Proposed Specification Revisions

January 2027 Specifications

The Department is proposing revisions to 25 Standard Specifications and adding 8 Standard Specials to the Specifications. These proposed revisions will be out for comment during the month of October 2026.

Red = added text; Green = ~~deleted text~~

Comment period ends Friday, October 30th.

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Specification Changes

101.02 Acronyms and Abbreviations

PEAS AASHTO Product Evaluation and Audit Solutions

Errata changes: NTPEP to PEAS 22 occurrences

101.03 Definitions

Construction Staking

Staking can either be the physical placement of stakes, flags, hubs, or paint marks that show contractors where to build project features as designed, or by the stake-less method whereas the surveying and layout of project features are located and built using electronic data—such as GPS coordinates, digital terrain models, and machine control—rather than physical stakes placed in the field.

Reason: General definition of staking and stake-less construction staking. Stake-less construction performed by the Department will still be added with the special provision. But in general terminology, staking can be either physical stakes or stake-less.

104.02.3 Significant Changes in the Character of Work

A. Minor Item.

A change in character applies when one or more of the following circumstances is met:

1. When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction.
2. When an item of work, not defined as a major item in Subsection 101.03, is increased ~~in excess of~~ more than150% or decreased below 50% of the original contract quantity. Any allowance for an increase in quantity will apply only to that portion ~~in excess of~~ more than 150% of the original contract item quantity, or in case of a decrease below 50%, to the actual amount of work performed.
3. Allowances for a minor item cannot be negotiated as a major item even if the value exceeds 10% of the total Contractor's bid.

Reason: Question raised by a Contractor if a minor item can be a major item when increases in quantity reach the limits. For simplicity of Change Orders and allowances, a minor will remain a minor item throughout the contract.

105.02 Contractor Submittals

All submittals are to be sent to the Project Manager ~~unless stated otherwise~~. Unless stated otherwise, the Department has 20 business days to review submittals before returning them to the Contractor.

Submit all project documents electronically unless otherwise directed by the Project Manager. This includes, but not limited to:

105.02.1 Contractor Furnished Drawings.

3rd paragraph edits:

~~The Department has 20 business days to review the submittals before returning them to the Contractor.~~ The Department has 20 business days to review drawings returned for correction and that are re-submitted for review. The Department will consider extending contract time should the Department review exceed the 20 business day review time limit, and the delay can be shown to affect the Contractor's operation based on the current schedule.

6th paragraph edits:

The Department ~~will~~ may charge for reviews of resubmittals for its staff time and at the rate charged by a hired engineering firm for its staff time if the Department hires one. The Department will subtract the charges from contractor payments.

Reason: cleanup

106.02.3 Contractor-Furnished Sources

A. Borrow Source Approval.

B. Concrete, Surfacing, and Bituminized Aggregate Source Approval.

C. Riprap Source Approval.

Sources will be approved from the date all test results are complete to the expiration date. Sources can be tested for re-approval prior to the expiration date.

1. Production Pits will be approved for 5 years. The Department defines a Production Pit as an aggregate source that houses aggregate crushing, plant mix, or concrete production equipment for 90% of the year for 3 or more consecutive years.
2. Project Pits will be approved for 10 years. Project Pits are all sources not meeting the Production Pit definition.

Reason: address production and project pit approval time lines.

203.04.4 Topsoil

Includes excavation of topsoil material from its original position, loading, hauling, stockpiling, ~~and~~ removal from the stockpile and spreading on the designated areas. This work is incidental to the topsoil pay item that is measured for payment by the cubic yard in the stockpile before final placement.

Before measurement, shape and smooth each stockpile into the smallest practical area. ~~Haul is not measured for payment~~.

Excavation of topsoil material will be performed only to the depth and limits shown in the contract unless otherwise directed by the Project Manager. Any topsoil removed beyond the neat-line quantity or plan depth will not be measured for payment. Manage topsoil operations to avoid excessive removal.

If over excavation results in increased borrow requirements, the measured borrow quantity will be reduced by an equivalent volume equal to the over excavated topsoil. No additional compensation will be allowed for costs associated with over excavating topsoil material.

Topsoil removed from cut areas is not deducted from the grading quantities.

Measurement is made as if the topsoil had not been removed.

Topsoil removed from embankment areas and from borrow areas, excluding Contractor-optioned in accordance with Section 106, is measured under the bid item Topsoil - Salvaging and Placing.

Reason: clarify over excavation of topsoil limits and payment.

210.03.1 General Requirements

Provide equipment in good mechanical condition having sufficient power to perform the work. Repair or replace equipment not meeting these requirements.

All equipment must be off the roadway by sunset and meet the requirements of Subsection 618.03.5. Nightwork operations, when approved, must meet the requirements in Subsections 210.3.8 and 618.03.15.

Reason: Clarifying that unless night work has been approved, all equipment must be off the roadway, parked and stored in approved locations in accordance with the Specs. If work is to be performed after sunset all equipment and flagging must be in accordance with the Specs.

401 Plant Mix Surfacing

401.03.1 Mix Design

Submit an asphalt mix design following AASHTO R 35 and meeting AASHTO M 323, as modified in section 701. Use the Bituminous Mix Design (form MDT-MAT-009) as a mix design cover sheet. Ensure all fields are completed. The mix design and cover sheet may be submitted electronically. Mix designs submitted without the cover sheet or submitted with a cover sheet that doesn't contain all the applicable information will be rejected. Include the asphalt binder supplier's recommended mixing and compaction temperature ranges. This compaction temperature range is for testing purposes only. Choose the design air voids target to be the lowest value, within the range of 3.4 to 4.0, ensuring all other criteria are met. Report the dust-asphalt ratio (D/A) for the target asphalt content. The mix design is to be produced on a total weight of mix basis. On contracts with multiple gravel sources, or combination of gravel sources, provide a mix design and meet all the requirements for each source or combination of sources and suppliers. For mix designs using binder replacement, furnish the asphalt content and gradation of each recycled component and furnish the total asphalt content and Job Mix Formula gradation including the RAP/RAS. If no analysis is completed, assume the available binder from the recycled material is 75% of the total recycled binder. Furnish all specific gravities.

401.03.2 Hamburg Wheel Track (Hamburg) Testing and Acceptance

TABLE 401-3
HAMBURG TESTING PAY FACTORS

PG 58S-XX and ~~64~~58H-XX

401.02.5 Binder Replacement

A portion of the asphalt binder may be obtained from either RAP and/or recycled asphalt shingles (RAS). Do not use RAS when producing warm mix. Inclusion of recycled materials will be evaluated by "percent binder replacement", defined as the ratio of the recycled binder to the total binder. If no analysis is completed, assume the available binder from the recycled material is 75% of the total recycled binder. Meet the requirements of the Table 401-1.

402.03.8 Performance Graded Asphalt Binder (PGAB and MSCR PGAB)

C. Acceptance. The Department will ~~grade~~ evaluate samples representing each lot in accordance with the PGAB-MSCR grading system with duplicate containers retained for testing in case of dispute. PGAB is accepted in accordance with Tables 402-2 through 402-10. The pay factors for each characteristic will be multiplied together to produce a final pay factor. ~~Subsection 105.03.2 using an "F" factor of 4. The "P" value is determined for the high temperature components of the resulting grade (e.g., 64, 58, etc.) using the formula:~~

~~$P = (TL + aR - X_n)F$~~

~~The "P" value is determined for the low temperature component of the resulting grade (e.g., -34, -28, etc.) using the formula:~~

~~$P = (X_n + aR - Tu)F$~~

~~Positive "P" value is added to determine the lot's total price reduction. No disincentive will be assessed for "P" values less than 13, based upon the Department's initial grading. This disincentive exclusion in "P" value will not be applied to averaged results described below.~~

$$PF_{Final} = PF_{DSR} \times PF_{DSRR} \times PF_{PAV} \times PF_m \times PF_S \times PF_J \times PF_R$$

$$ADJ = PF_{Final} \times Price$$

Where:

ADJ = Adjusted payment for production lot quantity

Price = Contract unit price for the pay item

PGAB will be evaluated according to Section 702 to determine final pay factors.

Where:

PFDSR – Original Dynamic Shear Rheometer (Minimum $G*/\sin(\delta)$)

PFDSRR – Rolling Thing Film Oven DSR (Minimum $G*/\sin(\delta)$)

PFPAV – Pressure Aging Vessel DSR ($G*\sin(\delta)$)

PFm – m-value Bending Beam Rheometer

PFS – Stiffness Bending Beam Rheometer

PFJ - Jnr @ 3.2 kPa (MSCR)

PFR – Percent Recovery @ 3.2 kPa (MSCR)

Table 402-2
RTFO DSR (AASHTO T 315)
Minimum G∗/sin(δ): 1.00 kPa

$G^*/\sin(\delta)$, S(kPa)	Pay factor, PF_{DSR}
$S \geq 1.00$	$PF_{DSR} = 1.00$
$0.80 \leq S < 1.00$	$PF_{DSR} = 1.00 - 0.15\frac{(1.00-S)}{0.20}$
$0.60 \leq S < 0.80$	$PF_{DSR} = 0.85 - 0.85\frac{(0.80-S)}{0.20}$
$S < 0.60$	$PF_{DSR} = 0$

Table 402-3
RTFO DSR (AASHTO T 315)
Minimum G∗/sin(δ): 2.20 kPa

$G^*/\sin(\delta)$, S(kPa)	Pay factor, PF_{DSRR}
$S \geq 2.20$	$PF_{DSRR} = 1.00$
$1.75 \leq S < 2.20$	$PF_{DSRR} = 1.00 - 0.15\frac{(2.20-S)}{0.44}$
$1.3 \leq S < 1.75$	$PF_{DSRR} = 0.85 - 0.85\frac{(1.75-S)}{0.44}$
$S < 1.30$	$PF_{DSRR} = 0$

Table 402-4
PAV DSR (AASHTO T 315)
Maximum G∗sin(δ): 6000 kPa

$G^*\sin(\delta)$, S(kPa)	Pay factor, PF_{PAV}
$S \leq 6000$	$PF_{PAV} = 1.00$
$6000 < S \leq 9000$	$PF_{PAV} = 1.00 - 0.15\frac{(S-6000)}{3000}$
$9000 < S \leq 12000$	$PF_{PAV} = 0.85 - 0.85\frac{(S-9000)}{3000}$
$S > 12000$	$PF_{PAV} = 0$

Table 402-5
BBR - m-value (AASHTO T 313)
Minimum m-value: 0.300

m-value	Pay factor, PF_m
$m \geq 0.300$	$PF_m = 1.00$
$0.250 \leq m < 0.300$	$PF_m = 1.00 - 0.15\frac{(0.300-m)}{0.050}$
$0.200 \leq m < 0.250$	$PF_m = 0.85 - 0.85\frac{(0.250-m)}{0.050}$
$m < 0.200$	$PF_m = 0$

Table 402-6
BBR - Stiffness (AASHTO T 313)
Maximum Stiffness value: 300MPa

Stiffness (MPa)	Pay factor, PF_S
$S \leq 300$	$PF_S = 1.00$
$300 < S \leq 450$	$PF_S = 1.00 - 0.15\frac{(S-300)}{150}$
$450 < S \leq 600$	$PF_S = 0.85 - 0.85\frac{(S-450)}{150}$
$S > 600$	$PF_S = 0$

Table 402-7
58H-34 MSCR Jnr @ 3.2 kPa (AASHTO T 350)
Maximum non-recoverable compliance requirement: 2.0 kPa^{-1}

J_{nr}, J(kPa^{-1})	Pay factor, PF_J
$J \leq 2.0$	$PF_J = 1.00$
$2.0 < J \leq 3.0$	$PF_J = 1.00 - 0.15\frac{(J-2.0)}{1.0}$
$3.0 < J \leq 4.0$	$PF_J = 0.85 - 0.85\frac{(J-3.0)}{1.0}$
$J > 4.0$	$PF_J = 0$

Table 402-8
58H-34 MSCR % Recovery @ 3.2 kPa (AASHTO T 350)
Minimum recovery requirement: 40%

Recovery, $R(\%)$	Pay factor, PF_R
$R \geq 40$	$PF_R = 1.00$
$40 > R \geq 30$	$PF_R = 1.00 - 0.15\frac{(40-R)}{10}$
$30 > R \geq 20$	$PF_R = 0.85 - 0.85\frac{(30-R)}{10}$
$R < 20$	$PF_R = 0$

Table 402-9
58V-34 MSCR % Recovery @ 3.2 kPa (AASHTO T 350)
Minimum recovery requirement: 55%

Recovery, $R(\%)$	Pay factor, PF_R
$R \geq 55$	$PF_R = 1.00$
$55 > R \geq 45$	$PF_R = 1.00 - 0.15\frac{(55-R)}{10}$
$45 > R \geq 35$	$PF_R = 0.85 - 0.85\frac{(45-R)}{10}$
$R < 35$	$PF_R = 0$

Table 402-10
58V-34 MSCR Jnr @ 3.2 kPa (AASHTO T 350)
Maximum non-recoverable compliance requirement: 1.0 kPa^{-1}

J_{nr}, J(kPa^{-1})	Pay factor, PF_J
$J \leq 1.0$	$PF_J = 1.00$
$1.0 < J \leq 1.5$	$PF_J = 1.00 - 0.15\frac{(J-1.0)}{0.5}$
$1.5 < J \leq 2.0$	$PF_J = 0.85 - 0.85\frac{(J-1.5)}{0.5}$
$J > 2.0$	$PF_J = 0$

If the calculation results in a price reduction ~~("P" value of 13 or greater),~~ the Contractor may make a written request for an independent laboratory to grade the duplicates for the lot in question. Ensure the Department receives the written request within 30 calendar days of the notification of price reduction. The Contractor and the Department will agree upon the choice of independent laboratory before release of the duplicate samples for testing. The independent laboratory results will be averaged with the results provided by the Department. The averaged results are binding on both parties for acceptance and payment of the material in question. The ~~"P" value~~ pay factor will be calculated based upon the averaged results, ~~with no exclusion allowed for results less than 13~~. Pay the cost of the duplicate testing, on a per lot basis, if the price reduction is confirmed or increased. The Department will pay the cost of the duplicate testing, on a per lot basis, if the price reduction is reduced.

The ductility requirement has no tolerance. Immediately stop paving if the binder fails the ductility requirement. Do not start paving until binder meeting the specifications is furnished.

Reason: Asphalt Binder acceptance updates

Section 551 Hydraulic Cement Concrete

551.03.2 Composition of Concrete A. Design

7. When Type V cement is specified for sulfate resistance, ~~other cementitious material mixtures tested in accordance with ASTM C1012 may be submitted for approval. Acceptance will be based on maximum length of change of 0.05% at 6 months or 0.10% at 12 months if the expansion exceeds the 6-month maximum expansion limit.~~ other AASHTO M85 cement types may be used provided they have an expansion less than 0.040% as tested by ASTM C452. Alternatively, an AASHTO M240 (HS) designated cement meeting the requirements outlined in Table 4 of the standard may be used. Other cementitious material mixtures tested in accordance with ASTM C1012 may be submitted for approval. Acceptance will be based on the maximum length of change of 0.50% at 6 months or 0.10% at 12 months if the expansion exceeds the 6-month maximum expansion limit.

551.03.6 Weather and Temperature Limitations

B. Cold Weather Concreting

3. Protection of Concrete. Add as last sentence:

Provide the final accumulated temperature data in a PDF format to the Project Manager within 7 calendar days of ending monitoring.

554.02.1 Concrete

Furnish hydraulic cement concrete in accordance with Section 551. Furnish Class General concrete unless otherwise specified. A maximum cementitious materials content of 705 lbs./yd^3 is permitted for precast production. SCC meeting the class general requirements may be used for Precast products provided they meet the additional requirements of Subsection 551.03.2(A)(8)(c).

For precast items installed below grade, ~~furnish low alkali hydraulic cements meeting M85/C150 Type V Portland Cement or M240/C595 Blended Cement with the (HS) designation for sulfate resistance meeting the requirements of Section 551.03.2 (A)(7) from sources listed on the QPL~~. furnish a sulfate resistant cement meeting the requirements of Section 551.03.2(A)(7) from sources listed on the QPL.

Reason: cleanup

607.04.1 New Fence

New fence is measured by the foot. The measurements are made on the fence line along the top wire or rail or along a line parallel thereto, ~~from end post to end post~~ including wing fences to structures. Gates, cattle guards, or other openings are measured separately. Double sections of fence erected across depressions are measured for payment. All other temporary closures are included in the measurement of temporary fence.

Reason: update spec language and Detailed Drawing for consistency on wire measurement.

618.05.2 Traffic Control – Lump Sum

Table 618-9 Traffic Control - Lump Sum Progress Payments
Note: Final partial payment may be issued prior to the Conditional Final Acceptance if all Traffic Control devices have been removed from the Project and Contractor staging areas have been restored to the satisfaction of the Project Manager.

Reason: Contractor asked if final payment could be released prior to the Conditional Final Acceptance if all work has been completed requiring Traffic Control and with acceptance of the Project Manager.

624.03.2 Welder Qualifications

~~2. If Department staff is available, certification testing of welders will be provided by the Department at a cost of $60.00 per hour. This certification will be provided in Helena at this cost only once per person per project.~~

Reason: Department cannot staff this requirement

701.03.2 Aggregate for Plant Mix Surfacing

TABLE 701-17
HAMBURG WHEEL TRACK REQUIREMENTS

Binder Grade	Water Bath Temperature	Max # of Passes to ½ in. (13mm) Rut Depth	
		Mix Design Verification	Production
PG 58-XX	111 °F	15,000	10,000
PG 64-XX	122 °F	15,000	10,000
PG 70-XX	133 °F	15,000	10,000
MSCR PG 58S-XX	111 °F	12,500	7,500
MSCR PG 58H-XX	111 °F	15,000	10,000
MSCR PG 58V-XX	~~111~~ 122°F	20,000	15,000
MSCR PG 58E-XX	~~111~~ 133°F	20,000	17,500

Reason: cleanup

713.12 ROLLED EROSION CONTROL PRODUCTS

B. Permanent Turf Reinforcement Mat.

2. Natural Fiber Matrix. Furnish a natural fiber matrix constructed of two or three nets of heavy-duty polypropylene, polyethylene, or nylon. The internal matrix fiber is composed of a natural fiber such as curled wood, straw, hemp, or coconut.

Reason: add hemp to the list of natural fibers

Division 150 Design-Build Contracts

152.01 JOINT VENTURE BIDS

Subsection 102.01 applies in addition to the following:

If forming a Joint Venture for a Design-Build Project, clearly identify who will be responsible for the engineering design, surveying, quality control, architectural and construction portions of the work. Firms are not required to form a Joint Venture.

152.02 CONTENTS OF BID PACKAGE

Subsection 102.02 is rescinded and replaced with the following:

~~The Contents of the bid package are included in the RFP.~~

The Bid Package is comprised of the following documents:

1. Q&A Forum
2. RFP and Attachments
3. Specifications
4. Schedule of Items
5. Technical Proposal; and
6. Other documents included by reference in the RFP but not attached.

152.09 PROPOSAL GUARANTY

Subsection 102.09 applies in addition to the following:

Utilize the Proposal Bond form found at the following website to satisfy the requirements of this section. https://www.mdt.mt.gov/business/contracting/design-build-RFP-attachments.aspx.

152.11.1 Withdrawal of Bid Price Proposals

Submit withdrawal requests to ECCS before the time set for opening Bid Price Proposals. A Firm may withdraw any Bid Price Proposal using EBS, ~~in person, through an authorized agent,~~ or by submitting the Withdrawal of Proposal form to ECCS via email to (mdteccs@mt.gov) before any Bid Price Proposal on that project is opened.

If a Firm discovers a material (factual, not judgmental) mistake in its Bid Price Proposal after the Bid Price Proposals have been opened, the Firm understands and agrees that it may either perform the Contract as originally bid or request permission from the Department to withdraw its Bid Price Proposal.

The request must be received by ECCS no later than 4:30 p.m. 2 business days after the day of the Bid Price Proposal opening (not counting the day of the opening). The ~~notice~~ request must be ~~by a notarized affidavit, under penalty of false swearing,~~ made on a form provided by the Department, signed by the Firm and accompanied by all worksheets used in the preparation of the Bid Price Proposal, requesting relief from forfeiture of the bid bond and the responsibilities of award. The ~~affidavit~~ request must describe the specific error(s), how they were made and who made them, and must certify that the worksheets provided are those that were used in preparing the erroneous Bid Price Proposal.

The Department will review the request to determine if a mistake occurred, was material and factual, and whether the Bid Price Proposal should be allowed to be

withdrawn. If the Department does not concur in the error or determines that the error has not been sufficiently proven, it may recommend awarding the Contract. If the Firm refuses to execute the awarded Contract as it was bid, the bid bond will be forfeited as stated under Section 18-1-204 MCA.

153.01 CONSIDERATION OF PROPOSALS

Subsection 103.01 is rescinded and replaced with the following:

Only Proposals from Firms that are short-listed and requested by the Department to submit Proposals will be considered for the Project.

153.06 CONTRACT BOND

Subsection 103.06 applies in addition to the following:

Utilize the Contract Bond form found at the following website to satisfy the requirements of this section. https://www.mdt.mt.gov/business/contracting/design-build-RFP-attachments.aspx.

155.02 CONTRACTOR SUBMITTALS

A. Post Bid Opening Submittals. The Firm will:

~~4. Submit Warranty/Contractor Guarantee criteria, measurable standards, (e.g., project specifications, applicable codes, etc.) and remedial plans for approval within 6 calendar days after NTP.~~

158.01 SUBCONTRACTING OR ASSIGNMENT OF CONTRACT

Subsection 108.01 applies in addition to the following:

The Firm may be allowed to subcontract any part of the work, but members of the Firm identified in the Statement of Qualifications and Technical Proposal must perform at least 40% of the total Contract cost.

Federal Prevailing Wage/Davis Bacon Wage Decision labor provisions that are attached to subcontracts do not apply to subcontractors providing Professional Services.

Reason: cleanup

Special Provisions Added

Section 556 Steel Structures

556.01 Description

This work is the furnishing, fabricating, painting, and erecting of steel structures and the steel structure portions of composite structures.

The Department uses 490 lb./ft^3 to calculate the weight of structural steel.

The weights of rolled shapes and plates up to and including 36 inches in width are computed based on their nominal weights and dimensions as shown on the shop drawings. One-half of the allowed percentage of overrun in weight as tabulated in ASTM A6 will be added to the nominal weights of plates exceeding 36 inches in width. The weight is computed ~~on the basis of~~ based on rectangular dimensions for all plates and overall lengths for all structural shapes with no deductions for copes, slips, sheared edges, punching, borings, milling, or planing. When parts can be economically cut in multiples from materials of larger dimension, the calculated weight is that of the material from which the parts are cut.

Bolts, nuts, and washer weights are the calculated weight in the AISC Manual of Steel Construction.

Weld metal weight is not computed.

556.02 MATERIALS

Furnish materials in accordance with the following subsection requirements:

Bearing Assembly Anchor Bolts for Bridges .711.13
Bolts and Nuts.....711.07
Castings.....711.12
Compression Joint Seals 711.15
Elastomeric Bearing Devices 711.14
Fiber-reinforced Pads for Bearing Plates 711.16
Galvanized Metal.....711.08
High Strength Bolts.....711.06
Pins and Rollers 711.04
Structural Steel.....711.02
Structural Steel Tubing.....711.03
Welding Electrodes.....711.05
Welded Stud Shear Connectors 711.09

556.03 CONSTRUCTION REQUIREMENTS

For the fabrication of steel structures, follow AASHTO LRFD Bridge Construction Specifications, and the AASHTO LRFD Steel Bridge Fabrication Specifications. unless otherwise specified in the contract.

556.03.1 Pre-Qualification for Steel Fabricators

Use metal fabricators that are pre-qualified under the AISC Quality Certification Program for the items listed below. The Department will make an exemption for new manufacturing plants that are of the same ownership as an existing certified plant, provided the new manufacturing plant operates under the same quality assurance and control programs as the certified plants, modified to address any production differences,

and all fabrication is performed under the direct supervision of a quality assurance and control manager provided by an existing pre-qualified plant. Direct supervision means that the quality assurance and control manager is on site during all fabrication performed in the new fabrication plant and is responsible for the quality assurance and control activities.

For new manufacturing plants, submit and receive approval of any proposed modifications to the parent plant's quality assurance and control program prior to beginning production. Allow 30 business days from the date submitted for Department review and approval. New manufacturing plants may operate under the parent plant's quality assurance and control programs for a maximum of 18 months from the date of opening. Items not listed may be fabricated by non-certified shops. Use metal fabricators having the following AISC quality certification categories:

1. Use fabricators having Advanced Bridges (ABR) certification to fabricate the following:
    a. Fracture critical members and attachments. Fabricators must have the Fracture Critical Endorsement (F).
    b. Tub, trapezoidal or closed box girders, large or non-preassembled trusses [over 200 feet] cable supported bridges, bascule bridges, arches, and bridges with tight radius.
2. Use fabricators having Intermediate Bridges (IBR) certification to fabricate the following:
    a. Fracture critical members and attachments. Fabricators must have the Fracture Critical Endorsement (F).
    b. Rolled beams with field or shop splices, either straight or with a radius over 500 feet.
    c. Built-up I-shaped plate girders with constant depth, either straight or with a radius over 500 feet.
    d. Built-up I-shaped plate girders with variable web depth (e.g., haunched), either straight or with a radius over 1000 feet.
    e. A truss with a length of 200 feet or less that is entirely or substantially pre-assembled at a certified facility and shipped in no more than three sub-assemblies.
    f. Welded floor beams.
    g. Diaphragms for horizontally curved girders.
3. Use fabricators having Simple Bridges (SBR) certification to fabricate the following:
    a. Non-spliced rolled beams.
    b. Non-spliced rolled floor beams.
    c. Non-spliced rolled diaphragms for straight girders (does not include diaphragms used for concrete beams).
4. Use fabricators having an SBR or Bridge and Highway Metal Component Manufacturers certification to fabricate the following:
    a. Bridge expansion joints.
    b. Steel grid decking.
    c. Bridge expansion bearings.
    d. Overhead sign bridge and cantilever sign structures.
    e. Lighting poles and anchor bases.

556.03.2 Submittals

For all submittals, meet the requirements of Subsection 105.02 unless stated otherwise.

~~A.~~ Fabrication Drawings. Prior to fabricating members, submit fabrication drawings and include the following information. ~~The Department will have 20 calendar days to review.~~

1. An erection layout with each member assigned a production number.
2. A tentative fabrication schedule.
3. Denote any changes from the details in the contract.
4. All dimensions, geometrical information, details, and other data required for fabrication. Include camber information, blocking diagrams and shop splices.
5. Denote specification, grade, finish, required toughness testing and required surface preparation for all steel plates, shapes, pipes, tubes, bars, and all miscellaneous hardware such as shear studs, bolts, stud bolts, threaded rods, nuts, and washers.
6. Identify the applicable specification for galvanized items. Specify paint type, manufacturer and recommended dried film thickness for each coat applied in the shop for painted items. Also identify surface preparation for each item to be painted. For ~~paint~~ painting requirements see Sections 612 and 710.
7. A list of field bolts and other items furnished by the fabricator:
8. Appropriate weld sizes, symbols, requirements for non-destructive testing, heat cambering and bending procedures. Provide welding certifications and welding procedure specifications and any supporting documentation for all welding required for fabrication. For welding requirements see Section 624; and
9. Welding Procedure Specification (WPS) identification is required in the weld symbol tail for all weld symbols shown on the shop drawings.

Submit shop drawings of welding procedures and design calculations. Ensure the submittal includes all information required to check the structural accuracy and fabrication procedures for the structure.

Structural shop drawings must be designed and stamped by a professional engineer registered and licensed to conduct engineering in the State of Montana.

Do not begin fabrication until the Department approved drawings are received by both the plant and the Project Manager. Coordinate the fabrication schedule with the Project Manager.

B. Certificate of Compliance. Furnish a manufacturer's Certificate of Compliance for all bolts, nuts, washers, and load indicator washers. Include documentation in accordance with Subsection 106.09 and test reports performed on the finished bolt confirming that all ~~of~~ the materials provided meet the requirements of the applicable AASHTO or ASTM specification. The documentation must include the name and address of the test laboratory, the date of testing, lot identification and the sample sizes of bolts and nuts used for each test performed for the certification.

Submit the following items before installation: ~~The Department will have 20 calendar days to review.~~

1. The certification from the supplier showing ~~that~~ all tests required by the AASHTO and ASTM specifications have been performed. Include the date and location of those tests, as well as the production lot numbers, and the sample sizes used for each test performed with the certification.
2. The certification from the supplier showing ~~that~~ the wedge tests and rotational capacity tests have been performed. ~~Also show~~ Include production lot numbers, dates, locations, and sample sizes of these tests and who performed them.
3. Three bolt, nut, and washer assemblies from each rotational capacity test lot for verification by the Department.

   Do not install fasteners prior to receiving approval.

556.03.3 Mill and Shop Inspection

1. Inspection of Work. Do not begin manufacturing or shop fabrication until the Department's Inspector has inspected the shop.
2. Facilities for Inspection. Furnish facilities for inspecting the material and workmanship in the mill and shop. ~~Always~~ allow the Inspector free access to the work.
3. Inspector's Authority. The Inspector may reject material or work not in accordance with the specifications. In case of dispute, the Contractor may appeal the Inspector's decision to the Project Manager.
4. Mill Test Reports. Provide the Project Manager with signed documentation in accordance with Subsection 106.09. Certify all steel meets the project specifications. Identify each piece of steel with a mark number on the mill test report.
5. Facilities for Testing. Furnish, at Contractor expense, test specimens, labor, testing machines, and tools to make the specimens and tests.
6. Rejections. Material or finished members accepted by the Inspector may be rejected if the material is subsequently found defective. Replace or repair rejected material at Contractor expense.

556.03.4 Storage and Handling of Materials

1. Mark alloy and high-strength steels as required by the AASHTO LRFD Bridge Construction Specifications. Mark material required to meet a Charpy requirement for identification.
2. Store materials off the ground and keep them clean and dry.
3. Place and store girders upright.
4. Support long members, including but not limited to columns, chords, and girders on blocks spaced to prevent deflection.
5. Store high-strength fastener components in accordance with the manufacturer's recommendations.
6. Store the bolts and nuts in the original containers until used.

7. Protect from dirt and moisture.
8. Remove only as many fasteners from protected storage as can be tightened during a work shift and return unused fasteners to protected storage at the end of each work shift.

556.03.5 Quality Control

~~Prepare and~~ Submit a quality control (QC) plan ~~for~~ ensuring the quality of all work and conformance to specifications. ~~The Department will have 20 calendar days to review.~~

Ensure that all nondestructive testing (NDT) is performed by personnel qualified in conformance with the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A to minimum Testing Level II for the individual methods. Ensure that the QC plan meets the following minimum requirements:

1. Include descriptions of any necessary pre-work meetings, procedures to verify materials meet approved submittals, and QC testing plan.
2. NDT, Radiographic Inspection. Inspect 100% of all complete joint penetration (CJP) groove welds.
3. NDT, Ultrasonic Inspection. Inspect 100% of all CJP groove welds on plates thicker than ¼-inch.
4. NDT, Magnetic Particle Inspection. Randomly inspect 25% of all welding for each member throughout the entire structure in accordance with AWS D1.5 bridge welding code. The Project Manager reserves the right to select locations for testing.
5. Personnel qualifications. Include the qualifications of the specific individuals that will be performing the QC testing.
6. Quality control manager. Identify the QC manager that will be the primary contact person for all QC communication. Ensure that this person is responsible for all QC work.
7. NDT, Phased Array Ultrasonic Testing (PAUT). This method may be used in place of RT and UT for the inspection of CJP groove welds. Perform all aspects of PAUT inspection in accordance with AWS D1.5, Annex K. ~~Provide, for approval, a submittal package 30 days prior to inspection.~~ Submit 30 calendar days prior to inspection the following; Provide all information, qualifications, etc. needed to determine the requirements of Annex K can be met. Include the inspector's history of successful NDT projects specific to PAUT and the requirements of AWS D1.5.

Complete reports of all QC testing as ~~the~~ testing is performed. Identify in the reports any deviations from specifications, standards, or the QC plan and a discussion of why the deviation occurred.

- Submit any reports containing any deviations, defects, or non-compliance to the Project Manager within 24 hours.
- Make other reports available upon request.
- Submit repair plans for approval.

The Department will have 3 working days to review.

At the completion of fabrication, and before shipment, provide all QC reports and a certification signed by the quality control manager that contains the following statement and supporting information:

Required Statement: “This is to certify that the quality control plan was followed and that the results of the quality control program indicate that the materials and the construction operations controlled by the quality control plan are in conformity with the approved plans and specifications. Exceptions to the plans, specifications, and quality control plan are described below.”

556.03.6 Pilot and Driving Nuts for Pins.

Furnish 2 pilot nuts and 2 driving nuts for each size of pin unless otherwise specified. Pilot and driving nuts are not required when shoes are assembled at the fabrication plant.

556.03.7 Bolts and Bolted Connections

A. General.
    1. When galvanized fasteners are specified, furnish assemblies manufactured with a visible dye, so a visual check verifies the presence of lubricant at installation.
    2. When uncoated fasteners are specified, use black fasteners oily to the touch at installation.
    3. Use beveled washers to provide full bearing to the head or nut where bolts are used on beveled surfaces.
B. Definitions. Terms are defined in the most recent edition of Steel Structures Technology Center, Inc. Structural Bolting Handbook~~, 2022 ed.~~ (Bolting Handbook).
C. Unfinished Bolts. Furnish standard unfinished bolts. Furnish bolts that extend through the nuts a maximum ¼-inch.
D. Breakaway Connections. Install breakaway connections in accordance with the breakaway device manufacturer’s recommendations.
E. Temporary Bolts. When used, temporary bolts are required to be of the same diameter as the production bolt and clearly marked or coated to distinguish them from permanent bolts. They are exempt from testing and storage requirements and may be re-used as temporary bolts.

556.03.8 Bolted Connections - High-Tensile-Strength Bolts

A. Submittals. Prior to installing bolts, submit the following for review and approval. ~~The Department will have 20 calendar days to review~~.
    1. Erection Plan. Submit an erection plan ~~meeting~~ in accordance with Subsection 556.03.14.
    2. Installation Method. Submit the method(s) that will be used:
        a. Turn of the nut,
        b. Calibrated wrench,
        c. Direct Tension Indicator (DTI),
        d. Tension Control Bolts (twist-off),
        e. Combined Method (Torque Nut Angle)

B. General. Make bolted connections in accordance with the most current version of Steel Structures Technology Center's Structural Bolting Handbook (Bolting Handbook), which is a compilation of the Research Council on Structural Connections (RCSC 2020 ed.), AISC (2022 ed.), and AASHTO (4th ed. 2017 with interim) code requirements.

In the event of a conflict between Section 556, a code, and the Bolting Handbook, the hierarchy is as follows:

1. Section 556
2. Code
3. Bolting Handbook

All provisions termed as "recommendations" in the Bolting Handbook are contract requirements.

1. Jobsite Storage. Store bolting components as required in the Bolting Handbook.
   a. Production Lot Traceability. Protect bolt container labels from damage. Maintain lot traceability of each component during storage and handling, so that any component's lot number will be identifiable until the point of installation.
   b. Component Assembly Condition. Do not install components that are rusty, dirty, or otherwise damaged/compromised.
      1) Tension Control (Twist-Off) Assemblies. Reject tension control components that are rusty or dirty, or otherwise compromised, or have them cleaned and relubricated by the original manufacturer.
      2) Other Components. Reject other components that are rusty or dirty or clean/relubricate according to the Bolting Handbook. Suppliers written recommendations for type and application of lubrication are required and must be applied to all remaining components of the lot(s) in question.
2. Bolt Lengths. Use bolt lengths having the grip-length values in Table 556-1 plus the total thickness of connected material. The values in Table 556-1 consider nut, one flat washer, and bolt point.

   Increase the bolt length ⅛-inch if direct tension indicator washers are used.

   Adjust the length to the next ¼-inch increment up to a 5-inch bolt and to the next ½-inch increment for bolts over 5 inches.

Table 556-1
Bolt Length Determination

Bolt Diameter	Added Grip Length[1]
English	
½-inch	⅞-inch
⅝-inch	1-inch
¾-inch	1⅛-inch
⅞-inch	1⅜-inch
1-inch	1½-inch
1⅛-inch	1⅝-inch
1¼-inch	1¾-inch
Metric	
M16	25 mm
M20	30 mm
M22	35 mm
M24	40 mm

Note: 1. Add to total thickness of connected material.

Where beveled washers are used, adjust bolt lengths to account for the use of nonstandard or beveled washers.

3. Bolted Parts. Ensure bolted surfaces in contact with the bolt head and nut do not have a slope of more than 1V:20H to a plane normal to the bolt axis.

   Provide a Class B finish, in accordance with AASHTO LRFD Bridge Construction Specifications for all faying surfaces. Restore the Class B finish for faying surfaces that have degraded prior to joint assembly.

4. Washers. Install hardened washer(s) under the turned component and in accordance with the Bolting Handbook.

C. Pre-Erection Meeting. Schedule a pre-erection meeting to be at least ~~seven~~ 7 calendar days before beginning steel erection and prior to installation of permanent high strength bolts, to review the bolting requirements and the approved erection sequence. The Project Manager, Steel Fabrication Specialist (or their designee), and the bolting crew supervisor(s) are required to attend the meeting. Repeat annually for multi-year projects.

1. Pre-Installation Verification (PIV) Testing. Perform Pre-installation verification procedures in accordance with the Bolting Handbook. Retest when directed by the Project Manager.

   Use a Skidmore Wilhelm Bolt Tension Measuring Device (BTMD) or equal that has been calibrated by the manufacturer or testing laboratory within the last 12 months. Keep calibration documentation with the BTMD. Notify the Project Manager at least ~~seven~~ 7 calendar days prior to PIV testing. The Steel Fabrication Specialist or their designee must be present during PIV testing.

a. For all installation methods, use the same tools for PIV testing that will be used during the installation.
b. The Steel Fabrication Specialist or their designee will issue a written certification for passing lots. Do not install components without certification.

2. Reuse of previously pretensioned components. Do not reuse previously pretensioned components.

D. Production Bolting. Do not install components from any lot until the lot has ~~passing~~ passed PIV and Department Lab testing. Repeat sampling and testing (PIV and Lab) for subsequent construction seasons.

1. Condition. Verify that the condition of the assembly is equivalent to that of the Pre-installation Verification test. Conditions of the assembly and the efficiency of the lubricant can be affected by many factors, including:
   a. Exposure to the elements.
   b. High temperatures during storage.
   c. High temperatures during tightening.
   d. Low temperatures during tightening.
   e. Additional moisture from snow and rain during pretensioning.
   f. Contaminants such as dirt, dust, rust.
   g. Loss of lubrication.

   If these conditions occur, or if untensioned bolts have been exposed to weather for more than ~~two~~ 2 days, or if bolts have been cleaned and relubricated, repeat the pre-installation verification test on at least 3 assemblies of each length. If any of the test fails, replace or relubricate all components within the affected connection(s).

2. Re-lubrication. If bolts require relubrication, submit ~~for approval~~ the supplier's written recommendations for type and application of lubrication. Re-lubrication of tension control bolts may only be performed by the manufacturer.
3. Snugging. Snug tighten structural connections in accordance with the snugging procedures and systematic approach given in the Bolting Handbook. Repeat the snugging cycle over the connection as necessary until all plies are brought into firm contact. A minimum of 2 snugging cycles is required. If firm contact is not achievable, notify the Project Manager.
4. Pretensioning. Fully tighten bolts in accordance with the pre-tensioning procedures given in the Bolting Handbook.
5. Turn of the Nut Method. Match mark as described in the Bolting Handbook.
6. Failures. Report fastener assembly stripping, breaking, or other failures to the Project Manager immediately and stop bolting until the cause of failure has been determined and documented, and the Project Manager approves continuation of pretensioning. Provide broken fastener(s) to the Project Manager.
7. Connection Acceptance. In the presence of the Inspector, verify each structural connection within 72 hours of completing installation and pretensioning of bolts as described below.

a. Access. Provide arms-length access to the connection for the Inspector so that they can observe installation or perform verification.
b. Bolt selection and marking. The Inspector will select and circle ~~ten percent~~ 10%(~~two~~2 minimum) of every bolt length within the connection for verification testing.
c. Pretension Verification.
    1) Connections with Direct Tension Indicating (DTI) Washers (including Self Indicating DTI washers).
        i. For verification of a completed joint, use a metal feeler gauge to inspect DTI washers on the selected fasteners. Connection fastener tension is acceptable if the selected fasteners meet the feeler gage refusal/acceptance requirements listed in the Bolting Handbook and manufacturer recommendations/instructions. For passing results, the Inspector will mark the connection, indicating acceptance.
        ii. If any fastener checked does not meet the requirements, inspect each bolt in the connection with the feeler gage and continue/complete pretensioning each as necessary. Resubmit the connection for inspection.
    2) Other Connections. ~~Furnish and~~ Use a torque wrench that indicates torque by means of a readout or that may be adjusted to give an indication that a defined torque has been reached, to verify tension as follows.
        i. Calibration. Calibrate the torque wrench at least once each inspection day using ~~five~~ 5 fastener assemblies of the same grade, size, and condition as those under inspection. Use a washer under the part turned in tightening each bolt if washers are used on the connection. Use the same material that abuts the part turned in the tension measuring device as used on the connection if washers are not used on the connection.

            In the calibration device, tighten each bolt to the exact value listed in the Required Minimum Bolt Pretension table in the Bolting Handbook. Apply the torque wrench to the tightened bolt to determine the torque required to turn the nut or head ~~five~~ 5 degrees (approximately one inch at a 12-inch radius), in the tightening direction. Discard the high and low torque values. The inspection torque is the average of the torque values for the other three bolts. Discard any bolts used for calibration.
        ii. Verification. Verify the bolts represented by the test bolts by applying, in the tightening direction, the inspection torque to the bolts selected by the Inspector.

            Connection fastener tension is acceptable if no nut or bolt head is turned. The Inspector will mark acceptable connection(s) with an indelible marker.

If any nut or bolt head is turned with the inspecting torque, apply the inspection torque to all fasteners in the connection. Once the inspection torque has been applied to all fasteners, the connection is acceptable and the Inspector will mark the connection, indicating acceptance.

556.03.9 Welded Stud Shear Connectors

The type, size or diameter, and length of stud shear connectors are specified in the contract.

Furnish fabrication material and perform welding in accordance with Section 624.

1. Shop Drawing Review. Provide alternate stud locations that will avoid conflict with safety and lifting devices. Ensure that all shear studs are a minimum of 6 inches away from top flange shop splices. Obtain approval from the Bridge Bureau before installing any studs in these alternate locations.
2. Field Removal. Stud shear connectors that are removed in the field must use one of the following removal methods:
   a. Cut completely through the stud above the weld.
   b. Partially cut the stud above the weld and break off the stud the rest of the way. Prevent damaging the base metal during stud removal.
3. Field Replacement. Replace all stud shear connectors that are removed in the field. Replacement shear studs must be within 3 inches of the original stud location, no closer than 1½ inches from base metal edges, and at least 1 inch between adjacent studs. Follow all the surface preparation, field welding, and testing requirements in accordance with AWS D1.5.
4. Additional Payment. No additional payment will be made for field removal and replacement of stud shear connectors and base metal inspection, repair, or replacement.

556.03.10 Field Welding

Notify the Project Manager and Steel Fabrication Specialist at least 3 working days prior to field welding. Do not weld temporary construction supports to beams, girders, or other main members. Any member with unauthorized field welds, tack welds, or arc strikes will be rejected. Perform welding in accordance with Section 624.

556.03.11 Assembling Steel

Field or shop-assemble steel parts as follows:

A. Shop Work. Clean all contacting metal surfaces of deleterious materials before assembling, bolting, or welding. Paint may be applied to contact surfaces after bolting or welding.

   Shop assemble and adjust to line and camber all bolted trusses, continuous plate girders, curved steel elements, box girders, I-beam spans, skew portals, skew connections, rigid frames, bents, and towers.

   Drill and ream the field splice holes during assembly. Holes for other field connections may be shop drilled or reamed with the connecting parts assembled or drilled or reamed to metal templates with hardened bushings, without assembling.

Use an approved alternate procedure where shop space prevents complete shop assembly of continuous span girders or trusses. The procedure may require adjusting the line and camber of at least two abutting sections of girder for drilling or reaming of field splices if all girder lines for the complete structure are assembled consecutively.

Field butt joints for welded girders may be assembled with abutting members adjusted for line and camber and prepared to fit for welding, subject to Project Manager approval.

Bridge expansion devices must be initially shop assembled to establish the proper fit between the joint parts.

B. Field Work. Assemble the parts as specified in the contract, following the match-marks. Prevent damaging the material while handling. Clean all bearing and member surfaces in permanent contact before assembly.

Splices and field connections must have a minimum of ½ of the holes filled with bolts or erection pins before removing temporary supports or releasing the load from erecting equipment.

Do not place deck forms or other loads on straight steel girders except in accordance with an approved erection plan.

Use erection pins $\frac{1}{32}$-inch larger than the nominal diameter of the permanent bolts.

C. Drifting of Holes. Use a minimum of ~~two~~ 2 drift pins during assembly to the extent necessary to bring the parts into position without enlarging or distorting the holes or metal. Do not ream holes during field fitting without approval from the Project Manager.

D. Matchmarking. Match-mark parts assembled in the shop for reaming field connection holes and provide the Project Manager with a diagram showing the marks.

556.03.12 Marking and Shipping

Paint or mark each member with an erection mark and ~~furnish~~ provide the Project Manager with an erection diagram detailing the erection marks.

~~Furnish~~ Submit ~~copies of~~ material orders, shipping statements, and erection diagrams. Show the individual member weights on the statements.

A shipping statement must accompany the material and be marked to clearly identify it with the delivered material and the relevant domestic material and contract specification certifications.

Mark the weight on members weighing 3 tons or more. Load and unload structural members on trucks or cars without stressing or causing damage.

Pack bolts, loose nuts, or washers of each size separately. Ship pins, small parts, bolts, washers, and nuts in boxes, crates, kegs, or barrels, with the gross weight of each package not exceeding 300 pounds. Plainly mark each shipping container, listing and describing the contents on the outside of each shipping container.

Keep structural material clean and free from damage.

556.03.13 Painting

Clean and paint all iron and steel surfaces in accordance with Section 612.

556.03.14 Erection

Submit a steel erection plan and specifications meeting the latest editions of the AASHTO LRFD Bridge Construction Specifications and the AASHTO Steel Bridge Erection Guide Specification, that ensures safety, prevents overstressing of the steel, maintains stability, prevents damage to the work or surroundings, and achieves the proper final geometry. Submit a complete erection plan and specifications for erection of the steel and for any necessary falsework, temporary bracing, temporary bolts, or other items. Describe the sequencing of bolt snugging and pretensioning.

The erection plan and specifications must bear the signature and seal of a professional engineer licensed to practice in Montana. Check and approve before submitting. ~~The Department has 20 calendar days to review and return the submittal.~~

556.03.15 Falsework

Design, construct, and maintain falsework to support the maximum construction loadings. Check and approve falsework drawings before submitting. ~~The Department has 20 calendar days to review and return the submittal.~~

556.03.16 Bearing and Anchorage

Place masonry bearing plates in accordance with Subsection 565.03.2.

556.03.17 Placing Anchor Bolts

Place anchor bolts in accordance with Subsection 552.03.13.

556.03.18 Straightening Bent Material

Submit a plan to the Project Manager for approval, for straightening bent material. ~~The Department has 20 calendar days to review and return the submittal.~~

556.03.19 Pin Connections

Furnish the Project Manager the pilot and driving nuts provided with the steelwork once the work is complete. The members must take full bearing on the pins. Bring pin nuts up tight and burr the threads at the nut face.

556.03.20 Misfits

Correct all misfits, errors, and injuries as a part of the assembly and erection work. Report to the Project Manager all shop work errors that prevent the assembly and fitting of parts with a minimum use of drift pins, reaming, slight chipping or cutting. Obtain Department approval for the correction method. Corrections must be inspected and approved.

556.03.21 Cleanup

Remove all falsework, excavated or unused materials, rubbish, and temporary buildings. Restore all public and private property damaged during construction to its original condition.

Pull, cut off or otherwise remove all falsework piling 1-foot below finished the ground line or streambed, unless otherwise directed. Perform all work affecting the stream channel in accordance with Subsection 208.03.4 before final acceptance.

556.03.22 Rejections

An Inspector's acceptance of material or finished members does not prevent later rejection if defects are found. Replace or repair rejected material and work at Contractor expense.

556.03.23 Girder Profile Survey

Survey the top flange 10th points under steel dead load after completion of erection and before adding any additional dead load. ~~Submit to the Project Manager a minimum of 14 calendar days prior to deck placement.~~

556.04 Method of Measurement

See Subsection 151.01.1 for Design-Build Contracts.

Structural Steel is measured by the lump sum.

556.05 Basis of Payment

See Subsection 151.01.1 for Design-Build Contracts.

Payment for the completed and accepted quantities is made under the following:

Pay Item	**Pay Unit**
Structural Steel	Lump Sum

The weight of structural steel in the contract is an estimate only. No guarantee is made that the estimated weight is the correct weight to be furnished. No adjustment in the contract unit price is made if the weight furnished is more or less than the estimated weight.

If changes in the work ordered by the Project Manager vary the weight of steel to be furnished, the lump sum payment is adjusted as follows:

The value per pound of a decrease or increase in the weight of structural steel involved is determined by the following:

$$\text{Value per Pound} = \frac{\text{Contract Lump Sum Bid}}{\text{Estimated Contract Weight}}$$

The adjusted contract lump sum amount paid is the contract lump sum bid plus or minus the value of steel involved in the change.

Should the ordered change materially alter the character of the work and the unit cost, compensation for that work is made at an agreed price established before the work is performed. Detail in writing, the changes in procedures and the resulting costs for labor, equipment, and materials to support the agreed price.

Partial payments for structural steel will be made based on the lump sum contract unit price as follows:

1. 90% when erected.
2. 97% when bolted and spot painted.
3. 100% when fully in compliance with the plans and specifications.

Reason: add the Standard Special provision. Any further updates to Section 556 will be added as a special so that changes are apparent and visible.

617.03.8 Luminaires

Special Provision: High Efficacy Luminaire LED

Furnish and install High Efficacy Luminaires that use light-emitting diodes (LED) and in accordance with Subsections 556.03.8, 703.04.5 and 703.11.

~~Install luminaires in accordance with Subsections 556.03.8 and 703.04.5.~~

Furnish Luminaires that meet the following requirements:

1. Has a power supply with a minimum power factor of 0.90 and a maximum total harmonic distortion (THD) of 20% or less.
2. Has surge protection with a minimum of ANSI/IEEE C62.41 category C protection. Wired for 240-volt operation. Provides access to electrical components without the use of tools.
3. Has a minimum 10-year manufacturers' warranty for the entire luminaire assembly including material, workmanship, photometrics, power supply and LED modules. If more than 10% of the LED's fail within an individual luminaire within the warranty period, the luminaire must be repaired or replaced.

Check luminaires on the ground to ensure they provide the specified ANSI/IES light distribution pattern before mounting. Adjust the luminaires at night, as directed, to provide the best roadway light distribution. Adjust luminaires so they are level from side to side to limit glare and provide shielding for residential areas as directed by the Project Manager.

Notify the Project Manager when the luminaire system is complete. The luminaires may be put into operation when necessary for public use as directed by the Project Manager.

Furnishing and installing the LED Luminaire, mounting hardware, electrical connections and any additional equipment required are included in this item.

703.11 LUMINAIRES

Furnish ~~and install~~ luminaires and lamps ~~meeting the contract requirements.~~ that meet the following requirements:

1. Have a die cast aluminum housing and a universal four-bolt slip fitter mount.
2. Are UL listed for use in wet locations.
3. Utilize arrayed discreet LEDs. COB (chip-on-board) LEDs will not be accepted.
4. Have a light distribution of type 2.
5. Are rated at lumens as shown in the contract.
6. Have a field adjustable drive current selector with a range of 350 milliamps to 700 milliamps.
7. Have a current drive setting of 450 mA for 17,600 lumen and 700 mA for a 26,700 lumen.
8. Have an uplight rating of U1 or less. Submit the backlight, uplight, and Glare (BUG) ratings.
9. Meet ANSI C136.37 standards for solid state light sources.
10. Have an LED optical assembly that has an ingress protection rating of IP66.
11. Are photometrically tested by certified independent testing laboratories in accordance with IES LM-79 testing procedures.
12. Use a correlated color temperature (CCT) of 4000 K and a minimum color rendering index (CRI) of 70.

13. Are mercury and lead free and are tested in accordance with IES LM-80 testing procedures.
14. Have LEDs rated to produce a minimum of 70% intensity at 100,000 hours of life based on IES TM-21 (L70). Submit a TM-21 report for the LEDs.

617.03.14 Traffic and Pedestrian Signals

Special Provision: Signal Head Mounting

~~C.~~ **Signal Head Mounting.** ~~Mount signal heads as shown in the contract. Use internally wired plumbing devices for mounting signal heads to mast arms. Use the standard mounting for all three-section mast arm mounted signals, unless 17.5 feet of roadway clearance cannot be obtained. Use an elevator plumbizer, when necessary, to obtain the 17.5-foot clearances.~~

~~Use an elevator plumbizer to mount all four and five section signals.~~

Mount signal heads as shown in the contract. Use internally wired elevator plumbizer for mounting signal heads to mast arms. Attach between the top and second signal display of the signal head unless 17.5 feet of roadway clearance cannot be obtained. Use the standard mounting for side of pole signal.

~~Provide positive lock rings and fittings for all signal heads.~~ Use rings and fittings with serrated contacts.

Cooperate with Department personnel to aim the signal heads after installation prior to the signal turn-on.

617.03.17 Pedestrian Push Buttons

Special Provision: Push Button/Pedestrian-Tactile

Furnish and Install tactile accessible pedestrian signals (APS).

Install the push button and sign on the crosswalk side of the pole with the arrow pointing in the direction of the crosswalk.

~~Use ¼-inch (M6) coarse thread stainless steel bolts to mount pedestrian push buttons to the side of signal poles.~~

A. ~~**Accessible Pedestrian Signals.**~~ Any additional hardware, control unit, signal cable or wiring required for operation of each ~~accessible pedestrian signals~~ APS must be included as part of the ~~accessible pedestrian signals~~ APS.

At new traffic signal installations, do not activate ~~accessible pedestrian signals~~ APS until the day of the scheduled signal turn-on. Department personnel from the traffic engineering section must be present before activation to program accepted sound/volume settings.

At existing traffic signal installations, do not install ~~accessible pedestrian signals~~ APS until Department personnel from the traffic engineering section are present. Contact the Traffic Signal Engineer at least 2 weeks prior to installation to schedule a representative from traffic engineering.

~~When voice messaging is required,~~ Voice messaging is required. Submit a custom voice message detail sheet with the electrical material submittals.

703.10 PEDESTRIAN PUSH BUTTONS

Furnish APS that include the pedestrian pushbutton and housing combination. Furnish tamper-proof pedestrian push buttons using a piezo-type switch meeting ADA requirements. ~~The push button must be flush with the housing and be at least 2 inches in the smallest dimension~~. The button must have a raised arrow, which can be adjusted to point toward the appropriate crosswalk. The push button housing must be weatherproof and electrically insulated to prevent shock under all weather conditions. Furnish a dark olive-green housing back plate to fit the pole curvature and, when required, provide saddles to make a near fit. Furnish push button signs shown in the contract.

Use ¼-inch (M6) coarse thread stainless steel bolts to mount pedestrian push buttons to the side of signal poles.

~~**703.10.1 Accessible Pedestrian Signals (APS) (Tactile Push Buttons)**~~

~~Furnish APS that include the pedestrian pushbutton and housing combination.~~ ~~The push button must be in accordance with Subsection 703.10~~. The housing must have a locator tone to indicate the location of the button. The volume of the locator tone must be adjustable by digital means and must automatically adjust to ambient noise level. The volume over ambient noise level must be adjustable in increments of 5 decibels (dB). ~~The button must have a raised arrow, which can be adjusted to point toward the appropriate crosswalk.~~ The button and housing combination must also provide feedback that a call for service has been placed. The feedback must be in the form of a lit LED and an audible indication. The accessible signal must also provide vibro-tactile information, in the form of the button vibrating during the appropriate Walk signal. The pedestrian signals must

operate without any additional equipment in the signal cabinet, or additional signal conductors from the cabinet.

~~When voice messaging is required,~~ Provide ~~accessible pedestrian signals~~ APS stations with custom voice messages that provide location information on a button push, and street crossing message when the appropriate walk signal is activated. The voice messages will be in the following format:

1. Voice on location (VOL): Wait to cross (Street to be crossed) at (Intersecting Street).
2. Walk Message: (Street name being crossed). Walk sign is on to cross (Street name to be crossed).

617.03.25 Radar Detection System

Special Provision: Detector – Radar/Presence & Detector Radar/Advance

Furnish a radar detection system for advance detection or radar presence of vehicles for traffic signal operation that meets the requirements of Subsection 703.16.

Mount the radar detection units as approved by the manufacturer at the locations shown on the plans. Connect the radar detector to the detection cable as approved by the manufacturer and install the radar detection cable as a single continuous run from the traffic signal cabinet to each radar detector connection. Splicing the radar detection cable is not allowed. Seal any wire entrance holes drilled in the signal standard as approved by the Project Manager.

Furnishing and installing each radar detection sensor, mounting hardware, electrical connections and any additional equipment required is included in this item.

703.16 RADAR DETECTION SYSTEM

Furnish a complete detection system including radar presence or radar advance detector, cabinet interface, and necessary mounting hardware approved or provided by the manufacturer. The cabinet interface must provide communication, power, and surge protection for four (4) detection units. The cabinet interface must provide ethernet connectivity and an SDLC port. Furnish radar detection cable as specified and approved by the manufacturer of the radar detection equipment.

Furnish a radar presence detection system capable of detecting and reporting the presence of vehicles within a 90-degree field of view with a range of 6 feet up to a 140-foot arc from the sensor.

Furnish a radar advance detection system capable of detecting and reporting the presence of vehicles within a detection area of 50 feet to 600 feet from the sensor.

Furnish a detection system that holds a call while a vehicle remains in the detection zone and operates in a temperature range of –40 °F to +165 °F and maintains accurate performance in all weather and light conditions. Both detection systems must provide at least 8 RF channels so that multiple units can be mounted in the same vicinity without causing interference between them.

Furnish any additional cable, terminations, jumpers, connectors, and any miscellaneous equipment required to make this a complete and functional system as part of this item.

The radar presence detection system is required to have automatic and manual configuration of lanes, stop bars, and zones. The radar advance detection system is required to have automatic and manual configuration of lanes and zones. Both detection systems must include software for saving detector configurations and firmware upgrading.

Ensure that a factory representative of the radar detection system manufacturer is present at the traffic signal turn-on to give technical assistance in setting up, checking out, and demonstrating that the system meets functional and operational requirements.

619.04.8 Replace Signs

Special Provision: RSFO Removal

New materials for signs designated "Replace" are measured in accordance with Subsections 619.04.1, 619.04.2, and 619.04.3.

Removal of existing signs designated "Replace" are measured in accordance with Subsection 619.04.7.

New materials for signs designated "Replace Sign Face" are measured in accordance with Subsection 619.04.1. Removal of the sign is not measured separately for payment.

620.03.11 Pavement Marking Grooving

A. Equipment. Furnish a self-propelled grooving machine equipped with gang-stacked diamond cutting head to perform the work and meet the following requirements:
   1. Do not use grinder type heads.
   2. Capable of providing uniform depth and alignment.
   3. Capable of cutting the intended groove in a single pass.
   4. Leaves the groove clean, dry, and ready for pavement marking application.
   5. Captures dust and debris during grinding operation.

B. Grooving.
   1. General.
      a. Provide a groove depth of 120 mils ± 10mils for all Epoxy Paint locations.
      b. Provide a minimum groove depth of 150 mils not to exceed 200 mils for all High Perf Tape locations.
      c. Ensure the bottom of the groove meets the manufacturer's requirements.
      d. When grooving is near a longitudinal joint, ensure the edge of the groove is at least 1 inch from the joint unless directed otherwise by the Project Manager. Stop grinding operations if damage occurs to pavement joints, joint sealant material(s), etc. Repair damaged areas to the satisfaction of the Project Manager. Repair areas at no cost to the Department.
      e. Ensure groove placement/alignment allows the pavement marking to be placed entirely in the bottom of the groove in accordance with the following tolerances:
      f. Do not grind or groove bridge decks. Apply all pavement markings on bridge decks to the surface unless otherwise specified in the contract.
      g. Do not allow debris to enter waterways, storm drains, wetlands, drainages, or other aquatic resources.
   2. Longitudinal Lines. Provide a grooved area not wider than 1 inch and not longer than 5 inches past the pavement stripe to be applied in the bottom of the groove.
   3. Words and Symbols. Cut grooves for words and symbols so that the marking fits within the grooved area without an excessive border. Provide a grooved area not exceeding 5 inches surrounding the letter, word, or symbol, as measured to the nearest point of the pavement marking.

C. Pavement Marking Application.
   - Align the markings within the grooved area.
   - Complete marking application the same day as grooving. If the markings cannot be completed in their entirety the same day, furnish traffic control in accordance with Section 618 at the Contractor's expense.
   - Apply pavement markings in accordance with the provisions found elsewhere in the contract.

620.04.9 Pavement Marking Grooving

Linear pavement marking grooves are measured by the linear foot based on a 4-inch width for the actual quantity of stripe grooved. Lines wider and narrower than 4 inches are converted to the equivalent linear feet of 4-inch-wide line.

Words and Symbols are measured at the unit price per square foot of Stripe Grooving.

620.05 Basis of Payment

Pay Item	Pay Unit
Stripe Grooving	LNFT or SQFT

Detailed Drawings:

There a several revisions to the Detailed Drawings. Changes to the Drawings can be found here: Proposed Detailed Drawings

Errata

NTPEP to PEAS 22 occurrences

1. **Class Pre Concrete.** Class Pre concrete is evaluated for acceptance for ~~air entrainment~~ air content and on a lot-by-lot basis based on the average of the 28-day compressive strength cylinders and variation in test results as measured by the standard deviation.

Table 701-16. fix columns

Table 618-8 & 608-9 misnumbering within Subsection.

Specifications Revision Process

Submit proposed changes in writing to the Specifications Engineer. Include the following:

1. The title and Section or Subsection to be revised.
2. A description of the needed change. It is recommended that proposed language be includedbut is not required.
3. List any specifications, Detailed Drawings or manual sections that may be affected due to theproposed revision.
4. A brief explanation to support the need and reason for the change. The Specifications Engineer may request additional supporting data and analysis after receipt of the proposed specification revision.
5. A brief statement explaining if the revision requires an implementation plan and if so, statewho may be impacted by the change. Will the change require advance notice prior to implementation to ensure lead time to allow coordination and compliance withthe change?
6. A list of those consulted and involved with the recommended change.

Submit the proposed change in one of the following ways:

1. MDT employees may e-mail to MDT Construction Specifications
2. External submissions emailed to mdtspecifications@mt.gov

The complete revision process is available here:
https://www.mdt.mt.gov/other/webdata/external/const/proposed_spec_changes/SPEC_REVISION_PROCESS.PDF