standard Specifications, with the following amendment: All costs associated with clearing and grubbing shall be considered incidental to the project, unless a separate bid item is included in the proposal form. Clearing shall be under the direction of the engineer in the field and care will be required to protect all trees not removed. All timber, stumps, roots and other debris or by-products resulting from the clearing and grubbing operation shall be disposed of off the site.

1.02 EXCAVATION AND EMBANKMENT (2105)

All site grading and street construction of excavation and embankment shall be in accordance with Section 2106 of the current Minnesota Department of Transportation Standard Specification with the following modifications:

A. Requirements

The following compaction requirements shall be met for all embankment and trench backfilling relative to subgrade under this contract:

1. The zone below the upper 3 feet of the embankment or trench shall be compacted to 95 percent of standard proctor density.

2. The zone from 3 feet below subgrade to finished subgrade (upper 3 feet) shall be compacted to 100 percent of standard proctor density.

B. Excessive Moisture

If the existing moisture content of the backfill material below three feet of subgrade is greater than 3 percentage points above the optimum moisture content, the soil shall be compacted to a minimum density of 3 pounds per cubic feet less than the standard Proctor curve at that moisture content. At no time shall the density be less than 90 percent of the standard Proctor density. This modification of the compaction specification shall at no time be used or applied to the upper 3 feet of the subgrade or the aggregate base.

1.03 SUBGRADE PREPARATION AND CORRECTION (2112)

Subgrade preparation and correction shall be performed in accordance with the following: The contractor shall prepare the subgrade to the grade, compaction and stabilization to a depth of one foot (1') below subgrade elevation. All work in preparing the subgrade to this one-foot depth shall be considered incidental.

Test or proof rolling shall be performed on the completed subgrade prior to addition of base materials. The contractor will furnish a tandem truck loaded with a minimum of 14 tons to check the completed subgrade and/or base. This truck will be driven near the curb and gutter locations on both sides of the roadway and in other locations the Engineer may direct, to determine if any soft spots exist so that these areas may be removed and replaced with satisfactory material before completing subgrade or base preparation, subject to Engineer approval. Cost of furnishing the loaded truck and driver for the test roll and any retests shall be incidental to construction of the subgrade and/or aggregate base and no direct compensation will be made therefore.

A. If, in the Engineer's opinion, based on the test roll, there are any sections of the road subgrade that are unstable, the contractor shall, at his/her expense, scarify the roadbed and aerate or add moisture to the material as necessary and re-compact the material to the extent that it will be stable when re-tested by rolling.

B. However, where test failures re-occur and the Engineer is satisfied that the corrective measures were exhausted, then a qualified soils engineer shall be retained to recommend corrective measures (i.e. subcut, fabric, draintile). Upon review of the soils report, the City Engineer shall determine an alternative to produce acceptable stability on the roadbed. The unstable sections shall be repaired by the contractor as directed by the Engineer and at the owner's expense.

In the event subgrade subcut efforts are deemed necessary to correct any unsuitable soils in the road section, at the Engineers discretion three inch minus and/or a granular (free draining) backfill meeting the requirements of MnDOT Section 3149.2 "D.3 Select Granular Backfill" shall be used. In addition, if the road section is in need of subgrade removal, the depth of removal shall be consistent throughout the entire road section with the exception of a small isolated area. The practice of varying depths of subcut in a continuous section of road will not be allowed.

In roadbeds where existing soil subcuts have been performed, drain tile and cleanouts in low areas and any other areas deemed necessary by the Engineer shall be installed as per standard detail plate nos. 5232, 5233 and 5234.

1.04 APPLICATION OF WATER (2130)

This work shall consist of furnishing and applying water for dust control or moisture content within the Project limits as directed by the Engineer or stipulated in the Contract.

A. Materials

The water shall be furnished by the Contractor and it shall be reasonably clean. The Contractor shall make all arrangements with the City's Utility Superintendent for obtaining any water which may be needed for the construction. No water may be taken from any City hydrants unless authorized in writing by the Utility Superintendent. Failure to obtain City authorization will result in prosecution and fines within the limits of city ordinance.

B. Construction Requirements

1. Equipment

   Water supply tanks shall be equipped with distributing bars or other apparatus that will ensure uniform application of the water. Application of water on the road shall be with a self-propelled distributor of the pressure type, mounted on pneumatic-tired wheels. Pump capacity shall be sufficient to permit application of the whole load uniformly at any rate up to 250 gallons per minute.

2. Application

   The water supply and equipment used shall be sufficient to apply the quantity required within the time interval necessary to secure optimum results and avoid unwarranted loss of water through evaporation, absorption, or drainage. The water shall be applied at such times and in such quantities as the Engineer approves.

C. Method of Measurement

Water applied for Dust Control or moisture content within the Project limits, by direct order of the Engineer, will be considered Incidental to the Project unless a specific bid item is provided. If a bid item is provided, deductions may be made for any water wasted through failure of the Contractor to coordinate the application of water with other operations as may be directed.

D. Basis of Payment

If a bid item is provided, payment for the accepted quantities of water at the Contract price per unit of measure will be compensation in full for all costs of furnishing, transporting, and applying the water as directed.

These provisions apply to water used for dust control within the Project limits as directed by the Engineer. These provisions do not apply to any sprinkling or other uses for water required in conjunction with the construction of concrete pavements; to any water used in the production or curing of concrete; to any water used to maintain plant life; to any water used in conjunction with compacting soil and aggregate; or to any water used for dust control in any Contractor selected haul roads, detours, or work sites outside of the Project limits; all costs of which will be incidental to the Contract items involved.

When a bid item is provided, payment for the application of water will be made on the basis of the following schedule:

Item No.	Item	Unit
2130.501	Water	Gallon

SECTION 2.00 - BASE MATERIALS AND CONSTRUCTION

2.01 AGGREGATE BASE (2211)

The contractor shall place and compact the aggregate base of the class and depth specified. All aggregate base and its placement shall conform to Section 2211 of the current Minnesota Department of Transportation Standard Specification.

Aggregate base shall be paid for by the number of cubic yards as calculated from the design widths, depths and lengths. No payment shall be made for additional material used due to low subgrades, spillage, tolerances, etc.

Prior to the placement of any aggregate base material, all soil reports and compaction tests including previous tests on utilities must be reviewed by the City.

2.02 MATERIALS

A. Aggregate 3138

The class of aggregate to be used in each course will be shown in the contract. Gradation acceptance for Classes 1, 2, 3, 4, 5 and 6 aggregates will be by the random sampling method in accordance with 2211.3D.1.

2.03 REQUIREMENTS

A. Spreading and Compacting

At the time of spreading the base material for compaction, the aggregate shall be so uniformly mixed that it will meet specified gradation requirements, based on the results of gradation tests run on aggregate samples obtained after mixing and prior to compaction.

The material for each layer shall be spread and compacted to the required cross section and density before placing aggregate thereon for a succeeding layer. The surface of each layer shall be maintained, with uniform texture and firmly keyed particles, until the next layer required by the contract is placed thereon or until the completed base is accepted if no other construction is required thereon.

Compaction shall be obtained by the:

1. Specified density method,

2. Quality compaction method, or

3. Penetration index method

whichever method is prescribed for the particular course. **Compaction by the specified density method will be required on all base courses except those that are otherwise designated in the contract for compaction by either the quality compaction or penetration index method.** If Class 5C or Class 5BC is specified or substituted for another class of aggregate, then densification shall only be obtained by the quality compaction method or the penetration index method.

B. Penetration Index Method

The full thickness of each layer of Classes 5 or 6 shall be compacted to achieve passing results in a modified DCP or a penetration index value less than or equal to 10 mm per blow, as determined by a MnDOT standard dynamic cone penetrometer (DCP) device. For test purposes, a layer will be considered to be 75 mm in compacted thickness but a testing layer can be increased in thickness to a maximum of 150 mm if compacted in one lift by a vibratory roller. At least two passing dynamic cone penetrometer tests shall be conducted at selected sites within each 800 cubic meters (CV) of constructed base course. If a test fails to meet the specified requirements, the material represented by the test shall be recompacted and will be retested for density compliance.

All aggregates prescribed to be tested under the Penetration Index Method 2211.3D.2.c must be tested and approved within 24 hours of placement and final compaction. Beyond the 24 hour limit, the same aggregate can only be accepted by the Specific Density Method 2211.3D.2.a.

Water shall be applied to the base material during the mixing, spreading and compacting operations when and in the quantities the Engineer considers necessary for proper compaction.

C. Determination of Penetration Index Value

The Penetration Index Value will be determined using a MnDOT standard dynamic cone penetrometer (DCP) device. The basic test method can be found in the MnDOT User Guide to the Dynamic Cone Penetrometer and the detailed test methods and procedures for base and shouldering aggregate are available from the Grading and Base Office, Maplewood.

D. Random Sampling Gradation Acceptance Method

The following provision shall apply to the use of Classes 1, 2, 3, 4, 5 and 6 aggregates:

Gradation Control

The contractor and/or aggregate producer shall be responsible for maintaining a gradation control program in accordance with the random sampling acceptance method described in the Grading and Base manual. The contractor will be permitted to proceed with and complete the base construction on the basis of the contractor's Certification (on Form 24346 furnished by the engineer) that the material supplied and used conforms to the appropriate specification

requirements. The contractor shall assume full responsibility for the production and placement of uniform and acceptable materials.

2.04 ACCEPTANCE TESTING

Aggregate gradation compliance will be determined in accordance with the following table:

ACCEPTANCE TESTING SCHEDULE[A]

Quantity ((metric tons (t))[a][b]	No. Lots[c]	No. Samples[d][e] or No. Sublots/Lot[f]	Payment Acceptance Schedule
Less than 500	NA	Use Form 2415 or 2403 (small quantity)	See Chanhassen's General Condition 6.09
$\geq$ 500 but less than 4,000	NA	1/1,000t[g]	See Chanhassen's General Condition 6.09
$\geq$ 4,000 but less than 10,000	1[h][i]	4[j]	See Chanhassen's General Condition 6.09

A. In accordance with section 1503 of the current Minnesota Department of Transportation Standard Specification, Conformity with Contract Documents, it is the intent of these specifications that materials and workmanship shall be uniform in character and shall conform to the prescribed target value or to the middle portion of the tolerance range. The purpose of the tolerance range is to accommodate occasional minor variations from the median zone. The production and processing of the materials and the performance of the work shall be so controlled that the material or workmanship will not be of borderline quality.

B. Or equivalent in cubic meters loose volume or cubic meters compacted volume ((1t – 0.6m^3 (LV) or 1t – 0.46m^3 (CV), respectively)).

C. The use of any one kind or class of material from more than one source is prohibited without permission of the engineer according to section 1601 of the current Minnesota Department of Transportation Standard Specification. If the contractor changes sources (with the engineer's approval), a new lot consisting of four sublots will be established provided that the quantity equals or exceeds 4,000t. When a material source is changed prior to completing a lot, the remainder of the 4 samples will be taken from the previously placed materials, provided that the quantity equals or exceeds 4,000t. However, if the quantity placed is less than 4,000t, acceptance testing will be based on one test per thousand metric ton.

D. Samples for gradation testing will be taken randomly by the engineer prior to compaction, in accordance with the random sampling method described in the Grading and Base Manual.

E. Classes 1, 2, 5C and 5BC, Shoulder Surfacing Aggregate, may be sampled from the stockpile for testing and acceptance in accordance with section 3138.3 of the current Minnesota Department of Transportation Standard Specification.

F. Each lot will be divided into four sublots which are approximately equal in quantity.

G. Each individual sample will be analyzed separately for payment.

H. Each lot shall consist of a maximum of approximately 10,000t of material, although lesser sized lots may occur due to construction constraints.

I. Each lot will be analyzed separately for payment.

J. One gradation sample will be taken from each sublot and tested. The results obtained from the four samples will be averaged for payment to the nearest one-tenth of one percent for the specified sieves.

The engineering firm will have each sample tested in the field by a MnDOT certified technician or may submit them to the district laboratory for testing. A delay of at least three (3) working days is anticipated before laboratory tests results are available but a maximum of eight (8) working hours delay is anticipated for field gradations.

Non-complying material shall be dealt with in accordance with the City of Chanhassen's General Conditions Section 6.09.

2.05 SPECIFIED DENSITY METHOD

The full depth of aggregate base shall be compacted to not less than 100% of the maximum density and at the time of compaction the moisture content of the material shall not be less than 65% of optimum moisture. All failing moisture and density tests must be corrected before the project is complete.

2.06 AGGREGATE COMPOSITION (3138)

Scope

Provide certified aggregate along with Form G&B-104 for 2118, 2211 and 2221.

Note that Class 5Q, which a designer may designate for use as a base, would most commonly be produced at a quarry.

Requirements

A. General

Use aggregate sources meeting the requirements of 1601, "Source of Supply and Quality."

Provide certified aggregate materials that have uniform: appearance, texture, moisture content and performance characteristics.

Provide binder soils from sources meeting the requirements of 3146, "Binder Soil." Add binder soils during the crushing and screening operations.

B. Virgin Materials

Provide virgin aggregates meeting the following requirements:

1. Comprised of naturally occurring mineral materials, and contains no topsoil, organics or disintegrating rock as defined in Laboratory Manual Section 1209,
2. Class 2 must be composed of 100% crushed quarry rock, and
3. Conforms to the quality requirements of the latest edition of Table 3138.2-1.

Table 3138.2-1
Quality Requirements for Virgin Materials

Requirement	Class			
	1 and 2	3 and 4	5	6
Maximum Shale	NA	7.0 percent	7.0 percent	7.0 percent
Minimum Crushing Requirements *	NA	NA	25 percent	30 percent
Maximum Los Angeles Rattler (LAR) loss from Carbonate quarry rock	40 percent	40 percent	40 percent	35 percent
Maximum Insoluble residue for the portion of quarried Carbonate Aggregates passing the No. 200 Sieve	10 percent	10 percent	10 percent	10 percent
Maximum amount of Brick	1.0 percent ‖			
Maximum amount of other objectionable Materials including but not limited to: wood, plant matter, plastic, plaster, and fabric	0.1 percent ‖			

* Material crushed from quarries is considered crushed Material.
‖ The Contractor/supplier may not knowingly allow brick and other objectionable Material and must employ a QC process to screen it out, before it becomes incorporated into the final product.

C. Recycled Materials

The Contactor may substitute recycled aggregates for virgin aggregates, if meeting the following requirements:

1. Recycled aggregates contain only recycled asphalt pavement (RAP), recycled concrete materials, recycled aggregate materials, or certified recycled glass, and
2. Must meet the requirements of the latest edition of Table 3138.2-2.

Table 3138.2-2
Quality Requirements for Recycled Materials

Requirement	Class 1	Classes 3, 4, 5, and 6
Maximum Bitumen Content of Composite	4.0 percent	4.0 percent
Maximum Masonry block percent	10 percent	10 percent
Maximum percentage of glass *	Not Allowed	10 percent
Maximum size of glass *	Not Allowed	3/4 inch
Maximum amount of Brick	1.0 percent ‖	1.0 percent ‖
Maximum amount of other objectionable debris including but not limited to: wood, plant matter, plastic, plaster, and fabric	0.2 percent ‖†	0.2 percent ‖†

* Glass must meet certification requirements on the Grading and Base website. Combine glass with other Aggregates during the crushing operation.
‖ The Contractor/supplier may not knowingly allow brick and other objectionable Material and must employ a QC process to screen it out, before it becomes incorporated into the final product.
† It is recognized that recycled Aggregates may occasionally contain debris, and the 0.2 percent requirement is meant to be an average requirement for each Material delivery.

D. Surfacing Aggregates

Provide surfacing aggregates in accordance with 3138.2A, "General," 3138.2B, "Virgin Materials," and 3138.2C, "Recycled Materials," and meeting the following requirements:

1. 100 percent (100%) of the material passes the ¾ in [19.0 mm] sieve, regardless of the class specified,
2. Does not contain glass,
3. Recycled concrete materials only may only be used for the roadway shoulders,
4. There is no restriction on the bitumen content, if used for shouldering,

Note: Class 2 must be composed of 100% crushed quarry rock per 3138.2B3.

E. Gradation Requirements

1. For products containing less than 25 percent (25%) recycled materials, conform to the latest edition of Table 3138-3.
2. For products containing 25 percent (25%) or more recycled materials and less than 75% recycled concrete, conform to the latest edition of Table 3138-4.
3. For products containing 75 percent (75%) or more recycled concrete, conform to the latest edition of Table 3138-5.
4. Perform gradation tests prior to bituminous extraction, and
5. Provide Aggregate with a minimum clay content of 3 percent and Plasticity Index (PI) of 5-12. The requirements for PI and minimum clay content are fulfilled if one of the following are met:

   a) the Material composed of at least 25 percent recycled Materials
   b) the Material composed of at least 50 percent crushed quarry Aggregate

Table 3138.2-3
Base and Surfacing Aggregate
(Containing less than 25 percent recycled Aggregates)
Total Percent Passing *

Sieve Size	Class 1 (Surfacing ‖)	Class 2 (Surfacing †)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 6 (Base)
2 inch	—	—	100	100	—	—
1 1/2 inch	—	—	—	—	100	100
1 inch	—	—	—	—	—	—
3/4 inch	100	100	—	—	70 - 100	70 - 100
3/8 inch	65 - 95	65 - 90	—	—	45 - 90	45 - 85
No. 4	40 - 85	35 - 70	35 - 100	35 - 100	35 - 80	35 - 70
No. 10	25 - 70	25 - 45	20 - 100	20 - 100	20 - 65	20 - 55
No. 40	10 - 45	12 - 35	5 - 50	5 - 35	10 - 35	10 - 30
No. 200	8.0 - 15.0	5.0 - 16.0	5.0 - 10.0	4.0 - 10.0	3.0 - 10.0	3.0 - 7.0

* If product contains recycled Aggregate, add letters in parentheses for each Aggregate blend designating the type of recycled products included in the mixture: (B) = Bituminous, (C) = Concrete, (G) = Glass, (BC) = Bituminous and Concrete, (BG) = Bituminous and Glass, (CG) = Concrete and Glass, (BCG) = Bituminous, Concrete, and Glass.
‖ Recycled concrete when used for surfacing is only allowed for Shoulders.
† Class 2 must be composed of 100 percent crushed quarry rock per 3138.2B, "Virgin Materials," Note (2).

Table 3138.2-4
Base and Surfacing Aggregate
(Containing 25 percent or more recycled Aggregates & 75 percent or less recycled concrete)
Total Percent Passing *

Sieve Size	Class 1 (Surfacing ‖)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 6 (Base)
2 inch	—	100	100	—	—
1 1/2 inch	—	—	—	100	100
1 inch	—	—	—		
3/4 inch	100	—	—	70 - 100	70 - 100
3/8 inch	65 - 95	—	—	45 - 90	45 - 85
No. 4	40 - 85	35 - 100	35 - 100	35 - 80	35 - 70
No. 10	25 - 70	20 - 100	20 - 100	20 - 65	20 - 55
No. 40	10 - 45 † 5 - 45	5 - 50	5 - 35	10 - 35	10 - 30
No. 200	5.0 - 15.0 † 0 - 15.0	0 - 10.0	0 - 10.0	0 - 10.0	0 - 7.0

* Add letters in parentheses for each Aggregate blend designating the type of recycled products included in the mixture: (B) = Bituminous, (C) = Concrete, (G) = Glass, (BC) = Bituminous and Concrete, (BG) = Bituminous and Glass, (CG) = Concrete and Glass, (BCG) = Bituminous, Concrete, and Glass.
‖ Recycled concrete is only allowed for Shoulders.
† Note: For Class 1, if the bitumen content is ≥ 1.5 percent, the gradation requirement is modified to 5 – 45 percent for the No. 40 Sieve and 0 – 15.0 percent for the No. 200 Sieve.

Table 3138.2-5
Base and Surfacing Aggregate
(Containing more than 75 percent recycled concrete)
Total Percent Passing *

Sieve Size	Class 1 (Surfacing ‖)	Class 3 (Subbase)	Class 4 (Subbase)	Class 5 (Base)	Class 6 (Base)
2 inch	—	100	100	100	100
1 1/2 inch	—	—	—	—	—
1 inch	—	—	—	—	—
3/4 inch	100	—	—	45 - 100	45 - 100
3/8 inch	65 - 95	—	—	25 - 90	25 - 85
No. 4	40 - 85	35 - 100	35 - 100	15 - 65	15 - 65
No. 10	25 - 70	20 - 100	20 - 100	10 - 45	10 - 45
No. 40	10 - 45	0 - 20	0 - 20	0 - 20	0 - 20
No. 200	5.0 - 15.0	0 - 6.0	0 - 6.0	0 - 6.0	0 - 6.0

* Add letters in parentheses for each Aggregate blend designating the type of recycled products included in the mixture: (B) = Bituminous, (C) = Concrete, (G) = Glass, (BC) = Bituminous and Concrete, (BG) = Bituminous and Glass, (CG) = Concrete and Glass, (BCG) = Bituminous, Concrete, and Glass.
‖ Recycled concrete is only allowed for Shoulders.

Table 3138.2-6
Reclamation Material Permitted as a Substitute for Class 3, 4, 5, or 6
Total Percent Passing

Sieve Size	Class 3	Class 4	Class 5	Class 6
3 inch*	100	100	100	100
3/4 inch	-	-	70 – 100	70 - 100
3/8 inch	-	-	45 – 90	45 - 85
No. 4	35 -100	35 -100	35 -80	35 - 70
No. 10	20 - 100	20 - 100	20 - 65	20 - 55
No. 40	5 - 50	5 - 35	10 - 35	10 - 30
No. 200	0 – 10.0	0 – 10.0	0 – 10.0	0 – 10.0

* Note for bedding within 2 feet of plastic pipe, the requirement is 100 percent passing the 1 inch Sieve.

F. Sampling and Testing

Report the No. 200 sieve results to the nearest 0.1 percent and all other sieve results to the nearest 1percent (1%).

A Sampling, Sieve Analysis and Crushing Tests Grading and Base Manual

B Los Angeles Rattler Loss Laboratory Manual Method 1210

C Shale Tests Laboratory Manual Method ..... 1207 & 1209

D Bitumen Content Laboratory Manual Method 1852

E Insoluble Residue Laboratory Manual Method 1221

F Reclaimed Glass AGI Visual Method ..... (AGI Data sheet 15.1 and 15.2)

2.07 SCHEDULE OF PRICE REDUCTIONS

The following schedule for price reductions on non-complying construction material shall be used when not addressed in the Contract.

The following schedule of price adjustments and/or corrective action for non-compliance material and/or work is a guideline only. Special circumstances may result in price reductions differing from this schedule. These special circumstances shall be determined and evaluated by the City Engineer.

Price reductions are implemented only if it is in the best interest of the City to leave the non-complying material in place, otherwise, the material should be removed and replaced.

Gradation Failures

A. MnDOT Specification 3138, Aggregate for Surface and Base Courses.

1. Class 1, 2, 3, 4, 5 and 6 designations.

   The above classes of material should be accepted for payment in accordance with the provisions of the City of Chanhassen's General Conditions Section 6.09.

   Price reductions for more than one failing sieve size shall be accumulative, but will not exceed 50.0 percent. The compensation due to the contractor should be reduced accordingly.

B. MnDOT Specification 3149, Granular Material.

The granular materials listed in MnDOT Specification 3149 should be accepted for payment in accordance with the following:

1. All Sieves
   Price adjustments shall be in accordance with MnDOT specs

2. # 200/1 inch or 75µm/25 mm. Ratio
   (MnDOT Specification 3149.2.B1 and 3149.2.B2)

% Outside Specified Limits*	
+1.0	Substantial Compliance
+1.1 - 2.0	5.0% Price Reduction
2.1 - 3.0	15.0% Price Reduction

>3.0	Corrective Action Required

*Based on individual sample test results. Price adjustment applied to the quantity of non-compliance material represented by the sample. The compensation due to the contractor should be reduced accordingly.

C. The Contractor may correct the quantity of non-compliance material in order to qualify for full payment. When corrective action is required for acceptance of the non-complying material, in accordance with the previously indicated schedules, the Contractor shall perform the corrective work at no cost to the Owner. The Contractor shall remove the unacceptable material and replace with acceptable materials, or correct the unacceptable materials on the road. The corrected material will be tested for compliance with the specification after the completion of the corrective action. In lieu of replacement or correction, the Engineers may allow (in the best interest of the City) the Contractor to accept a price reduction instead of corrective action.

SECTION 3.00 – PAVEMENT CONSTRUCTION

3.01 PLANT MIXED BITUMINOUS ASPHALT (2360)

This Specification requires the Contractor to follow of the most current MnDOT Standard Specification and provide a mix that complies with all of the design, production, and placement requirements of the specification. The City does not make any guaranty or warranty, either express or implied, that compliance with one part of this specification guarantees that the Contractor will meet the other aspects of the specification.

A. Description

This work consists of the construction of one or more pavement courses of hot plant mixed asphalt-aggregate mixture on the approved prepared foundation, base course or existing surface in accordance with the specifications and in conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer. Mixture design will be 2360 (gyratory) as described in the Special Provisions or the Standard Detail Plates through the mixture designation.

B. Submittals

In addition to the submittals required under MnDOT Bituminous Specifications 2360, submit Q/C testing for Class B aggregates included in mix designs based on the following schedule:

1. For every 5,000 tons of bituminous mixture placed on the project, or for mix placed 25 days after the previous submittal, perform and submit Q/C testing from Class B aggregate stockpile:
   a) Soundness Testing (ASTM C 88)
   b) Loss by Abrasion and Impact (ASTM C 131)
2. Aggregate testing requirements shall be submitted on a per project basis. Individual tests and submittals are required for each project.

3.02 CITY OF CHANHASSEN COMPACTION TEST METHOD

For the specified density method of compaction, each lift shall be uniformly compacted to a density not less than what is required per Table 2360.3-1. The density test shall be in accordance with MnDOT Bituminous Specifications 2360 and the MnDOT Bituminous Manual. Compaction testing will be performed for the owner by an independent testing laboratory approved by the Engineer as identified below. The cost of all tests will be paid by the contractor.

A. One (1) sample for a density test per 200 tons of mix installed or a minimum of two (2) sample per job.

B. In-place density test performed by one of the following procedures as directed by the Engineer:

1. A minimum of one (1) core sample for in-place density tests per 200 tons of mix installed or a minimum of four (4) cores per job. No cores are to be taken in the wheel tracks.
2. Four (4) density test taken with a portable nuclear testing device at randomly selected locations per 200 tons of mix installed. A minimum of six (6) tests per job.

The mixture with failing density will not be accepted for payment at the Contract bid price, but, in lieu of being removed and replaced, will be accepted at a reduced price in accordance with Table 2360-22. The appropriate pay factor will be applied to the quantity of mixture represented by the failing density test. One retest of each failing test will be permitted and the higher of the two densities will be used in determining the pay factor. All retesting shall be done within three (3) working days after placement of the bituminous mixture. The Contractor will be responsible for the costs of all retesting.

3.03 BITUMINOUS PATCHING

Over any areas that need to be corrected (settlements, bird baths, etc.) one of the following methods as required by the Engineer should be used for patching:

A. Wedge cut one inch (1") into the existing pavement around the outer limits of the area that needs to be patched, tack and fill with approved bituminous material.

B. Tack area to be patched then skin patch with approved bituminous material and apply a seal coat over patched areas. Seal coat should be trap rock and applied as per Section 3.09 Bituminous Seal Coat.

C. Bituminous materials to be used in patch areas shall be in accordance with Section 2231 of the current Minnesota Department of Transportation Standard Specification unless otherwise directed by the engineer.

D. Straight line cut (mill/colter wheel or saw cut) and remove. Tack edges to be patched and fill with approved bituminous material.

Patching shall be done in such a manner to produce a smooth driving surface of which the patch or patch edge shall not deviate from surrounding pavement. Milling of patches will be required when any deviation occurs.

In areas where, in a 100-foot length of street, measured from any area in need of repair or in either direction and three or more patches/settlements are evident, a one and one-half inch bituminous overlay shall be constructed over the entire length and width of the affected street section.

In areas where trench settlements (of any kind) have occurred, corrections may be performed by either the above-listed methods, or if, in the opinion of the Engineer, the existing bituminous is in satisfactory condition, it may be repaired by a bituminous leveling course.

Prior to any overlays deemed necessary, a minimum four-foot wide edge mill along the gutter line shall be completed and any settlements shall be filled with bituminous material, leveled out, and thoroughly compacted.

3.04 BITUMINOUS TACK COAT

The bituminous material for tack coat shall be applied in accordance with Section 2357 of the current Minnesota Department of Transportation Standard Specification. The rate of application shall be in accordance with Table 2357.3-1 or as approved by the engineer.

Tack coat shall be applied in a manner that will allow traffic movement on at least one side of the street at all times without pick up or tracking of tack coat material.

At no time will the application of tack coat be applied by means other than a motor powered distributor.

3.05 MILL PAVEMENT SURFACE

A. Description

This work shall consist of improving the profile, cross slope, and surface texture of an existing pavement surface by machine (cold) milling preparatory to placement of another course thereon.

B. Equipment

Pavement milling shall be accomplished with a power operated, self-propelled cold milling machine capable of removing concrete and bituminous surface material as necessary to produce the required profile, cross slope, and surface texture uniformly across the pavement surface. The machine shall also be equipped with means to control dust and other particulate matter created by the cutting action.

The machine shall be equipped to accurately and automatically establish profile grades along each edge of the machine, within plus or minus 1/8 inch (3 mm), by referencing from the existing pavement by means of a ski or matching shoe, or from an independent grade control. The machine shall be controlled by an automatic system for controlling grade, elevation, and cross slope at a given rate.

C. Operations

The pavement surface shall be milled to the depth, width, grade, and cross slope as shown in the Plans or as otherwise directed by the Engineer. Machine speeds shall be varied to produce

the desired surface texture grid pattern. Milling shall be performed without excessive tearing or gouging of the underlying material.

The pavement milling operations shall be referenced from an independent grade control in those areas where the Engineer considers such control is essential. The control shall be established and maintained by the Contractor in a manner and in such position as the Engineer approves.

Milling operations shall be conducted so that the entire pavement width is milled to a flush surface at the end of each work period, whenever the pavement is open to traffic. In case of uncompleted operations resulting in a vertical or near vertical longitudinal cutting face, it shall be the Contractor's responsibility to minimize the hazardous effects to traffic by resloping the longitudinal face to provide a suitable taper, by constructing a temporary bituminous taper, or by otherwise providing the necessary protective measures, as approved by the Engineer. Transverse cutting faces shall be tapered at the end of each working period where traffic is permitted. To further provide for traffic, the Contractor shall also construct temporary bituminous tapers at intersecting streets, around utility appurtenances, and at all appropriate entrances during the milling operations, as ordered by the Engineer.

The Contractor shall construct the temporary milled tapers and furnish, place, and remove temporary bituminous tapers as incidental work for which no direct compensation will be made.

In areas inaccessible to the milling machine, the work shall be accomplished by other equipment or methods acceptable to the Engineer.
After the milling operations are completed to the planned depth, the milled area shall be cleaned by sweeping or vacuuming with equipment approved by the Engineer. Such cleaning shall be performed to the satisfaction of the Engineer.

Debris resulting from milling and cleaning operations shall be disposed of outside of the Right of Way except as otherwise authorized by the Engineer.

Milling at previously patched areas shall be performed to the required depth below the pavement surface existing prior to the previous patch being placed, and not from the surface of the patch.

The contractor shall take care to avoid disturbing or damaging any existing drainage or utility structures on the Project. Any damage resulting from the Contractor's operations shall be repaired by the Contractor at no expense to the City.

D. Method of Measurement (2232.4)

Pavement milling will be measured by the area of each type of surface removed. Measurements will be of those areas milled as specified, based on actual finished dimensions of the work.

E. Basis of Payment (2232.5)

Payment of pavement milling at the appropriate Contract price per unit of measure will be compensation in full for all costs of performing the work as specified, including, but not limited to, traffic control, cleanup, and disposal operations.
Payment for pavement milling will be made on the basis of the following schedule:

Item No.	Item	Unit
2232.504	Mill Bituminous Surface	square yard (square meter)

3.06 BITUMINOUS OVERLAY

This work shall consist of constructing a pavement overlay course of hot plant mixed bituminous aggregate mixture on a prior approved prepared surface. It shall be constructed in a manner that when complete, all low or high areas of the overlay surface have been adequately tolerated to provide a smooth profile, cross slope and exhibit satisfactory ride ability. Overlays for all streets shall consist of a minimum of two inches in compacted depth and meet all construction and material specifications as stated in Section 3.00. Material for overlays shall meet MnDOT 2360 specification and shall be specified in the project documents.

SECTION 4.00 - MISCELLANEOUS CONSTRUCTION

4.01 SUBSURFACE DRAINTILE (2502)

See Section 2.19 of Sanitary and Storm Sewer Specifications.

4.02 UTILITIES

A. Unless specified otherwise, this work shall be entirely at the contractor's expense.

1. There shall be an inspection of the sanitary sewer, storm sewer and water main utilities prior to the start of construction. The contractor shall notify the Engineer 24 hours in advance to aid in accomplishing this inspection. All deficiencies in these existing systems prior to beginning street construction must be immediately brought to the attention of the Engineer.

2. After the manholes and valve boxes are cleaned, and raised to proper grade prior to paving the wear course, they shall be inspected to assure trouble free operation.

3. The contractor shall be responsible for locating all curb boxes within the limits of the project. The City has location ties to the curb boxes. The contractor shall notify the Engineer at least 24 hours in advance of this location work so that a representative of the Engineer can be present at all times while this work is being done and to aid in the accomplishment of this work. This work shall be done prior to start of construction. Prior to completion of the project, the curb boxes shall be adjusted to be flush with final grade.

B. A final inspection of all utilities will be performed at the completion of the project for acceptance. Adjustments shall be made as follows:

1. **Sanitary Sewer**. All sanitary sewer manhole castings shall be left in place during the paving operation. The castings shall be adjusted before the mat is laid and shall be left one-quarter to one-half inch (1/4 – 1/2") below finished grade. Where the Engineer requires or where it is impossible to adjust the structure with the addition or removal of adjustment rings, reconstruction will be necessary. In such cases, it will be necessary to add or remove manhole sections.

2. **Storm Sewer**. Existing storm sewer castings shall be adjusted where necessary to be two inches (2") below finished gutter line. In areas of surmountable curb, the top of casting shall match the top of curb.

3. **Water Valve Boxes**. All water valve boxes shall be adjusted prior to paving the wear course, and left one-quarter to one-half inch (1/4 – 1/2”) below finished grade. Thorough tamping of the material around the valve box is required. In the event the valve box cannot be adjusted without the use of extensions, the contractor shall remove the upper section, place the necessary extension and replace the upper section.

4. **Grouting Adjusting Rings**. Adjustment rings are required to be grouted; the contractor shall grout between rings, place the casting and-remove all excess grout on the inside of the manhole by wiping smooth with a gloved hand or similar instrument. Refer to detail plates for limitations on number of rings allowed. I and I shields to be installed as specified.

4.03 WARRANTY

The contractor should take special note of the warranty provisions of these contract documents as detailed in Sections 3.04 and 9.16 of the General Conditions of the Contract which are included as part of this Standard Specification

4.04 WATER TO HOMES

The contractor shall be responsible (until completion of the project) for providing water to any homes which have their individual water systems become inoperative due to dewatering operations during the project construction

4.05 CONCRETE (2531)

A. Concrete Curb and Gutter and Driveway Aprons

All concrete curb and gutter and driveways shall be constructed in accordance with Sections 2301, 2461 and 2531 of the current Minnesota Department of Transportation Standard Specifications, except as modified or altered below:

1. Driveway openings in the curb shall be constructed as shown on the plans, standard plates, or as directed by the Engineer in the field.

2. The contractor shall construct concrete gutters and driveway aprons as detailed on the City's standard detail plates, and as located on the plans.

3. Localized panels or sections of concrete determined either by the plan set or Engineer to be saw cut, removed and replaced shall be joined to each adjacent panel by two grouted #4 epoxy coated rebar.

4. Delete that portion of Section 2531 which requires that the concrete curb and gutter joints be sealed with joint sealer material.

5. The contractor shall furnish without charge all concrete samples needed for test cylinders, slump tests, air entrainment tests, and other tests ordered by the Engineer.

6. For surmountable curb installations, all radii at intersections shall be B-618 concrete curb and gutter with a 5-foot taper section, on each side of the radius.

7. Where a curb machine is used, the contraction joints shall be formed (tooled) or sawed at 10 foot intervals as approved by the engineer to a depth of two inches (2") from all exposed surfaces. Provide full depth expansion joints where indicated on detail plates, on the plans, against fixed objects and/or at a maximum of 200 foot intervals.

8. After the concrete is finished and a transverse broomed surface texture provided, the contractor shall spray it with a spray membrane curing compound conforming to MnDOT specifications, Section 3754.

9. Section 2531.2A.1 shall be mix no. 3F52 with granite aggregate.

10. Section 2531.2A.2 shall be mix no. 3F32 with granite aggregate.

11. The use of High-early concrete pavement used by the Contractor will be incidental to the Contract Item unless specified otherwise in the Special Provisions.

B. Concrete Sidewalk

All concrete sidewalk shall be constructed according to Section 2521 of the current Minnesota Department of Transportation Standard Specifications and City Standard Detail Plates, except as modified or altered below:

1. Delete that portion of Section 2521 which requires that the sidewalk be sealed with joint sealer material.

2. Calcium Chloride Type 1 or 2, MnDOT Specification 3753 shall not exceed 2% of the weight of the cement incorporated into the mix.

3. Concrete used for sidewalk shall meet the requirements of MnDOT Section 2521, mix no. 3F52 with granite aggregate.

C. Reduced Payment Associated With Deficient Strength Requirements On All Concrete Construction

If the Specified Strength requirement has not been obtained on the date specified, the mixture with failing tests will not be accepted for payment at the Contract bid price. If the material strength is in a range within 95% of the specified strength, in lieu of being removed and replaced acceptably, will be accepted at a reduced price in accordance with the schedule shown below. All material below 95% of the specified strength will be removed and replaced to specified requirements. The appropriate pay factor will be applied to the quantity of mixture represented by the failing test. Two core samples of each failing test will be permitted and the higher of the two tests will be used in determining the pay factor. All re-testing shall be done within a time frame determined by the City Engineer.

Strength Requirements (% Below Specified Minimum)	Pay Factor (% of Contract Price)

0% 100%
0 to 1%.....98%
1 to 2%.....95%
2 to 3%.....90%
3 to 4%.....85%
4 to 5%.....75%
More than 5% .....Remove and Replace

The Contractor does not have the option of taking a price reduction in lieu of complying with the Specifications. Material not meeting requirements shall not knowingly be placed in the work. Should any non-conforming material be inadvertently placed in the work, it will be up to the City Engineer to determine whether the non-conforming work will be allowed to remain in place or removed and replaced or otherwise corrected to meet specifications. Non-conforming material that is allowed to remain in the project shall be subject to the price reductions listed below for the indicated test provided the material was placed to the satisfaction of the Engineer. Otherwise the Engineer may make the determination according to other procedures addressed in MnDOT Specification 1503.

With failing or borderline material, make sure next load is tested before it is incorporated into the work.

1. General

   a) Price reductions that are not part of the Contract should not be issued unless the price reduction is in excess of $350. If the calculated price reduction is equal to or less than $350, it shall be documented as substantial compliance. At the discretion of the Engineer, several smaller price deductions may be lumped together to comply with the $350 minimum to alleviate a continuous marginal failure problem.

   b) Bid prices for the project in question should be reviewed prior to calculating a price reduction. If the bid prices are considerably below average prices, then the price reduction should be assessed based on: (1) the average bid price as determined by the City Engineer or (2) a fair market value.

   c) The price reduction shall represent only the quantity of material represented by the sample and actually used.

      Example: A quantity of ready mixed concrete is placed in the work. A slump test indicates failing material. Then the price reduction would only apply to that load of ready mix represented by the test, not by all concrete placed since the last passing test.

d) The price reduction will normally be the quantity represented by the failing test times price reduction per unit quantity (tons, gals, etc.) determined from the "Schedule of Price Reductions" times the bid price of (2) above.

e) The following guide for price reductions on non-conforming construction materials shall be used when not addressed in the contract:

D. Schedule of Price Reductions For Materials For Concrete Construction Slump / Air - Isolated tests (not consistently high or low)

(See MnDOT Specification 2461). Slumps or air tests that are consistently high or low require corrective action by the Contractor's quality control personnel. When test results are inconsistent or borderline, every load should be tested.

1. Slump out of compliance (see MnDOT Specification Table 2461.5-6)

2. Air Content Out of Compliance (See MnDOT Specification Table 2461.5-8)

3. Low Slump Concrete (See MnDOT Specification Table 2461.5-7)

4.06 BITUMINOUS CURB (2535)

All bituminous curb shall be constructed in accordance with Section 2535 of the current Minnesota Department of Transportation Standard Specification, except as modified or altered below:

A. Driveway openings in the curb shall be constructed as shown on the plans, standard plates, or as directed by the engineer in the field.

B. The contractor shall provide all samples needed for tests ordered by the engineer.

C. Where specified, a bituminous berm shall be constructed along the edge of the roadway instead of a bituminous curb. The bituminous berm shall meet the requirements of Section 2535 except that the berm shall be formed by a shoe attached to the paver. The berm section shall be as shown on the plans.

D. Bituminous curb shall not be used to tie in catch basin inlets or manholes. Concrete sections shall be poured in these areas.

4.07 BITUMINOUS TRAIL/PATHWAY

Bituminous trail/pathway shall be paved in such a way to minimize or eliminate cold joints, which may require milling or other means deemed necessary by the Engineer, when abutting existing infrastructure or other trails. Trail intersections shall be constructed with 20' radii or as approved by the Engineer. This shall be done at no extra expense to the City. Trails shall be constructed in accordance with Standard Detail Plate 5216.

4.08 ELECTRIC LIGHTING SYSTEMS (STREET LIGHTING)

A. General

The street lighting system shall comprise all of the work shown on the respective plan and detail sheets for the system, complete, in place and in operation, all in accordance with the current Minnesota Department of Transportation "Standard Specifications and for Construction" except as shown and noted in the drawings and modified in these specifications.

The distribution circuits of the lighting system shall consist of two conductors. The two conductors shall constitute 240 volt circuits. Lighting circuits shall be installed complete to each standard.

All circuit wires including runs between light poles and street crossings shall be placed in conduit. Splice boxes or handholes shall be installed at all street crossings that serve an opposite side light pole.

Power supply to the lighting system is unmetered 120/240 volt, single phase, alternating current.

B. Permits and Inspections

Obtain and pay for all permits and inspections required for the electrical work, arrange for inspections to be performed and furnish a Certificate of Final Inspection and approval by enforcement authorities.

C. Standards

The following industry standards are considered minimum requirements:

1. Standard rules and regulations of the Institute of Electrical and Electronic Engineers.
2. Rules and regulations of the National Fire Protection Association - NFPA No. 70.
3. National Electrical Manufacturers Association Standards.
4. American National Standards Institute.
5. National Electrical Safety Code.
6. Minnesota Department of Transportation Standard Specifications for Construction
7. Other Industry Standard Listings per MnDOT 2545.2.

D. Codes, Ordinances and Regulations

The National Electric Code, together with applicable state and city ordinances or regulations, shall be considered as establishing minimum requirements for the work.

Ascertain the existence of, and comply with, any interpretations and/or enforcement policies of the local enforcement agencies or individuals peculiar to this area or to this particular installation.

Where these specifications call for materials or construction of better quality or larger size than required by the above rules and regulations, the provisions of the specifications shall take precedence.

E. Conduit

All rigid steel conduits (R.S.C.) shall meet the requirements of MnDOT 3801. Rigid Steel Conduit (R.S.C.) shall be installed at all roadway crossings as shown in the Plans. The RSC shall be installed by auguring or jacking methods and not by open trenching across the roadways. When auguring or boring operations through a roadbed are abandoned for any reason, the resultant voids shall be grouted to the satisfaction of the Engineer.

F. Conductors

1. Pole Wire - The pole wire from the in-line fuse connector and the distribution cables to the luminaries and photo cell wires shall be No. 12 AWG copper wires type R.H.W., T.H.W., or X.H.H.W. rated 600 volts.

2. Branch Circuit Conductors - The branch circuit conductors and feeder wires, shall by type T.H.W.N., or T.H.W., or type X.H.H.W. copper rated 600 volts.

G. Fuses

Light standards in the 240 volt system shall include in-line fuse holders with fuses (3 amps) in the phase conductors to the luminaire ballast. Breakaway fuse holders shall be installed at the handhole of the light standards.

H. Grounding

System shall be solidly grounded throughout. Lighting standards, lighting service cabinet, ground rods and any exposed metal system components shall be solidly bonded to the system equipment ground conductor with accessible mechanical approved grounding connectors. Ground rods shall be 5/8” x 15’ for lighting service cabinet and 5/8” x 10’ for lighting standards and shall be copperweld type.

I. Feed Point

Power will be supplied to the system from utility owned pole or pad mounted transformer. Make all provisions and arrangements for service as required by the respective utility agency.

Lighting service cabinet shall be pad mounted type T1 in accordance with MnDOT Standard Plate No. 8140A. Enclosure shall be a NEMA 3 rated minimum 12 gauge steel cabinet with gasketed full hinged doors and padlock hasps. Suitable galvanized steel anchor bolts with double nuts to be provided for concrete foundation mounting. Inside of cabinet shall be finished with white enamel on suitably prepared surface.

Service cabinet equipment, as applicable, shall be as specified below, or equal.

Lightning Arresters	McGraw Edison Type L
Panelboard	Square D NQOB
Circuit Breakers	Square D Q1B & Q0
Contactor	Allen Bradley Bulletin 500L
Selector Switch	Allen Bradley Bulletin 800H

Lighting service cabinet concrete foundation shall be provided in accordance with City of Chanhassen's Standard Plate No. 5243.

The contractor shall furnish and install 2" R.S.C. stubouts from the lighting service cabinet through the foundation. One 2" R.S.C. shall be provided for the lighting service cabinet to the utility transformer and two conduits (2" R.S.C.) shall be provided for the lighting circuits. One 2" R.S.C. shall be provided as a spare.

J. Lighting Equipment

Lighting equipment shall be as described herein. Each lighting unit shall be complete as described with luminaire, standard or supports, auxiliaries, internal wiring, mounted accessories, etc. All equipment shall be UL labeled.

Luminaries shall be of weather proof construction. LED lamps shall be in accordance to detail plate no. 5240 and operable to -20 degrees F. All internal parts of luminaire shall be readily accessible.

Lighting standards shall be as individually described hereinafter. Concrete shall be Mix No. 3G52 and shall cure 28 days before placing lighting equipment. Anchor bolt assemblies shall be provided by the lighting standard manufacturer.

K. Lighting Unit

Roadway lighting unit including foundation, standard and luminaire.

1. Foundation - Shall be constructed of 3G52 concrete as per MnDOT specifications and shall include anchor rods and anchor rod bolt pattern as per pole manufacturer's

recommendations or as modified per base detail as indicated on the drawings. Anchor rods shall be furnished by the pole manufacturer; anchor bolt assemblies shall be high strength steel with top 12" galvanized after threading, galvanized break-away couplings and galvanized double nuts.

Each foundation shall include three non-metallic conduit (N.M.C.) stubouts. The stubouts shall be 2" N.M.C. for feeders and one 3/4" N.M.C. for grounding conductor.

L. Residential Street Lighting

Street lighting in residential areas shall conform to Xcel/Minnesota Valley Electric Group V rating. Street light fixtures shall be the Xcel/Minnesota Valley Electric Traditional, Acorn, or an approved equal style.

4.09 FENCE RESTORATION (2557)

Removal and relocation or restoration of any fences disturbed shall be in accordance with the current Minnesota Department of Transportation Standard Specifications and considered incidental to the cost of the project unless otherwise specified.

4.10 PAVEMENT MARKINGS

A. Applications shall be in accordance with MnDOT specifications and the Minnesota Manual on Uniform Traffic Control Devices, and as supplemented or modified by Chanhassen Detail Plates. A portion of the MnDOT requirements are as follows:

1. All pavement markings shall be ground-in epoxy unless otherwise directed by the City Engineer.

2. At the time of applying the marking material, the application area shall be free of contamination. The Contractor shall clean the roadway surface prior to the line application in a manner and to the extent required by the Engineer.

3. Glass beads shall be applied immediately after application of the paint line.

4. Pavement markings shall only be applied in seasonable weather when the air temperature is 50 degrees F or higher, and shall not be applied when the wind or other conditions cause a film of dust to be deposited on the pavement surface after cleaning and before the marking material can be applied.

5. The filling of tanks, pouring of materials or cleaning of equipment shall not be performed on unprotected pavement surfaces unless adequate provisions are made to prevent spillage of the material.

6. No striping operations will be permitted between sundown and sunrise without written permission from the Engineer.

7. All material shall be placed in a workmanlike manner, which shall result in a clearly defined line that has been adequately reflectorized with glass beads.

8. All pavement striping shall be 4 inches wide unless designated otherwise on the plans, and skip lines shall be in lengths of 10 feet separated by gaps of 40 feet. All pavement striping shall be a minimum of 15 mils thick (wet thickness).

9. Glass beads shall be uniformly applied at a rate of 6 pounds per gallon.

10. A reduction in pay shall be made for reduced thickness and/or width. Width shall be computed by random measuring. Thickness shall be computed by the following formula:

$$\text{Thickness} = \frac{\text{Gallons x 231}}{\text{Length x Width}}$$

11. Application for the marking material shall be such as to provide uniform film thickness throughout the coverage area. Stripe ends shall be cleaned out and square, with a minimum of material beyond the cutoff.

12. Maintenance of traffic during pavement marking operations.

B. The contractor shall furnish and place, without extra compensation, all necessary warning and direction signs to maintain traffic during all pavement marking operations, and shall provide such protection to the uncured markings as may be necessary until traffic may cross them without any damage thereto. Traffic control during the striping operation shall be safe and satisfactory to the Engineer or all marking operations shall cease until traffic control meets with the Engineer's approval. Traffic control requirements may include, but are not limited to, furnishing a pilot car and/or flag persons. Traffic shall be allowed to keep moving at all times, and the striping equipment shall be operated in such a manner that will not force traffic to cross uncured markings. Protection devices such as "cones shall be of an approved typed that will not cause damage to the vehicle when accidentally struck.

C. Payment for pavement markings shall be paid for at the contract unit price per linear foot or as otherwise specified.

4.11 STREET SIGNS AND POSTS

A. Signs and installation shall be in accordance with the Minnesota Manual on Uniform Traffic Control Devices, and as supplemented or modified by Chanhassen Detail Plates.

1. Residential Street Sign Post:

a) Posts are to be of a modified channel design with two ribs along the back of each post as well as each toe.

b) Post shall be fabricated from high-strength billet steel with minimum yield strength of 80,000 PSI and minimum tensile strength of 100,000 PSI.

c) Post installation shall be composed of two 7-foot lengths. The upper section shall weigh 2.5 lbs/ft and the lower section shall weigh 3 lbs/ft before punching. The posts shall be punched with continuous 3/8-inch diameter holes on 1-inch centers for the entire length of the post. The first hole shall be 1 inch from the top.

d) The posts shall be hot dip galvanized to ASTM-A123.

Bracket: 12" flat blade, heavy-duty bracket assembly part nos. BA8A12 & BA90F12 or approved equal by the engineer.
Signs: White lettering on dark brown background – Double-faced, DG3 Hi-intensity on .08 aluminum. White E-450 border (white around bolt). E-450 size radius corner, punch and notch for E-450. First letter of each word upper case with bottom justification. See chart below for lettering sizes. Nine inch (9") by 36" or 42" wide plates used.

B. Private streets signs shall be the same as above, except lettering to be white on blue background.

Type of Mounting	Type of Street or Highway	Speed Limit	Recommended Minimum Letter Height	
			Initial Upper-Case	Lower Case
Overhead	All Types	All Speed Limits	12 inches	9 inches
Post-Mounted	Multi-lane	More than 40 mph	8 inches	6 inches
Post-Mounted	Multi-lane	40 mph or less	6 inches	4.5 inches
Post-Mounted	2-lane	All Speed Limits	6 inches*	4.5 inches*

*On local two-lane streets with speed limits of 25 mph or less, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.

C. Supplementary lettering to indicate the types of streets (such as Street, Avenue, or Road) or the section of the city (such as NW) on the D3-1 and D3-1a signs may be in smaller lettering, composed of initial upper-case letters at least 3 inches in height and lower-case letters at least 2.25 inches in height.

4.12 PROTECTION AND RESTORATION OF VEGETATION (2572)

This work consists of protecting and preserving vegetation from damage and taking corrective action when damage occurs. Vegetation includes but is not limited to trees, brush, roots, woody vines, and perennial forbs and grasses. All work done shall conform to Section 2572 of the current MnDOT Standard Specifications.

4.13 EROSION CONTROL (2573)

The Contractor shall be solely responsible for the installation, maintenance and removal of all sediment and erosion control measures within the project areas. The Contractor shall install fabric fences, culverts, check dams, sediment traps, erosion control blanket, hydroseed, etc. and all other such appropriate procedures as may be required to prevent sedimentation or erosion as noted on the plans or as directed by the Engineer. Upon completion of the project and restoration of all disturbed areas, the City will authorize the removal of all sediment and erosion control measures. The contractor shall remove and dispose of the erosion and sediment control measures.

The BMPs shown on the plans are the minimum requirements for the anticipated site conditions. As construction progresses and unexpected or seasonal conditions dictate, the contractor shall anticipate that more BMPs will be necessary to ensure erosion and sediment control on the site. BMPs must be adjusted accordingly as to not cause flooding on roadway that would impede traffic flow. During the course of construction it is the responsibility of the contractor to address any new conditions that may be created by construction activities and/or climatic events and to provide additional BMPs over and above the minimum requirements shown on the plans that may be needed to provide effective protection of soil and water resources.

4.14 TURF ESTABLISHMENT (2575)

All turf establishment shall be in accordance with Section 2575 of the current Minnesota Department of Transportation Standard Specification and the current MnDOT Seeding Manual, except as modified or altered below.

The BMPs shown on the plans are the minimum requirements for the anticipated site conditions. As construction progresses and unexpected or seasonal conditions dictate, the contractor shall anticipate that more BMPs will be necessary to ensure erosion and sediment control on the site. During the course of construction it is the responsibility of the contractor to address any new conditions that may be created by construction activities and/or climatic events and to provide additional BMPs over and above the minimum requirements shown on the plans that may be needed to provide effective protection of soil and water resources.

A. Sodding

1. The Contractor shall furnish and install sod and topsoil to the areas designated by the engineer.

2. The sod shall meet the requirements of MnDOT Specification 3878. Sod shall be from vendors on the “Approved/Qualified Products List”.

3. The Contractor shall use a sod cutter to make a straight line cut at full sod widths to match existing areas. Waste material shall then be removed and the area prepared to allow a depth of six inches (6") for topsoil placement.

4. The topsoil shall not be placed until the Engineer has inspected the area and approved the subgrade preparation and topsoil materials.

5. The topsoil fine grading shall not be completed more than 24 hours prior to the sod laying operation. The contractor shall be required to remove topsoil placed on unapproved areas or topsoil which does not meet Section 4.14(D) for topsoil material with such removal being done at the contractor's expense.

6. The Contractor shall not dump the topsoil on the street unless specifically approved by the engineer in the field. Topsoil dumped on the street shall not be allowed to remain overnight unless proper safety flashers are installed and approved by the Engineer in the field.

7. At all times during grading, preparation and sod laying, it shall be the Contractor's responsibility to see that all catch basins in the working area are kept clean. Gutters shall be cleaned and free of dirt and other materials at the end of each working day to ensure proper drainage.

8. Starter fertilizer, with a 1:2:1 ratio, shall be applied to all sod areas at the rate of one half (0.5) pound Nitrogen per 1,000 square feet.

9. A follow-up application of fertilizer consisting of one (1) pound Nitrogen per 1,000 square feet is required 3-4 weeks after the initial application.

10. Watering of the sod shall be the responsibility of the Contractor. Watering may occur on Sunday's if written approval is provided by the City Engineer or their designee.

B. Seeding

1. Site Preparation

   a) Verify that areas to receive seeding are free of stones larger than 1½ inches in diameter, weeds, debris and other extraneous material. The surface shall also be free of tire ruts, rills and low spots where "bird baths" may form.

   b) Verify that grades are within acceptable tolerances of required finished grade and that drainage will be per design.

   c) Site shall have received six inches (6") of topsoil. Import may be required.

   d) Apply water to areas to be seeded as necessary to bring soil to optimum soil moisture content for planting

2. Seeding shall not be done until the Engineer has inspected the area and approved the subgrade preparation and topsoil materials.

3. The Contractor shall furnish and install seed and six inches (6") of topsoil to the areas designated by the Engineer. Imported topsoil may be required.

4. Unless otherwise noted, all measurement of seed shall be in pure live seed (PLS). The following State seed mixtures and rate of application shall be used per the plan:

   a) 25-151 at 120 PLS lbs./acre.;

   b) 25-141 at 59 PLS lbs./acre.;

   c) 34-262 at 145 PLS lbs./acre.,;

   d) 32-241 at 38 PLS lbs./acre.

5. The seeding shall not be done until the Engineer has inspected the area and approved the subgrade preparation and topsoil materials.

6. In the absence of soil analysis, a starter fertilizer, with a 1:2:1 ratio, shall be applied to all seeded areas at the rate of one half (0.5) pound Nitrogen per 1,000 square feet.

7. A follow-up application of fertilizer consisting of one (1) pound Nitrogen per 1,000 square feet is required 3-4 weeks after the initial application.

8. If so directed by the Engineer, the Contractor shall reseed, at his/her cost, any area on which the original seed has failed to grow.

9. Seed shall be broadcasted prior to applying mulch or other stabilization material.

10. Hydro-seeding must use a hydro-seeder capable of continuous agitation action to uniformly distribute the seed at the adjusted bulk application rate of each mixture. Add 50 pounds of Type Hydraulic Mulch per 3884, “Hydraulic Erosion Control Products,” as a tracer for each 500 gallons of water in the hydro-seeder tank. Use flood type nozzles and manufacture’s recommended water volume. Once the seed has been added to the tank mixture a one-hour time limit is set for spreading the mixture on the soil. Once the one hour is passed the excess mixture must be discarded.

11. Hydraulic Mulch (Type 4) shall be applied in accordance with Section 2575.3 and the requirements of Section 3884 of the current Minnesota Department of Transportation Standard Specification. Areas to be mulched shall be as shown on the plans or as directed by the Engineer in the field.

a) Mechanically spread mulch to provide a uniform distribution over all exposed soil at the application rate to provide 90 percent uniform soil coverage. If non-uniform distribution occurs, remulch areas or remove the excess coverage.
b) Equipment shall have a built in agitation system sufficient to agitate, suspend and homogenously mix the slurry.
c) Apply Type 4 mulch as a dual operation with the Type 3 mulch blown on the soil surface at 1 ½ tons per acre and immediately over-spray with stabilized fiber matrix per 3884, "Hydraulic Erosion Control Products," at 750 pounds per acre.

12. Rapid stabilization method 3 shall be used on all slopes greater than 10% and on all slopes with a positive gradient toward all impaired waters that are not to be sodded.

13. Seeding shall not be done in excessively windy conditions (greater than 15 mph) or when soil is overly wet or frozen.

14. Hydro-seeding shall be performed separate from placing hydraulic erosion control products (hydro-mulch).

C. Maintenance and Establishment

1. During seeding applications care shall be taken to avoid overspray onto fences, walls, other structures, other plant material, other planting areas and paved areas. The contractor shall be responsible for washing the overspray from these areas.

2. The contractor shall request that the planted areas be inspected within 24 hours of completion.

3. The work includes a grass-establishment period of 30 calendar days commencing immediately after completion and acceptance of initial stabilization.

4. If, during the establishment period, areas are lacking sufficient sod growth or seeding to assure adequate stands of acceptable vegetation, such areas shall be re-cultivated and re-sodded/reseeded within 48 hours of notification from the Engineer.

5. The establishment period, in this case, shall be continued until the work meets the specified requirements.

6. The establishment period shall include continuous operation of watering, weeding, mowing, fertilizing, spraying, insect and pest control and any other normal operation required to assure proper growth.

7. Only Rodeo™, C-2, 4-D and Accord™ shall be used within 50 feet of streams, wetlands and ponds.

8. The contractor shall manage activities onsite to minimize compaction of vegetated areas. Post project compaction shall not exceed compaction of 1,400 kilopascals (kPa) / 200 pounds in vegetated areas.

D. Topsoil Material

All topsoil material and its placement shall conform to Section 3877 of the current Minnesota Department of Transportation Standard Specifications except as modified or altered below,

1. The minimum amount of organic material shall be 5%
2. The minimum amount of sand shall be 15%.
3. Stripped topsoil material may be reused onsite if one or more of the following conditions apply:
    a. Material is tested and meets the City of Chanhassen's standard specifications for topsoil. A minimum of 1 test per 500 CY is required. Additional testing requirements may be required as determined by the Engineer.
    b. Material is approved by the Engineer.
    c. Four inches of 60 percent sand and 40 percent compost mix is ripped into existing soil materials to a depth of ten inches on the site.

E. Street Sweeping

The Contractor shall sweep the streets following the completion of the sodding and seeding operations. All sweeping shall be completed within two (2) calendar days after completion of the sodding and seeding operation. This sweeping shall be with a pick-up power sweeper and shall continue until all loose material is completely cleaned up to the satisfaction of the Engineer. Also, all catch basins shall be cleaned within the same time requirements stated above.

F. Basis of Payment

1. Sodding. The contract price bid for the sod shall include the cost of furnishing and installing 6 inches of topsoil under the sod.

2. Water (sod). The cost shall be considered incidental to the project.

3. Roadside seeding. The contract price bid for the roadside seeding shall include the cost of furnishing and installing 6 inches of topsoil over the area to be seeded.

4.15 GEOTEXTILE STABILIZATION FABRIC

Geotextile fabric shall be used where shown on the plans, and shall be MnDOT Type 5, Amoco 2002 or Mirifi 500X or approved equivalent. The fabric shall be overlapped a minimum of two

feet (2'). The fabric in extremely bad soil conditions may need to be sewed together as directed by the engineer, and shall be paid for at an agreed upon hourly rate.

Payment for the fabric shall be in square yards in place, and excluding overlap.

4.16 SEGMENTED MASONRY RETAINING WALL UNITS (2411)

A. Part A (Dry Cast)

1. Scope

This specification covers segmental masonry units for use in the construction of mortarless walls. Locations and wall heights shall be as shown on the plans and/or as directed in the field by the Engineer.

2. Requirements

General

Each wall that exceeds four (4) feet in exposed height shall be designed and certified by a registered professional engineer of the State of Minnesota. Design shall be submitted to the Engineer for review. In addition, the Contractor shall submit the following for all wall design:

a) Manufacturer's literature: materials description and installation instructions.

b) Shop drawings: Retaining wall system design including wall heights, reinforcement and drainage provisions approved by a registered professional engineer.

c) Color sample for selection by owner.

d) A one (1) foot square piece of geotextile reinforcing as required by the Engineer.

Materials

Each manufacturing facility shall provide the Engineer with a copy of their quality control plan and procedures, including testing rates and material sources. Each manufacturing facility shall also supply test reports and documentation to verify compliance with this specification.

The units shall conform to ASTM C1372, except that:

a) The minimum compressive strength requirements shall be 38 Mpa (**5500 psi**) for any individual unit and 40Mpa (**5800 psi**) for the average of 3 units.

b) The freeze/thaw durability of wall units tested in accordance with ASTM C 1262 in a 3% saline solution shall be the minimum of the following:

(1) The weight loss of each of five test specimens at the conclusion of 90 cycles shall not exceed 1% of its initial weight; or:

(2) The weight loss of 4 out of 5 test specimens at the conclusion of 100 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5th specimen to not exceed 10%.

(3) The freeze/thaw durability of cap units test tested in accordance with ASTM C 1262 in a 3% saline solution shall be the minimum of the following:

(i) The weight loss of each of 5 test specimens at the conclusion of 40 cycles shall not exceed 1% of its initial weight; or:

(ii) The weight loss of 4 out of 5 test specimens at the conclusion of 50 cycles shall not exceed 1.5% of its initial weight, with the maximum allowable weight loss for the 5th specimen to not exceed 10%.

(4) Cap units must meet the requirements of (a) and (c) and have a top surface sloped at minimum of 1 mm fall per 10 mm run (**1 inch fall per 10 inches run**) front to back or be crowned at the center.

(5) ASTM C 1262 test results shall be recorded and reported in 10 cycle intervals.

Note: It is the intention of this testing that 100% of the wall units and cap units meet the weight loss requirements for (2i) and (3i) respectively, or the a minimum of 80% of the wall units and cap units tested meet the weight loss requirements for (2ii) and (3ii) respectively. If a manufacturer chooses to increase the sample size tested beyond the 5 units required for each block type, these percentages will still apply to the sample size chosen (i.e. if a sample size of 7 blocks is tested a minimum of 6 must meet the weight loss requirement of (2ii) and (3ii), if a sample size of 10 blocks is tested a minimum of 8 must meet the weight loss requirement).

3. Sampling and Testing

Shall conform to ASTM C 140, except that:

Section 6.2.4 shall be selected and replaced with: "The specimens shall be coupons cut from a finished side or back shell of each unit and sawn to remove any face shell projections. The coupon size shall have a height to thickness ratio of 2 to 1 before capping and a length to thickness ratio of 4 to 1. The coupon shall be cut from the unit

such that the coupon height dimensions are in the same direction as the unit height dimension. Compressive testing of full size units will not be permitted. The compressive strength of the coupon shall be assumed to represent the net area compressive strength of the whole unit".

Cap units and wall units shall be sampled and tested as separate block types.

Each manufacturing facility is required to sample and test each block type at the rate of one set of samples per 5000 units of continuous production or fraction thereof (if production is interrupted) as part of their overall quality control testing. Each 5000 units of continuous production (or fraction thereof) shall constitute a lot.

> Example: If 12,000 wall units are produced in a continuous production run, this would constitute 3 lots and 3 sets of samples would be required. If 6000 units are produced in each of two production runs (12,000 total) then 2 sets of samples would be required from each separate production run or lot (4 sets of samples total).

Minimum manufacturing testing shall include a minimum of 5 randomly selected units from each lot and the following testing on each set of samples:

a) Compressive strength (average of 3 units)

b) Freeze-thaw durability (average of 5 units)

Test results from each lot of production shall be provided to the Engineer within 30 days of the completion of testing and prior to the incorporation of any material into a project. The test report will clearly state the production lot number represented by the test results. This lot number shall correspond with the lot number supplied with the block on the certificate of compliance as outlined in section 4 below.

4. Acceptance and Use

All block manufacturers complying with the requirements of Sections 1, 2 and 3 above shall submit test results supporting this compliance to the Engineer. An approved products list on file in the MnDOT Foundations Unit and can be viewed on the MnDOT website at: http://www.dot.state.mn.us/materials/foundations.html.

Block types and manufacturing facilities not on this list shall not be allowed for use.

All block submitted for use on MnDOT or Federal-Aid projects shall be accompanied by a certificate of compliance attached to each pallet of block (MnDOT specification 1603). The certificate of compliance shall include the name and address of the manufacturing facility, date of manufacture and lot number, in addition to all other required information.

5. Method of Measure

Measurement will be made by the square foot for the area of the wall face above and below finished grade furnished and installed as specified.

6. Basis of Payment

Payment will be made under unit (Modular Block Retaining Wall). Payment will include all labor and materials required to completely construct the wall including, but not limited to, backfill, drainage system components, geo-grid (as required), stain, sealer and aggregate base material. Common Excavation for the wall will be paid under a separate line item.

4.17 MINOR CONCRETE STRUCTURES

B. Part B (Wet Cast)

1. Description

This work shall consist of the construction of a modular block retaining wall where shown on the plans. Locations and wall heights shall be as shown on the Plans and/or directed in the field by the Engineer. Wall design shall include aggregate foundation, drainage rock, geo-grid tiebacks (as required), subdrainage system, staining, sealant and all other materials necessary to construct the wall.

a) Concrete

- Concrete shall be 3F52 (Mn/DOT Certified Mix) and have a minimum 29 day compressive strength requirement of 4,000 psi for any individual load bearing unit.
- Concrete blocks shall be wet cast and shall be 6% air entrained by volume.
- Blocks shall be a minimum of 16" high, 48" wide and 24" deep.
- Exterior face pattern shall be limestone textured rockface as approved equal. Apply per manufacturer's recommendations.

b) Sealant

After construction of the wall, apply TK-290 sealant as manufactured by TK products Minnetonka, MN 800-441-2129 or approved equal. Apply per manufacturer's recommendations.

c) Staining

Wall face shall be stained to wall manufactures recommendations after sealant is applied.

2. **Construction Requirements**

a) General

The wall system shall be constructed in accordance with the manufacturer's recommendations upon review of the design methodology by the Engineer.

b) Manufacturer

Modular Block Retaining Wall shall be RECON Wall Systems Inc. (952-922-0027) or approved equal.

c) Submittals

Each wall that exceeds two (2) feet in exposed height shall be designed and certified by a registered professional Engineer of the State of Minnesota. Design shall be submitted to the City Engineer for review. In addition, the Contractor shall submit the following for all wall design:

(1) Manufacturer's Literature: Materials description and installation instructions.
(2) Shop Drawings: Retaining wall system design including wall heights, reinforcement, and drainage provisions approved by a Registered Professional Engineer.
(3) Color sample for selection by Owner.
(4) A one (1) foot square piece of geotextile fabric reinforcing as required by the Engineer.

d) Delivery, Storage and Handling

Contractor shall check the materials upon delivery to assure that proper materials have been received and then protect the materials from damage. Contractor shall prevent excessive mud, wet cement, epoxy and like materials, which may affix to the materials, from coming in contact with the materials. No damaged materials may be used on the project.

e) Footing Construction

Shall be as recommended by the manufacturer. Over excavated areas shall be filled with select granular backfill material and compacted to 95% standard proctor density. Base material shall be compacted so as to provide a level hard surface on which to place the first course of units. Compaction shall be with mechanical plate compactors with density obtained by the Ordinary Compaction Method.

f) Wall Construction

First course of block shall be placed on the prepared base and then checked for level, alignment, and full contact with the base. Units shall be placed end to end for the full length of the wall alignment. The alignment shall be set by using a string line or offset from a base line.

g) Backfill and Compaction

Shall be in accordance with the manufacturer's recommendations and commence immediately after placement of the first course.

3. Method of Measure

Measurement will be made by the square foot for the area of the wall face above and below finished grade furnished and installed as specified.

4. Basis of Payment

Payment will be made under the unit price (Modular Block Retaining Wall). Payment will include all labor and materials required to completely construct the wall including, but not limited to, backfill, drainage system components, geo-grid (as required), stain, sealer and aggregate base material. Common Excavation for the wall will be paid under a separate line item.

4.18 SEGMENTAL MASONRY RETAINING WALL SURFACE SEALING

C. Part C (Surface Sealing)

1. All segmental masonry retaining walls shall have their surfaces sealed.

   Segmental masonry retaining wall surface sealing shall consist of preparation, furnishing and applying the surface sealer to the top, exposed front face, and backside of the upper three courses of all walls.

   Surface sealers shall meet requirements on file in the MnDOT Concrete Engineering Unit. The list may also be viewed on the MnDOT website at: www.dot.state.mn.us/products/concrete/index.html.

   Due to the potentially hazardous ingredients contained in sealer formulations extreme care must be exercised in their handling and use, and the manufacturer's recommendations shall be closely followed.

2. Construction Requirements

   a) The Contractor shall comply with the manufacturer's written instructions for preparing, handling and applying the surface sealer.

   b) The surface to be treated shall receive a light-blast to the extent that the surface is clean and free of oils.

   c) Before the surface sealer is applied the surface to be sealed shall be dry and free of all dust, debris and frost.

   d) Surface sealers shall be applied at the heaviest applications rate specified by the manufacturer.

All materials and work performed as specified above will be incidental to the construction of the wall.

4.19 PEDESTRIAN CURB RAMPS

Pedestrian curb ramps shall be constructed in accordance with MnDOT Standard Plate No. 5-297.250. Detectable warnings shall be Neenah R-4984 or approved equal by the Engineer.