Iowa Department of Transportation

# GS-12001

## General Supplemental Specifications
## for
## Highway and Bridge Construction

**Effective Date**
**October 16, 2012**

**THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS, ADDITIONS, AND DELETIONS. THESE ARE GENERAL SUPPLEMENTAL SPECIFICATIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

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# Division 11. General Requirements and Covenants.

## Section 1102

**1102.**

**Add** the Article 1102.20, Title VI Assurance:

To comply with US DOT Order 1050.2 (dated August 24, 1971) the following Appendix A is a contract requirement of each contract and shall be included in each subcontract.

**APPENDIX A**

During the performance of this contract, the contractor, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

**1.** Compliance with Regulations: The contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the Department of Transportation (hereinafter, "DOT') Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

**2.** Nondiscrimination: The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, national origin, sex, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

**3.** Solicitations for Subcontracts, Including Procurement of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurement of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, national origin, sex, age, or disability.

**4.** Information and Reports: The contractor shall provide all information and reports required by the Regulations or directives issued pursuant there to, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Iowa Department of Transportation or Federal Highway Administration to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information the contractor shall so certify to the Iowa Department of Transportation or the Federal Highway Administration as appropriate, and shall set forth what efforts it has made to obtain the information.

**5.** Sanctions for Noncompliance: In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the Iowa Department of Transportation shall impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

**a.** withholding of payments to the contractor under the contract until the contractor complies, and/or

**b.** cancellation, termination or suspension of the contract, in whole or in part.

**6.** Incorporation of Provisions: The contractor shall include the provisions of paragraphs (1) through (6) in every subcontract, including procurement of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the Iowa Department of Transportation or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for non-compliance: Provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Iowa Department of Transportation to enter into such litigation to Protect the interests of the Iowa Department of Transportation and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

**1102.09, A.**

**Replace** the Article:

Only contractors who have been authorized to bid a proposal may submit a bid for a contract. ~~For bids submitted to the Department that exceed $1 million, the bidder shall use subparagraph 2 or subparagraph 3 below. The Department may wave this requirement for unique or isolated situations.~~

~~**1.** Submit the signed, original Bidding Document furnished by the Contracting Authority with a Schedule of Prices from the Estimating Proposal.~~

~~**2.** Submit the signed, original Bidding Document furnished by the Contracting Authority with the computer printout and diskette of the Schedule of Prices from the bidding software furnished by the Department.~~

~~**3.** Submit an electronic bid with digital signature using the bidding software furnished by the Department and the electronic bid submittal procedures of the Department.~~

Unless otherwise specified, bidder shall submit an electronic bid with digital signature using bidding software furnished by the Department and electronic bid submittal procedures of the Department. When prequalification is waived per Article 1102.01, H, or elsewhere in the contract documents, bidder may submit the signed proposal on the original forms furnished by the Contracting Authority in lieu of submitting an electronic bid.

**1102.10, Irregular Proposals.**

**Add** the Article:

**G.** If a bidder fails to acknowledge receipt of an addendum. For electronic bidding, loading of the addendum into the Department's bid preparation software is acknowledgment of receipt by bidder.

**1102.17, G, 2.**

**Replace** the Article:

If the contract contained a DBE commitment, the Engineer will verify that the Contractor has attained the DBE commitment specified to each DBE firm listed on Form 102115. ~~If the commitment is not met and was less than the goal, the price adjustment is the difference between the actual dollars paid and the commitment. If the commitment is not met and was greater than the goal the price adjustment is the difference between the actual dollars paid and the goal.~~ A price adjustment will be assessed for the amount of commitment not paid to each DBE firm used unless the DBE commitment to that DBE firm was reduced as allowed by Article 1102.17, G, 3.

**1102.19, F, 5.**

**Replace** the Article:

~~An individual, group of individuals, or entity believing they have been subjected to discrimination prohibited by Title VI Nondiscrimination Provisions may file a written complaint with OES-Civil Rights. A formal, signed complaint shall be filed within 180 calendar days of the alleged occurrence.~~

~~Upon receipt of the complaint, the OES-Civil Rights Coordinator will determine its jurisdiction, acceptability, need for additional information, and investigative merit of the complaint. In cases where the complaint is against one of the Department's sub-recipients of federal highway funds or federal transition funds, the Department will assume the jurisdiction and will investigate and adjusticate the case.~~

~~Once the Coordinator decides to accept the complaint for investigation, the complainant and the respondent will be notified in writing of such determination within five calendar days. The complaint will receive a case number and be logged into the OES-Civil Rights' records identifying its basis, race, color, national origin, and gender of the complainant.~~

~~In cases where the Department assumes the investigation of the complaint, the Coordinator will provide the respondent with the opportunity to respond to the allegations in writing. The respondent will have 10 calendar days to furnish OES-Civil Rights their response to the allegations.~~

~~Within 40 calendar days of receipt of the complaint, the OES-Civil Rights investigator* will prepare an investigative report for the Director of the Department's Operations and Finance Division to review. The report will include a narrative description of the incident, identification of persons interviewed, findings and~~

~~recommendations for disposition. *This may be the District/Division Title VI Liaison, Coordinator, or Title VI Specialist.~~

~~The investigative report and its finding will be sent to the Attorney General's Office for review. The Attorney General's Office will review the report and associated documentation and provide input within 10 calendar days.~~

~~Comments or recommendations from the Attorney General's Office will be reviewed by the Department's Operations and Finance Division. The Department's Operations and Finance Division will discuss the report and recommendations with the Title VI Coordinator. The report will be modified as needed and made final for its release.~~

~~Once the Department's investigative report becomes final, the parties will be properly notified of the outcome and appeal rights.~~

~~The Department's investigative report and a copy of the complaint will be forwarded to FHWA, Washington Division Office, within 60 calendar days of the receipt of the complaint.~~
~~If the complainant is not satisfied with the results of the investigation, they shall be advised of their rights to appeal the Department's determination to the FHWA - Washington Division Office, U.S. DOT or U.S. Department of Justice. Appeals shall be filed within 180 calendar days after FHWA's final resolution. Unless new facts not previously considered come to light, reconsideration of the Department's determination will not be available.~~

~~The Department will serve as appealing forum to a complainant that is not satisfied with the outcome of an investigation conducted by a Department sub-recipient. The Department will analyze the facts of the case and issue its conclusion to the appellant within 60 calendar days of the receipt of the appeal.~~

The Contractor shall promptly, within 14 calendar days, investigate complaints of alleged discrimination made to the Contractor in connection with its obligation under this contract, attempt to resolve such complaints, and take appropriate corrective action within a reasonable time. If the investigation indicates the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the Contractor shall inform complainant of their avenues of appeal.

If the complaint cannot be resolved at the contractor level, or when a contractor has a complaint against another contractor, the complainant or the Contractor can contact the Department's Office of Employee Services-Civil Rights (OES-Civil Rights) Team.

The Department has a formal Civil Rights Complaint procedure. This procedure is available at www.iowadot.gov/civilrights/documents/IowaDOTExternalComplaintProcedure.pdf. An individual, group of individuals, or contractor believing they have been subjected to discrimination may file a written complaint with the Department's OES-Civil Rights Team. A formal signed complaint shall be filed within 180 calendar days of the alleged occurrence.

## Section 1105

**1105.12, B.**

**Add** as the second sentence of the sixth paragraph:

The Contractor will not be billed for crossings located within areas designed for removal of pavement after cross hauling is completed as long as the pavement is not damaged by the cross hauling.

## Section 1108

**1108.02, E, 4.**

**Replace** the Article:

Working days will not be charged for Saturdays, Sundays, and recognized legal holidays the Contractor does not work. Working days will be charged for Saturdays, Sundays, and recognized legal holidays the Contractor does work. Work not requiring inspection may be performed on Saturdays with no time charged.

**1108.02, E, 5.**

**Delete** the Article:

~~Working days will not be charged for Saturdays the Contractor does work, unless a 6 day work week is specified in the contract documents.~~

## Division 22. Base Courses.

### Section 2212

**2212.03, B, 2, b, Full Depth Repair Patches.**

**Replace** the Article:

~~1)~~ Construct full depth repair patches according to Section 2529. ~~with the following exceptions:~~

~~a) If the thickness of full depth repair patches is not shown in the contract documents, base the thickness on the existing pavement type.~~

~~b) Construct patches to be no less than:~~

~~(1) 6 inches (150 mm) for County Roads.~~

~~(2) 9 inches (230 mm) for Primary Roads.~~

~~(3) 12 inches (300 mm) for Interstate Roads.~~

~~2) Base maximum full depth repair patch thickness on the following:~~

~~a) **Portland Cement Concrete Repair Patch.**~~

~~(1) **Rigid Pavement:** Pavement thickness, but not more than 12 inches (300 mm).~~

~~(2) **Rigid Pavement resurfaced with HMA (composite patch):** Rigid pavement thickness and the patch covered with HMA surface.~~

~~(3) **Flexible Pavement:** Same as above for resurfaced rigid pavement.~~

~~b) **Hot Mix Asphalt Repair Patch.**~~

~~(1) **Rigid Pavement:** Pavement thickness, but not more than 12 inches (300 mm).~~

~~(2) **Rigid Pavement resurfaced with HMA:** Thickness of pavement, including resurfacing, but not more than 12 inches (300 mm).~~

~~(3) **Flexible Pavement:** Thickness of surface and base course, but not more than 12 inches (300 mm).~~

## Division 23. Surface Courses.

### Section 2301

**2301.03, A, 3, a, 2, Integral Curb Forms.**

**Replace** the Article:

~~a) Use metal forms to form the back of all integral curbs, except where returns have a small radius or other special sections making the use of metal forms impractical.~~

~~b) Rigidly attach back forms for curb to the side forms for the pavement slab. Use all fastenings provided by the form manufacturer. Supply a sufficient length of curb forms and number of fastenings to make it possible to leave the forms in place for at least 6 hours after the curb is place.~~

~~c) At the time the curb form is placed, ensure the top of the pavement is free of all substances which prevent the rigid fastening or accurate alignment of the curb form. Ensure the curb form extends the plane of pavement form without a variation of more than 1/8 inch (3 mm). Set the top of the curb form at the elevation of top of curb being built, except at curb runouts.~~

~~d) Sloping faced curb not more than 4 inches (100 mm) in height may be shaped to the desired cross section with a curb mule without the use of face forms.~~

~~e) For straight sections of integral curb more than 4 inches (15 mm) high, the Contractor may use face forms or a slip form curb mule. If face forms are used, provide no less than 100 feet (30 m) for each curb being constructed. Properly secure face forms to maintain their shape and position during use. Ensure the face forms produce a curb cross section matching that of the details within the contract documents. Approved hand tools and methods may be used to supplement the forms in shaping the top roll and on returns and other special sections.~~

~~f) If a slip form curb mule is used, use a slip form curb mule that is no less than 6 feet (1.8 m) long, unless mounted on a machine. Obtain the Engineer's approval before using the slip form curb mule. Both back~~

~~and face forms will be required when constructing barrier curbs or any curb having a top width of 8 inches (200 mm) or more.~~

Meet the requirements of section 2512, 03, C.

**2301.03, E, 2, d.**

**Replace** the Article:

~~Cutting the tie wires of the load transfer assemblies is optional.~~ A maximum of three tie wires may remain uncut on each load transfer assembly.

**2301.04, A, 1.**

**Add** as the second sentence of the Article:

The area of manholes, intakes, or other fixtures in the pavement will not be deducted from the measured pavement area.

**2301.05, K, 1.**

**Delete** the Article:

~~Deduction will not be made from the area of pavement for fixtures with an area less than 9 square feet (1 $m^2$).~~

## Section 2303

**2303.02, C, 6, c, 2**

**Replace** Table 2503.02-1:

| Mix Designation | Aggregate Quality Type | Maximum Allowance Usage[2] | | |
|---|---|---|---|---|
| | | Unclassified RAP | Certified RAP | Classified RAP |
| HMA 100K S | B | 0% | 10% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 100K I | B | 10% | 20% | No Limit |
| HMA 100 K B | B | 10% | 20% | No Limit |
| HMA 300K S | B | 0% | 10% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 300 K I | B | 10% | 20% | No Limit |
| HMA 300K B | B | 10% | 20% | No Limit |
| HMA 1M S L-4 | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 1M S | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 1M I | B | 10% | 20% | No Limit |
| HMA 1M B | B | 10% | 20% | No Limit |
| HMA 1M B (shoulder) | B | 10% | 20% | No Limit |
| HMA 3M S L-4 | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 3M S L-3 | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 3M S | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 3M I | A | 0% | 0% | No Limit |
| HMA 3M B | B | 10% | 20% | No Limit |
| HMA 10M S L-3 | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 10M I | A | 0% | 0% | No Limit |
| HMA 10M B | B | 10% | 20% | No Limit |
| HMA 30M S L-3 | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 30M S L-2 | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 30M I | A | 0% | 0% | No Limit |
| HMA 30M B | B | 10% | 20% | No Limit |

| | | | | |
|---|---|---|---|---|
| HMA 100M S L-2 | A | 0% | 0% | ~~15% (min. 70% virgin binder)~~ No Limit[1] |
| HMA 100M I | A | 0% | 0% | No Limit |
| HMA 100M B | B | 10% | 20% | No Limit |

Note:

1. ~~More than 15% of Classified RAP may be used for the surface course when there is quality control sampling, testing, and reporting of the RAP meeting the requirements in Materials I.M. 505.~~ At least 70% of the total asphalt binder in the surface mix shall be virgin.
2. ~~Maximum percentages shown are not to be combined.~~

**2303.02, D, Flexible Paving Mixture.**

**Replace** Articles 6, 7, and 8:

**6.** Unless otherwise indicated on the contract documents, use a 1/2 inch (12.5 mm) or 3/4 inch (19 mm) 1,000,000 ESAL HMA Base mixture (or higher ESAL) for base widening. When an adjoining surface is designed for 300,000 ESALS or less and is paved during same project, use a base mixture at same ESAL level used in surface mixture.

~~6~~ **7.** Prepare gyratory mixture designs for base, intermediate, and surface mixtures. Follow the procedure outlined in Materials I.M. 510. Submit a mixture design complying with Materials I.M. 510. Propose both a production and a compaction temperature between 215ºF (102ºC) and 280ºF (138ºC) for WMA mixture designs.

~~7~~ **8.** Use gyratory compacter for design and field control meeting the AASHTO protocol for Superpave gyratory compactors. Compactors for which compliance with this protocol is pending may be used at the discretion of the District Materials Engineer.

~~8. Unless otherwise indicated in the contract documents, do not use WMA on interstate travel lanes for surface, intermediate, or base courses.~~

**2303.02, E, 2, a.**

**Replace** Articles 2 and 3:

**2)** Mixtures for Interstate and Primary highways containing quartzite, granite, or other siliceous (not a limestone or dolomite) aggregate ~~(not a limestone or dolomite)~~ obtained by crushing from ledge rock in at least 40% of the total aggregate (virgin and recycled) or at least 25% of the plus No. 4 (4.75 mm).

**3)** All WMA mixtures placed in travel lanes designed for 10,000,000 ESALS and higher.
For the purpose of evaluating moisture sensitivity of a proposed ~~WMA~~ mix design~~s which use water injection technologies, in lieu of a lab-scaled foaming device~~, the Contractor may test the proposed JMF from plant produced material placed off-site at no additional cost to the contracting authority.

**2303.03, C, 3, d, 4.**

**Add** the Article:

**e)** Production temperature limits apply starting at point of discharge from mixer.

**2303.03, C, 5, b, 2, b.**

**Add** to the end of the Article:

If surface course and intermediate course are not placed the same calendar year, then place test strip at beginning of surface mix production.

**2303.03, C, 5, b, 2, e.**

**Replace** the first sentence of the Article:

Only one test strip will be allowed for each mixture and shall be declared to the Engineer prior to placement.

**2303.03, D, 3, a, 4.**

**Replace** the Article:

- All of the following qualify as a “significant mix change”:

- A single occurrence of an aggregate interchange of greater than 5%.
- An aggregate interchange of greater than 5% from last approved JMF.
- A single occurrence of an asphalt content change greater than 0.2%.
- An asphalt content change greater than 0.2% from last approved JMF.
- A deletion or introduction of a new material into the mix.
- A change of additive dosage rate.
- A change of binder, aggregate, or additive source.

**2303.03, D, 3, b, 3, a.**

**Add** to the end of the Article:

Modify sampling location to include placement with mix stored from a prior day's production.

**2303.03, D, 3, b, 3, f.**

**Replace** the first sentence of the Article:

For PWL analysis of laboratory voids, each mixture bid item will constitute a lot. Lot size is defined as follows:

**2303.03, B, 3, d, 3, i.**

**Add** the Article:

**(3)** When same mix type is produced for multiple bid items in a single day from a single plant, apply all samples for that day to the lot for each bid item.

**2303.03, B, 3, d, 3, i, 1.**

**Replace** the Article:

For base widening, non-high speed ramps, non-interstate shoulders, recreational trails, and other mixture bid items not placed in travel lanes of a permanent pavement, acceptance for laboratory voids will be based on a moving average absolute ~~average~~ deviation (AAD) from target as defined in Materials I.M. 501 ~~of this specification~~. Use the production tolerance in Table 2303.03-5. At any time, if more than 100 tons (100 MG) of the bid item is placed in an area not listed above, apply Article 2303.03, D, 3, b, 3, ix, b, for entire production of bid item.

**2303.03, B, 3, b, 3, j.**

**Replace** the first paragraph of the Article:

For mixture bid items in a PWL lot, determine the pay factor using the average absolute ~~average~~ deviation (AAD) procedure described in Materials I.M. 501 for proportions of a mixture bid item which are produced in irregular intervals and placed in irregular areas. The following items qualify as such and shall be combined into ~~weekly lots~~ a single lot:

**2303.03, D, 4, c, Smoothness.**

**Replace** the Article:

Construct pavement to have a smooth riding surface according to the following:

**1)** Apply Section 2317 to HMA surface mixture bid items of a Primary project if any individual HMA mixture bid item is 1000 tons (1000 Mg) or greater or 5000 square yards (4200 $m^2$) or greater. Apply Section 2316 to all other Primary projects with a surface course and when specifically required for other projects.

**2)** When neither Section 2316 nor Section 2317 is applied to a project, periodically check the riding surface longitudinally with a 10 foot (3 m) straightedge. The surface shall not deviate from a straight line by more than 1/8 inch in 10 feet (3 mm in 3 m). If a deviation is present, correct the area according to Article 2316.03, B, 2.

**2303.03, D, 5, b, 8.**

**Replace** the third sentence of the Article:

~~A single sample shall represent no more than 10,000 tons of mixture.~~ Each sample shall constitute a separate lot and include all quantities placed from beginning of bid item's production (or previous sampling point) to next sampling point (or 10,000 tons, whichever is less).

**2303.03, E, 1, a.**

**Replace** the Article:

An anti-stripping agent is required when TSR on mix design is less than 90%.

**2303.04, A, 3, a.**

**Add** as the second sentence of the Article:

The area of manholes, intakes, or other fixtures will not be deducted from the measured pavement area.

**2303.05, D, 1.**

**Replace** the last sentence of the Article:

For mix designs (small quantities excluded) with a TSR greater than or equal to 80%, payment will stop when the Contracting Authority's TSR results of the field produced mixture without the agent are greater than or equal to 80% and any remaining asphalt binder containing the agent in the current tank is consumed.

**2304.02, B, 3.**

**Replace** the second sentence of the Article:

Apply ~~Class I~~ compaction per Section 2303.

## Division 24. Structures.

### Section 2401

**2401.05, B.**

**Replace** the third bullet:

If the existing structure will become the property of the Contracting Authority, payment for proper storage, salvage, and delivery of the structure ~~shall~~ will be according to Section 2555.

### Section 2403

**2403.03, L, Design and Construction of Forms and Falsework.**

**Replace** Articles 4 and 5:

**4. Design Loads.**

Design formwork and falsework for the following loads:

**a.** Vertical load of concrete with a density of 150 pounds per cubic foot (2400 kg/m$^3$).

**b.** Horizontal load of fresh concrete as a liquid with a density of 150 pounds per cubic foot (2400 kg/m$^3$) for the depth of plastic concrete, except when lesser pressures are permitted by AASHTO Guide Design Specifications for Temporary Works.

**c.** Vertical dead load of forms and falsework.

**d.** Vertical dead load of rail and walkway applied at edge of deck form equal to 75 pounds per linear foot (1.1 kN/m)

~~**d**~~ **e.** Construction live load equal to 50 pounds per square foot (2.4 kPa) of horizontal projection

**f .** Live load equal to 6 kips (26.69 kN) of finishing machine located along the edge of the deck form to maximize the design condition.

~~**e**~~ **g.** Wind loads ~~on walls and columns according to the requirements of the ACI~~ equal to 50 pounds per square foot (24 kPa) for elevations to 30 feet (10 m) above the ground, increased for elevations above 30 feet (10 m).

**h.** Other applicable loads such as horizontal loads due to equipment or construction sequence, additional live load, impact, stream flow, and snow loads specified in AASHTO Guide Design Specification for Bridge Temporary Works.

**5. Design Stresses.**

**a.** Design formwork and falsework using load groups specified in AASHTO Guide Design Specifications for Bridge Temporary Works and material working stresses ~~and a normal duration of load, as for a~~

~~permanent structure~~. For structural steel and reinforced concrete use the allowable stress percentages given with load groups. For lumber and timber use appropriate load and duration factors instead of percentages. Calculate lumber strength on the basis of dressed size ~~and, except for sheathing, a dry condition~~. Publications of the APA – The Engineered Wood Association, ACI, and the ~~National Forest Products Association~~ American Forest & Paper Association, American Wood Council will be considered standard references for design and analysis of plywood, lumber, and timber formwork and falsework.

**b.** Do not exceed 50 times the dimension of the least side for the unsupported length of wood~~en~~ columns and compression members. ~~Analyze the member as a column.~~

**c.** Unless the Contractor certifies a higher stress grade or value as allowed by AASHTO Guide Design Specification for Temporary Works, adequacy of falsework material will be ~~checked~~ reviewed on the basis of the following values:

**1)** Structural steel stresses ~~per AASHTO~~ for ~~30,000~~ 36,000 psi (~~207~~ 248 MPa) yield strength and ~~22,500~~ 22,000 psi (~~155~~ 151 MPa) maximum working stress.

**2)** Plywood sheathing stresses per ~~American Plywood Association~~ APA – The Engineered Wood Association for ~~concrete form grade~~ Plyform, Class I, wet use, ~~permanent loading~~ 7 day duration of load, span-perpendicular-to-face grain. Orientation of plywood panels must be shown on drawings if advantage is taken of greater strength with span-parallel-to-face grain.

**3)** ~~Stresses~~ Design values for lumber in good condition and 4 inches (100 mm) or less in thickness, in psi (MPa) as follows:

| | |
|---|---|
| $f_b$, bending | = ~~1000~~ 875 (~~6.90~~ 6.03) |
| $f_t$, tension | = ~~625~~ 450 (~~4.30~~ 3.10) |
| $f_v$, shear | = ~~120~~ 135 (~~0.83~~ 0.93) |
| $f_c$, perpendicular to grain | = ~~345~~ 425 (~~2.40~~ 2.93) |
| $f_c$, parallel to grain | = ~~1050~~ 1150 (~~7.20~~ 7.93) |
| E, modulus | = ~~1,500,000~~ 1,400,000 (~~10,300~~ 9650) |

These design values are to be modified for seven-day duration of load (except for fc, perpendicular to grain and E, modulus) and other applicable adjustment factors when determining allowable stresses.

**4)** ~~Stresses~~ Design values for ~~lumber~~ timber in good condition and 5 inches (125 mm) thick and thicker in psi (~~MPs~~ MPa) as follows:

| | |
|---|---|
| $f_b$, bending | = ~~1200~~ 850 (~~8.30~~ 5.86) |
| $f_t$, tension | = ~~1000~~ 450 (~~6.90~~ 3.10) |
| $f_v$, shear | = ~~120~~ 125 (~~0.83~~ 0.86) |
| $f_c$, perpendicular to grain | = ~~390~~ 425 (~~2.70~~ 2.93) |
| $f_c$, parallel to grain | = ~~1000~~ 625 (~~6.90~~ 4.31) |
| E, modulus | = ~~1,600,000~~ 1,300,000 (~~11,000~~ 8960) |

These design values are to be modified for seven-day duration of load (except for fc, perpendicular to grain and E, modulus) and other applicable adjustment factors when determining allowable stresses.

**5)** Safe bearing value of coarse sand, gravel, very firm clay, and other similar confined soils in thick beds at 1500 pounds per square foot (72 kPa) unless recommended otherwise by a Professional Engineer licensed in the State of Iowa. Safe bearing value of compacted berms at 2000 pounds per square foot (96 kPa).

**2403.03, L, 1, General.**

**Add** the Article:

**c.** Design values for lumber and timber vary considerably depending on size and or use, species, and grade. For each type of structural member, list on the falsework plans specifications for the following if known: size or use category, species group, and minimum grade.

**2403.03, L, 3, c.**

**Add** as the first sentence of the Article:

To ensure stability for pile bents 10 feet (3 m) or less in height that are not sway braced, show pile type, size, and minimum embedment length on plans.

## Section 2407

**2407.01, Description.**

**Replace** Articles C and D:

**C.** Apply the provisions of this section to production and construction of prestressed precast concrete bridge units and nonprestressed precast concrete ~~as defined in Section 1101~~ bridge units.

**D.** Unless modified elsewhere in the contract documents, all fabrication is required to be done only in precast fabrication plants that are approved prior to the letting as per Materials I.M. ~~445~~ 570 and 570 LRFD.

**2407.02, A, 1.**

**Replace** the first sentence of the Article:

Apply Sections 4110, 4111, and 4115, except the gradation requirements of Articles 4110.02, 4111.02, and 4115.03.

**2407.03, B, 4.**

**Replace** the Article:

If using HPC for prestressed concrete beams, use a mix design that has been evaluated according to ASTM C 1202 or AASHTO TP 95, and approved by the Engineer. To obtain mix design approval either:

**a.** Submit to the Engineer ASTM C 1202 results from mix samples taken and tested by an independent laboratory. The results shall be 1500 coulombs or less when cured using accelerated moist curing.

**b.** Submit to the Engineer AASHTO TP 95 results from mix samples taken and tested by an independent. The results shall be 30 kilohm-cm or more when cured for 28-day moist curing.

~~**b**~~ **c.** Contact the Engineer and arrange for a trial batch. The producer certified technician shall cast 4 inch 8 inch cylinders for testing by the Materials Laboratory. The ASTM C 1202 results shall be 1500 coulombs or less when cured using accelerated moist curing or the AASHTO TP 95 results shall be 30 kilohm-cm or more on samples moist cured for 28 days.

~~**c**~~ **d.** When silica fume, class F fly ash, or GGBFS is used in the mix, the Engineer may waive ASTM C 1202 or AASHTO TP 95 testing.

**2407.03, J, 1, Precast Nonprestressed Units.**

**Rename** the Article:

Precast Nonprestressed Bridge Units.

**2407.03, J, 2, Precast Prestressed Units.**

**Rename** the Article:

Precast Prestressed Bridge Units.

## Section 2413

**2413.03, F, 2, a, 1.**

**Delete** the second sentence of the Article:

~~When Class HPC-O is used on projects with a deck overlay quantity greater than 1800 square yards (1500 $m^2$), allow the surface to cure for 168 hours.~~

## Section 2415

**2415.01, B, Precast.**

**Replace** the Article:

**1.** ~~Precast box culverts may be accepted when shown in the contract documents.~~ Apply Section 2419.

**2.** Use culvert sections that meet the requirements of ASTM 1433 C 1577.

**3.** The contract documents will designate the span, rise, and either the design earth cover, or the design loading, both defined in ASTM 1433 C 1577.

**4.** ~~Apply section 2407 to the aggregates used in the concrete.~~ Use coarse aggregate in concrete mixture from an approved source meeting requirements of Section 4115, with Class 2 or better durability rating.

~~**5.** Apply the appropriate requirements of Section 2407 to manufacturing process inspection.~~

~~**6**~~ **5.** Concrete strength will be based on cylinder tests.

## Section 2416

**2416.02, Materials.**

**Replace** the Article:

~~Meet the requirements of Section 4145 for the type and strength (class) of pipe specified in the contract documents.~~ Apply Section 2419.

## Section 2418

**2418, Temporary Stream Diversion.**

**Add** the Section:

**2418.01 DESCRIPTION.**

Construct, maintain, and remove temporary stream diversion according to the contract documents. Temporary stream diversion involves diverting flow of a perennial stream around the construction site by use of either a diversion channel, pipe, or hose. Temporary stream diversion applies to projects involving installation or extensions of reinforced box culverts 6 feet by 6 feet (1800 mm by 1800 mm) or larger, precast box culverts 6 feet by 6 feet (1800 mm by 1800 mm) or larger, or arch pipe culverts 102 inches by 62 inches (2590 mm by 1575 mm) or larger.

**2418.02 MATERIALS.**

**A. Impervious Dike.**

- Use one of the following:
- Impervious fabric with earth, stone, or other fill material,
- Revetment stone meeting the requirements of Section 4130 with impervious soil or fabric behind the dike,
- Sandbags,
- Sheet piles, or
- Other as approved by the Engineer.

**B. Temporary Energy Dissipation.**

Revetment stone meeting the requirements of Section 4130.

**C. Sediment Control.**

Meet the requirements of Section 2602 for silt fence or perimeter and slope sediment control devices.

**2418.03 CONSTRUCTION.**

Unless stated otherwise in the contract documents, the Contractor may choose which type of temporary stream diversion to construct. Construct temporary stream diversion according to Standard Rood Plan RL-20.

**A. Temporary Stream Diversion by use of a Pipe or Hose.**

This method may include bypass pumping.

**1.** Set up bypass pump (if used) and temporary pipe or hose. Provide temporary energy dissipation measures at discharge point of temporary outlet pipe or hose. Firmly anchor bypass pump and pipe or hose.

**2.** Construct impervious dike upstream of work area. When constructing dike, place revetment or impervious fabric prior to placing soil or earth.

**3.** Construct impervious dike or sediment control device downstream to isolate work area.

**4.** Routinely inspect bypass pump and temporary pipe or hose to ensure proper operation. Inspect impervious dike(s) for leaks and repair damage. Inspect discharge point for erosion. Install additional temporary energy dissipation material as needed. Ensure flow is adequately diverted through pipe or hose and maintain all elements of the temporary stream diversion throughout period of construction.

**5.** Immediately after completion of construction in the work area, remove impervious dike(s), bypass pump, temporary pipe or hose, temporary energy dissipation material, and sediment control materials in the stream.

**B. Temporary Stream Diversion by use of a Diversion Channel.**

**1.** Excavate diversion channel without disturbing existing channel. Install sediment control along top of diversion channel.

**2.** Connect downstream diversion channel into downstream existing channel. Install temporary energy dissipation measures at discharge point into existing channel.

**3.** Connect upstream diversion channel into existing channel at upstream side to divert flow into diversion channel.

**4.** Construct impervious diversion dike in existing channel at upstream side to divert flow into diversion channel. When constructing dike, place revetment or impervious fabric prior to placing soil or earth.

**5.** Construct impervious dike or other sediment control in existing channel at downstream side to isolate work area.

**6.** Routinely inspect diversion channel for scour/erosion and sediment loss at channel discharge location. Install rock checks in channel and additional temporary energy dissipation material at outlet as needed. Inspect impervious dikes for leaks and repair damage. Ensure flow is adequately diverted through diversion channel and maintain all elements of temporary stream diversion throughout the period of construction.

**7.** Immediately after completion of construction in the work area, remove impervious dike(s), temporary energy dissipation material, and sediment control materials in the stream. Divert channel back into existing channel.

## 2418.04 METHOD OF MEASUREMENT.

**A.** Each Temporary Stream Diversion will be counted.

**B.** Sediment control and sediment control removal will be measured according to Article 2602.04 for type of device used.

## 2418.05 BASIS OF PAYMENT.

**A.** Payment will be at contract unit price for each Temporary Stream Diversion. If there is no bid item for temporary stream diversion, it will be paid for according to Article 1109.03, B. Payment is full compensation for labor, equipment, and materials necessary to construct and remove Temporary Stream Diversion. Payment of 50% of item will be made upon completion of installation of temporary stream diversion and remaining 50% will be paid upon completion of removal of temporary stream diversion and restoration of work site.

**B.** Sediment control and sediment control removal will be paid for according to Article 2602.05 for type of device used.

## Section 2419

**2419, Precast Concrete Units.**

**Add** the Section:

**2419.01 DESCRIPTION.**

**A.** Provide precast concrete units produced in a plant for which equipment, procedures, and quality of concrete have been approved by the Contracting Authority.

**B.** Provide, or have fabricator provide, technical personnel experienced and skilled in application of precast system being used. Ensure technical personnel cooperate with Engineer in technical aspects of the work.

**C.** Apply provisions of this section to production and construction of precast concrete as defined in Section 1101.

**D.** Unless modified elsewhere in the contract documents, perform fabrication in precast fabrication plants that are approved prior to letting.

**E.** Requirements for specific precast units are found in the Materials I.M. 445 series, Materials I.M. 571, and in the following specification sections:

Section 4145: Concrete Culvert Pipe
Section 2415: Concrete Box, Arch, and Circular Culverts
Section 2416: Rigid Pipe Culverts
Section 2430: Modular Block Retaining Wall
Section 2431: Segmental Retaining Wall
Section 2432: Mechanically Stabilized Earth (MSE) Retaining Wall
Section 2513: Concrete Barrier (Precast)

**2419.02 MATERIALS.**

Use materials meeting requirements of Division 41 for respective material, and the following:

**A. Aggregates.**

**1.** Apply Sections 4110, 4111, 4115, and 4117, except gradation requirements of Articles 4110.02 and 4115.03.

**2.** Submit aggregate gradations and proportions with mix design to District Materials Engineer for approval.

**3.** Use aggregates similar to Class V only when 30% or more of total weight (mass) of aggregate is limestone.

**B. Admixtures.**

When authorized by Engineer, approved admixtures complying with Section 4103 may be used and shall be from an approved source identified in Materials I.M. 403.

**C. Reinforcing Steel and Wire Fabric.**

Comply with requirements of Section 4151 and ensure materials are from an approved source identified in Materials I.M. 451. Precast fabricator shall accept reinforcing steel with certified mill test reports for each heat delivered.

**D. Cement.**

Apply Section 4101, unless otherwise specified. If the use of Type III Portland cement has been authorized, use it in same proportions as specified for Type I Portland cement. Cement with total

equivalent sodium oxide between 0.61% and 0.75% may be used, provided it is non-reactive with proposed aggregate when tested according to ASTM C 1260, C 1567, or C 1293.

**E. Supplementary Cementitious Materials.**

**1.** Apply Section 4108.

**2.** Fly ash may be substituted for Portland cement. Use a substitution rate of no more than 25% by weight (mass) for wet cast concrete only. Fly ash shall be from an approved source identified in Materials I.M. 491.17.

**3.** GGBFS may be substituted for Portland cement. Use a substitution rate of no more than 35% by weight (mass) for GGBFS as a mineral admixture. GGBFS shall be from an approved source identified in Materials I.M. 491.14.

**4.** The maximum total supplementary cementitious materials substitution shall not exceed 50%.

**2419.03 Construction.**

**A. Equipment.**
Use equipment meeting requirements of Section 2001 and the following:

**1.** Forms: Use forms for precast concrete true to dimensions shown in contract documents, true to line, mortar tight, and of sufficient rigidity to not sag or bulge out of shape under placement and vibration of concrete. Ensure inside surfaces are smooth and free of projections, indentations, or offsets that might restrict differential movements of forms and concrete.

**2.** Weighing and Proportioning Equipment.
Apply Article 2001.20, except that a vibrator will not be required on cement batch hopper.

**3. Mixing Equipment.**
Article 2001.21.

**4. Bins.**
Article 2001.06

**B. Concrete.**

**1.** For precast construction, use at least 610 pounds (360 kg) of total cementitious material per cubic yard (cubic meter) of concrete. Do not exceed maximum water-cementitious ratio, including free moisture in aggregate, of 0.450 pound per pound (0.450 kg/kg).

**2.** Intended air entrainment of finished wet cast concrete is 6%. To allow for loss during placement, use a target value of 6.5% for air content of fresh unvibrated concrete, with a maximum variation of ± 1.0%.

**C. Proportioning, Mixing, and Placing Concrete.**

**1.** Proportion and mix concrete according to applicable requirements of Article 2403.02, D, 3.

**2.** Do not place concrete when ambient temperature is below 35°F (2°C) unless Engineer has approved plant for cold weather concrete placement. When necessary, heat aggregate or water, or both, so temperature of concrete when deposited in forms is 40°F to 90°F (4°C to 32°C). Do not use frozen material in concrete.

**3.** When a series of units is cast in a line, cast entire series in one continuous operation, or as directed by Engineer. Place successive batches before preceding batch has perceptibly hardened or dried. Do not allow more than 45 minutes to pass between placement of successive batches of concrete in a unit. Do not retemper concrete or add water to interface of the concrete between batches.

**4.** Carefully work and consolidate concrete around reinforcement without displacing it. Ensure formation of honeycomb, stone pockets, or similar defects have not occured. Consolidate concrete using small diameter vibrators or by other means approved by Engineer. Overfill forms during consolidation. Screed off excess concrete and finish surface to desired texture.

**D. Curing.**

**1.** Use a method of curing that prevents loss of moisture and maintains an internal concrete temperature at least 40°F (4°C) during curing period. Obtain Engineer's approval for this method.

**2.** In all cases, cover concrete and leave covered until curing is completed. Side forms and pans forming underside of channel shapes may be removed during this period if cover is immediately replaced. Do not, under any circumstances, remove units from casting bed until strength requirements are met.

**3.** When accelerated heat is used to obtain temperatures above 100°F (38°C):

**a.** Record temperature of interior of concrete using a system capable of automatically producing a temperature record at intervals of no more than 15 minutes during entire curing period.

**b.** Space systems at a minimum of one location per 100 feet (30 m) of length per unit or fraction thereof, with a maximum of three locations along each line of units being cured.

**c.** Ensure all units, when calibrated individually, are accurate within ± 5°F (3°C).

**d.** Do not artificially raise temperature of concrete above 100°F (38°C) for a minimum of 2 hours after units have been cast. After 2 hour period, temperature of concrete may be raised to a maximum temperature of 160°F (71°C) at a rate not to exceed 25°F (15°C) per hour.

**e.** Hold maximum temperature for a period sufficient to develop strength required for release of prestress or for post tensioning, as the case may be.

**f.** Lower temperature of concrete at a rate not to exceed 40°F (22°C) per hour by reducing amount of heat applied until interior of concrete has reached the temperature of surrounding air.

**E. Placing Reinforcement.**

Place reinforcement carefully, accurately, and secure in proper position according to contract documents. Apply Article 2404.03.

**F. Removal of Forms.**

If forms are removed before concrete has attained strength which will permit units to be moved or stressed, remove protection only from immediate section from which forms are being removed. Immediately replace protection and resume curing following form removal. Do not remove protection any time before units attain specified compressive strength when surrounding air temperature is below 20°F (-7°C).

**G. Tolerances.**

Limit variation from dimensions shown in contract documents to no more than 1/8 inch (3 mm). For overruns, greater deviation may be accepted if, in Engineer's opinion, it does not impair suitability of member for its intended use.

**H. Handling and Storage.**

During fabrication, storage, handling, and hauling take care to prevent cracking, twisting, unnecessary roughness, or other damage. In particular, do not allow tiedowns to come in direct contact with concrete surfaces. Do not subject units to excessive impact. Replace, at no additional cost to Contracting Authority, units that are, in Engineer's opinion, damaged in a way to impair their strength or suitability for their intended use.

**I. Finish.**

Finish surfaces which will be exposed in finished structure as provided in Article 2403.03, P, 2, b.

**2419.04 METHOD OF MEASUREMENT.**

For precast units, Engineer will determine quantity of each of the various respective sizes, lengths, and types per the sections listed in Article 2419.01, E.

**2419.05 BASIS OF PAYMENT.**
Payment will be per the sections listed in Article 2419.01, E.

**Section 2430**

**2430.02, B, 1, Concrete Units.**

**Add** the Article:
**e.** Apply Section 2419.

**Section 2431**

**2431.02, B, 1, Concrete Units.**

**Add** the Article:
**j.** Apply Section 2419.

**Section 2432**

**2432.02, B, 1, Concrete Units.**

**Add** the Article:
**n.** Apply Section 2419.

**2432.02, B, 1, a, 2**

**Delete** the Article:
~~**2)** Cement content per cubic yard (cubic meter)of concrete for face panels and precast coping sections no less than 600 pounds(360kg) nor more than 700 pounds(420kg).~~

**2432.02, B, 1, b, 4**

**Replace** the Article:
Test ~~two~~ three specimens at 7 days and ~~two~~ three at 28 days. A test will be average compressive strength of ~~2~~ three cylinders.

**Section 2435**

**2435.03, A, 11, Chimney Seal.**

**Rename** and **Replace** the Article:
**11. ~~Chimney Seal~~ Infiltration Barrier.**
For sanitary sewer manholes, install an ~~internal or external rubber chimney seal~~ infiltration barrier.
**a. Internal or External Chimney Seal.**
**~~a.~~1)** Do not use external chimney seal if seal will be permanently exposed to sunlight.
**~~b.~~2)** Extend seal 3 inches (75 mm) below the lowest adjustment ring.
**~~c.~~3)** Extend seal to 2 inches (50 mm) above the flange of the casting for a standard two piece casting, or 2 inches (50 mm) above the top of the base section of the casting for an adjustable three piece casting.
**~~d.~~4)** Use multiple seals, if necessary.
**~~e.~~5)** Install compression bands (external chimney seal) or expansion bands (internal chimney seal) to lock the rubber sleeve or extension into place and to provide a positive watertight seal. Once tightened, lock bands into place. Use only manufacturer recommended installation tools and sealants.
**b. Molded Shield.**
**1)** Clean surface of structure cone section.
**2)** Apply sealant to top surface of cone section. Use sufficient sealant to accommodate flaws in surface of cone section.
**3)** Cut molded shield to height by adding dimensions of adjustment rings and casting height. Be sure not to interfere with seating of lid into casting frame.

**4)** Seat molded shield against sealant on cone section.
**5)** Add adjustment rings and casting to meet final grade.

**2435.03, D, 2, d.**

**Replace** the Article:
Replace ~~chimney seal~~ infiltration barrier for sanitary sewer manhole using only new materials.

**2435.03, D, 3, e.**

**Replace** the Article:
Replace ~~chimney seal~~ infiltration barrier for sanitary sewer manhole using only new materials.

**2435.05, A, 2.**

**Replace** the Article:
Payment is full compensation for excavation, placing bedding and backfill material, compaction, base, structural concrete, reinforcing steel, precast units (if used), inverts, pipe connections, ~~chimney seals~~ infiltration barriers, castings, and adjustment rings.

**2435.05, E, 2.**

**Replace** the fourth bullet:
Installing new ~~chimney seal~~ infiltration barrier (sanitary sewer manholes only).

**2435.05, F, 2.**

**Replace** the fifth bullet:
Installing new ~~chimney seal~~ infiltration barrier (sanitary sewer manholes only).

## Division 25. Miscellaneous Construction.

### Section 2503

**2503.04, D, Connection to Existing Manhole or Intake.**

**Replace** the Article:
Connections to existing manhole or intake will be measured according to Article 2435.04, G.

**2503.05, D, Connection to Existing Manhole or Intake.**

**Replace** the Article:
Connections to existing manhole or intake will be paid according to Article 2435.05, G.

### Section 2511

**2511.03, B, 1, General.**

**Replace** the Article:
Widths shown in contract documents are minimums, excluding curbs or flares.

The contract documents will contain sheets for construction of curb ramps, turning spaces, and transitions. Measure or stake as required to construct features. If either of the following is met, Engineer will provide staking for that quadrant and verify slopes during finishing:

- Running Slope. Tolerance between design slope and maximum allowable slope is less than 1.0%.
- Cross Slope and Turning Space Slopes. Tolerance of ±0.5% from design slope would exceed minimum or maximum allowable slope.

If adequate construction tolerances are allowed, Engineer will not provide staking for construction of sidewalk or recreation trail. If field adjustments outside the acceptable range indicated in the contract documents are necessary, notify the Engineer prior to construction.

At locations other than curb ramps, turning spaces, and transitions, ensure cross slope is between 0.5% and 2.0%. Ensure grade is within approximately 2.0% steeper than profile grade of adjacent roadway, or does not exceed 5.0%, whichever is steeper.

Install detectable warnings according to manufacturer's recommendations. Install detectable warnings for full width of curb ramp, excluding curbs and flares.

## Section 2512

**2512.03, C, Forms.**

**Replace** the Article:

1. ~~Unless slip form equipment is permitted~~ When hand placement methods are used, form all straight sections of curb and gutter with steel forms for the full depth of the concrete. Wood forms may be used on curving sections.

2. Place a steel face, rigidly welded or bolted to the main form, on any extensions used to obtain the required depth of form.

3. Ensure the top face of forms does not vary from a true plane by more than 1/8 inch in 10 feet (3 mm in 3 m). Ensure the upstanding face, including any extension, does not vary from a true plane by more than 1/4 inch in 10 feet (6 mm in 3 m). Remove forms that are bent, twisted, warped, broken, or battered from the work. Allow Engineer to inspect and approve repaired forms before using.

4. Use flexible or rigid forms of proper curvature for curves having a radius of 100 feet (30 m) or less.

5. While concrete is being placed and consolidated, form the front face of the curb with fixed or movable forms. If movable ~~slip~~ forms are used, use forms that ~~are least 6 feet (1.8 m) long with~~ provide a suitable opening for placing and consolidating concrete. ~~Obtain Engineer's approval for slip forms.~~

6. Curb may be placed and shaped by hand methods, without the use of a front face form, provided placement tolerances in Article 2512.03, C, 3, are met. Form back of curb and consolidate to produce an integral unit with underlying gutter section.

~~6~~ 7. Set forms with the upper edge to the correct line and grade. Firmly hold forms in place with adequate stakes and bracing.

~~7~~ 8. Forms with height greater than the thickness of the concrete may be used, with no additional cost to the Contracting Authority for extra concrete required, if:
The upper edge is set accurately to line and grade, and
The subgrade is excavated to meet the bottom edge of the form in a slope not steeper than one vertical to four horizontal.

## Section 2513

**2513.02, Materials.**

**Add** to the end of the first paragraph of the Article:
Apply Section 2419 for precast concrete barrier rail.

**2513.02, D, Bolts Anchors, and Other Metal Fastenings.**

**Replace** the Article:
Apply Article ~~2407.02, G~~ 2419.02, F.

**2513.03, A, 1, a.**

**Replace** the first sentence of the Article:

Use concrete specified in Section ~~2407~~ 2419.

**2513.03, C, 1.**

**Replace** the Article:

Apply Article ~~2407.03, D, except apply the finishing requirements in Article 2403.03, P, 2, b, only to temporary barrier rail~~ 2419.03, C.

**2513.03, D, 1, a.**

**Replace** the second sentence of the Article:

Apply Article ~~2407.03, D~~ 2419.03, D, when elevated temperature cure is used.

**2513.03, F, I.**

**Replace** the Article:

For permanent precast and cast-in-place concrete barrier, apply Article ~~2407.03, L~~ 2419.03, I, except do not commence the finishing operation until completion of the initial wet cure period.

**2513.03, F, 4.**

**Replace** the last sentence of the Article:

Complete patching operations only as directed by the Engineer ~~and according to Article 2407.03, L~~.

## Section 2521

**2521.03. Application.**

**Replace** the Article:

~~**A.**~~ This specification applies to all HMA, HMA patching material, PCC, structural concrete, and flowable mortar, except where excluded by a note in the contract documents.

~~**B.** The Engineer may waive aggregate gradations, moisture, and specific gravity tests based on previous satisfactory experience with the plant for PCC which is furnished at a maximum rate of 25 cubic yards (25 $m^2$) per day, whether from one or more sources. This may be based on quantities planned by the Contractor several days ahead of placement.~~

## Section 2524

**2524.03, B, Erection of Signs, Milepost Markers, and 6 Inch by 6 Inch (150 mm by 150 mm) Route Markers.**

**Add** the Article:

**3. Perforated Square Steel Tube (PSST) Posts and Anchors.**

**a.** Position posts within anchor at furthest corner from likely point of impact from an errant vehicle.

**b.** Embed post within anchor without any play.

**c.** Provide minimum insertion length as required by manufacturer.

**d.** Ensure inside of break-away and slip base anchors installed in concrete are free of concrete to allow drainage.

**e.** Install triangular slip base assembly as required by manufacturer.

**2524.03, B, 1, c.**

**Replace** the Article:

Set wood posts in 12 inch (300 mm) diameter holes of the proper depth with a minimum embedment of 5.0 feet (1.5 m).

**2524.04, Method of Measurement.**

**Add** the Articles:

**G. Perforated Square Steel Tube Posts.**

Linear feet (meters), to nearest foot (0.3 m), measured from top of anchor to top of post. Embedded length will not be measured separately, but included in price bid for Perforated Square Steel Tube Posts.

**H. Perforated Square Steel Tube Post Anchors.**

By count of each type installed.

**2524.05, Basis of Payment.**

**Renumber** and **Replace** Article G:

~~G~~ **I. Excavation in Unexpected Rock.**

Excavation in unexpected rock for wood posts for Type A or B signs, steel posts for Type A or B signs, concrete footings for Type A or B signs, delineators, perforated square steel tube posts, and milepost marker posts will be paid for as extra work. Unexpected rock will be considered as rock encountered during post erection, but neither visible from the roadway nor indicated in the contract documents.

**Add** the Articles:

**G. Perforated Square Steel Tube Posts.**

**1.** Per linear foot (meter).

**2.** Payment is full compensation for furnishing, fabricating, and erecting posts.

**H. Perforated Square Steel Tube Post Anchors.**

**1.** Each, by type.

**2.** Payment is full compensation for providing and installing anchor, coring pavement, backfilling with concrete, slip base hardware, and other details necessary to provide anchor complete and erected in place.

**Section 2527**

**2527.02, D, 1, Removable Marking Tape.**

**Rename** the Article:

Wet, Retroreflective Removable ~~Marking~~ Tape Markings.

**2527.02, D, 1, b.**

**Replace** the Article:

Complying with the following:

**1)** Preformed markings consist of white or yellow films providing immediate and continuing retroreflection during dry, wet, and rainy conditions.

~~**1**~~ **2)** Nominal width of 4 inches (100 mm).

~~**2) Yellow or white, weather and traffic resistant film, precoated on one side with a pressure sensitive adhesive.**~~

**3)** Flexible and formable.

**4)** ~~Capable of remaining in place during its useful life.~~ Ensure tape is capable of performing for the duration of a normal construction season and being removed intact or in large pieces. Ensure tape is reflective throughout its useful life. Normal construction season is defined as the time between the last snowplowing in the spring and the first snowplowing in the fall/winter.

**5)** ~~Easily removed from the pavement at any time.~~ Ensure tape design and manufacture allows it to be readily removed when markings are no longer needed.

**2527.03, J, 2.**

**Replace** the Article:

Use wet, retroreflective removable tape markings for temporary pavement markings which extend diagonally across a final traffic lane.

**2527.04, A, 3, Removable Tape Markings.**

**Rename** and **Replace** the Article:

**3. Wet, Retroreflective Removable Tape Markings.**

Stations (meters) placed. Removing wet, retroreflective removable tape markings will not be measured separately for payment.

**2527.05, A, 3, Removable Tape Markings.**

**Rename** and **Replace** the Article:

**3. Wet, Retroreflective Removable Tape Markings.**

**a.** Per station (meter) placed.

**b.** Payment includes removing the wet, retroreflective removable ~~marking~~ tape markings, when required.

## Section 2528

**2528.03, I, Temporary Floodlighting.**

**Replace** the Article:

~~**1.** Ensure floodlighting is installed and in service before work is started that requires nighttime traffic control by the traffic control plan.~~

~~**2.** Ensure temporary floodlighting meets the following:~~

- ~~**a.** Pole-mounted luminaire or a luminaire mounted on portable equipment.~~
- ~~**b.** Mounting height of luminaires is no less than 35 feet (11 m) above the roadway, and as shown in the contract documents. Pole length determined by field measurement to obtain specified mounting height.~~
- ~~**c.** Clearance for overhead wiring a minimum of 18 feet (5.5 m). Auxiliary poles used to furnish power to floodlighting offset 30 feet (9 m) from the traveled way unless there are right-of-way restrictions.~~
- ~~**d.** Poles placed outside the normal shoulder line at the approximate locations shown in the contract documents.~~
- ~~**e.** Above ground lighting circuits are aluminum or A.C.S.R. triplex.~~
- ~~**f.** Underground lighting circuits are type U.S.E. or U.F.~~

~~**3.** Meet the following requirements for luminaires used for floodlighting:~~

- ~~**a.** Standard roadway types with totally enclosed refractors.~~
- ~~**b.** IES glare control rating of "cut off".~~
- ~~**c.** The lamps with an initial output rating of 19,000 lumens or greater.~~
- ~~**d.** Photoelectric controlled for dusk to dawn operation.~~
- ~~**e.** Approval of the Engineer.~~

~~**4.** Exercise reasonable care to avoid interruptions during the hours of darkness, promptly repair damage to the system, and replace all burned out lamps as soon as possible.~~

**1. General.**

- **a.** Set up and operate either pole mounted or portable, mobile self contained LED temporary floodlights at locations shown in contract documents.
- **b.** Ensure floodlighting is installed and in service before commencing work requiring nighttime traffic control according to the traffic control plan.
- **c.** Exercise reasonable care to avoid interruptions during hours of darkness, promptly repair damage to system, and replace burned out lamps promptly.

**2. Equipment.**

**a. Pole Mounted Floodlights**.

**1)** Pole-mounted luminaire.
**2)** Mounting height of luminaires is no less than 35 feet (11 m) above the roadway and as shown in the contract documents. Pole length determined by field measurement to obtain specified mounting height.
**3)** Place poles outside normal shoulder line at approximate locations shown on the contract documents.
**4)** Meet the following requirements for floodlighting luminaires:
- Standard roadway types with totally enclosed refractors.
- IES glare control rating of "cut off".
- Lamps with initial output rating at least 19,000 lumens.
- Photoelectric controlled for dusk to dawn operation.
- Approval of the Engineer.

**5)** Ensure clearance for overhead wiring at least 18 feet (5.5 m). Auxiliary poles used to furnish power to floodlighting offset 30 feet (9 m) from traveled way unless there are right-of-way restrictions.
**6)** Above ground lighting circuits are aluminum or A.C.S.R. triplex.
**7)** Underground lighting circuits are type U.S.E. or U.F.

**b. Portable, Mobile Self Contained LED Floodlights.**

**1)** Mounted on portable trailers containing solar cell array and storage battery system to power LED luminaire. Ensure system meets NCHRP 350 Category IV crash testing.
**2)** Ensure mounting height of LED luminaires is no less than 17 feet (5.2 m) above roadway, or as shown in the contract documents.
**3)** Locate portable trailers so LED luminaire is centered over outside edge of pavement and trailer is on shoulder offset as far as possible from traveled way
**4)** Meet materials requirements of Article 4188.05 for LED Floodlighting Luminaires.

## Section 2529

**2529.01, B.**

**Add** the Articles:

**8.** Full depth PCC finish patches (50 feet (15 m) or greater in length).

**9.** Full depth HMA finish patches (50 feet (15 m) or greater in length).

**2529.03, A, 1.**

**Replace** the fourth sentence of the Article:

The patch thickness and type of patch material ~~may~~ will be included.

**2529.03, B, Full Depth Patch Thickness.**

**Delete** the Article:

~~**B. Full Depth Patch Thickness.**~~

~~If full depth patch thickness is not shown in the contract documents, establish thickness as follows:~~

~~**1. HMA Patches.**~~

~~Interstate and Primary pavement: the thickness of the HMA pavement, but no less than 9 inches (230 mm) or more than 15 inches (380 mm).~~

~~**2. PCC Patches.**~~

~~**a.** PCC pavements on Interstate and Primary Roads: the thickness of the pavement but no less than 9 inches (230 mm) or more than 12 inches (300 mm).~~
~~**b.** County roads: thickness no less than 6 inches (150 mm) or more than 12 inches (300 mm).~~

~~**3. Composite Patches.**~~

~~PCC pavements which have been resurfaced with HMA: patch materials and thickness the same as the existing pavement except the PCC portion of the patch is not to be less than 9 inches (230 mm) or more than 12 inches (300 m) unless specified otherwise in the contract documents. If the HMA~~

~~resurfacing exceeds 4 1/2 inches (120 mm) (nominal) place an HMA patch, unless specified otherwise in the contract documents.~~

**2529.03, H, 2.**

**Replace** the first sentence Article:

Place, consolidate, finish, and cure ~~of the~~ concrete as provided in Section 2301, except as follows:

**2529.03, H, 2, c.**

**Replace** the Article:

Dump or convey the concrete into the patch areas to avoid segregation ~~of the aggregates and cement~~. Spread it into place and vibrate with a mechanical vibrator. Smooth the concrete and finish it to the elevation of the adjacent ~~PCC~~ pavement surface. Avoid excessive vibrating.

**2529.03, I, Smoothness.**

**Replace** the first sentence of the Article:

Apply Section 2316 to smoothness of full depth finish patches (except when the contract includes an overlay or pavement surface repair by diamond grinding or milling within the patch area) with the following modifications for Full Depth Finish Patches (50 feet (15 m) or greater in length):

**2529.03, I, 1.**

**Delete** the third sentence of the Article:

~~For each patch added by the Engineer that is greater than 50 foot (15 m) long, the Contractor will be paid $500 in addition to the appropriate unit prices involved. This is to compensate for additional smoothness requirements.~~

**2529.03, K, 5.**

**Delete** the third sentence of the Article:

~~A flagger will be required at these locations.~~

**2529.03, K, 6.**

**Delete** the Article:

~~**6.** When HMA patches on two-lane roadways and PCC patches with calcium chloride are constructed, adjust the work schedule so all equipment and obstructions are removed from the travel lanes and shoulders from 30 minutes before sunset to 30 minutes after sunrise.~~

**2529.05, A, 1, a.**

**Replace** the Article:

Each. The type or types of patches to be counted will be identified ~~by the following types~~ and tabulated in the contract documents.

~~**1)** Full Depth HMA Finish Patches.~~
~~**2)** Full Depth PCC Finish Patches, Without Dowels.~~
~~**3)** Full Depth PCC Finish Patches, Without Dowels, Composite Section.~~
~~**4)** Full Depth PCC Finish Patches, With Dowels.~~
~~**5)** Full Depth PCC Finish Patches, Composite Section.~~
~~**6)** Full Depth PCC Finish Patches, Continuously Reinforced.~~
~~**7)** Full Depth PCC Finish Patches, Continuously Reinforced, Composite Section.~~

**2529.05, A, 2, Full Depth Finish Patches, By Area.**

**Rename** the Article:

**Full Depth Finish Patches, by Area and Full Depth Finish Patches, by Area (50 Feet (15 m) or Greater in Length).**

**2529.05, A, 2, b.**

**Replace** the Article:

Payment is full compensation for:

- Removal of the old pavement,
- Restoring the subgrade or subbase,
- Furnishing and installation of tie bars,
- Restoring longitudinal reinforcement for continuously reinforced patches, ~~and~~
- Furnishing and placing the patching material, including the asphalt binder, tack coat, curing, joint sealing, and placing backfill material in the disturbed area~~.~~ and,
- Profilograph testing and any required profile correction for patches 50 feet (15 m) or greater in length.

**2529.05, A, 2, c.**

**Replace** Table 2529.05-1:

**Table 2529.05-1: Patching Quantity Adjustment**

| % Change of Thickness | % Change of Quantity |
|---|---|
| 0 to 10 | 0 |
| > 10 to 20 | 10 |
| > 20 to 30 | 15 |
| > 30 | ~~20~~ Paid per Article 1109.03, B |

**2529.05, F, 2.**

**Replace** the second sentence of the Article:

If removal of anchor lugs is not a bid item in the contract documents, payment will be paid $~~600~~ 1200 per lane in which an anchor lug, or portion of anchor lug, is removed.

**Section 2532**

**2532.03, B, 3, a.**

**Replace** the Article:

When specified in the contract documents, ~~G~~grind and longitudinally groove the entire surface of the bridge deck according to Article 2412.03, D, 4, a. For other projects, re-establish transverse grooving through corrected areas using diamond blades to provide a surface similar to a new deck except the area within approximately 2 feet (0.6 m) from the curb.

**Section 2541**

**2541.03, C, 3.**

**Replace** the second sentence of the Article:

~~When work encroaches on an adjacent lane, a flagger will be required at that location.~~

**Section 2542**

**2542.03, C, 2.**

**Replace** the second sentence of the Article:

~~When work encroaches on an adjacent lane, a flagger will be required at that location.~~

**Section 2539**

**2539.02, B, Fluidity.**

**Replace** the first sentence of the Article:

Measure the fluidity of the grout slurry using the ~~Corps of Engineers flow cone method according to their specification CRD-C611-80~~ method described by Materials I.M. 375.

**Section 2549**

**2549.01, C.**

**Replace** the second sentence of the Article:

Includes construction of structural liners, protective liners, and ~~chimney seals~~ infiltration barriers.

**2549.03, B, 2, Rubber Chimney Seal.**

**Rename** the Article:

**~~Rubber Chimney Seal~~ Infiltration Barrier.**

**2549.04, D, Rubber Chimney Seal.**

**Rename** and **Replace** the Article:

**~~Rubber Chimney Seal~~ Infiltration Barrier.**

Each ~~rubber chimney seal~~ infiltration barrier installed on an existing manhole will be counted.

**2549.05, D.**

**Rename** and **Replace** the Article:

**~~Rubber Chimney Seal~~ Infiltration Barrier.**

1. Payment will be made at the contract unit price for each ~~chimney seal~~ infiltration barrier.

2. Payment is full compensation for all necessary compression or expansion bands and extension sleeves as necessary to complete ~~chimney seal~~ infiltration barrier.

**Section 2552**

**2552.02, B, Bedding and Backfill Material.**

**Rename** and **Replace** the Article:

**Bedding (Class I) Material.**

**~~1. Class I Material.~~**

**~~a.~~** ~~Crushed stone complying with the following gradation:~~

| **~~Sieve~~** | **~~Percent Passing~~** |
|---|---|
| ~~1 1/2 inch (37.5 mm)~~ | ~~100~~ |
| ~~1 inch (25 mm)~~ | ~~95 to 100~~ |
| ~~1/2 inch (12.5 mm)~~ | ~~25 to 60~~ |
| ~~No. 4 (4.75 mm)~~ | ~~0 to 10~~ |
| ~~No. 8 (2.36 mm)~~ | ~~0 to 5~~ |

**~~b.~~** ~~The Engineer may allow the use of gravel or authorize a change in gradation subject to materials available locally at the time of construction~~

**~~c.~~** ~~The Engineer may authorize the use of crushed PCC for pipe sizes up to 12 inches (300 mm).~~

**~~d.~~** ~~Use aggregates having a percentage of wear, Grading A or B, not exceeding 50%, determined according to AASHTO T 96.~~

Meet the requirements of Section 4118.

# Division 26. Roadside Development.

## Section 2601

**2601.05, A, 9, b.**

**Replace** the Article:

Payment is full compensation for the Turf Reinforcement Mat, preparation, and materials including shaping channels, ditches and slopes, soil fill, seed and fertilizing, and wood excelsior mat ~~and watering~~.

## Section 2602

**2602.03, Construction.**

**Add** the Article:

**L. Mobilizations, Erosion Control.**

**1.** Mobilizations, Erosion Control, applies to projects not identified as erosion control or landscaping and containing at least one of the following items:

- Stabilizing crop seeding and fertilizing: 1 acre (0.4 ha) or more,
- Stabilizing crop seeding and fertilizing (urban): 1 acre (0.4 ha) or more,
- Silt fence: 250 feet (75 m) or more, or
- Silt fence for ditch checks: 250 feet (75 m) or more.

**2.** Only one mobilization will be paid for each stage of work described in the ECIP. Within the scope of work defined for each single mobilization described in the ECIP, additional movement due to weather delays or at the option of the Contractor will not be counted as a mobilization.

**3.** Separate mobilizations needed for different crews performing work such as silt fence, seeding, or ditch checks will be counted, however, multiple mobilizations will not be paid for a single crew performing different items of erosion control work.

**4.** Payment for mobilization applies to contract items from Sections 2601 and 2602, excluding watering, mowing, debris pickup, monitoring well, or removal items.

**5.** Additional mobilizations not outlined in the ECIP must be approved by the Engineer.

**6.** Payment for mobilization to correct items not properly installed will not be approved. Payment for mobilization will also not be approved if labor, equipment, and materials to perform erosion control are used for other non-erosion control work onsite.

**7.** Mobilize with sufficient labor, equipment, and materials to perform erosion control included in ECIP or as ordered or approved by Engineer. Failure to mobilize when erosion control work is needed to comply with the ECIP or PPP, will result in the Engineer, by written order, direct mobilization within 72 hours of a written order.

**8.** Failure to mobilize within such time period, will result in a deduction of $750.00 per calendar day from payment due under the contract, except when Engineer extends such time period.

**9.** Mobilizations, Erosion Control, will not include work provided under the item of Mobilizations, Emergency Erosion Control.

**M. Mobilizations, Emergency Erosion Control.**

An emergency will be considered to be a sudden occurrence of a serious and urgent nature which is beyond normal maintenance of erosion control items. Emergency work requires immediate mobilization and movement of necessary labor, equipment, and materials to the emergency site, followed by immediate installation of temporary erosion control measures.

**1.** Mobilize with sufficient labor, equipment, and materials on job site within eight hours of Engineer's written order to install temporary erosion control items on an emergency basis. Engineer's written

order will include a description of required work. Only one mobilization will be paid for work described in the written order.

**2.** Failure to mobilize within eight hours of written order, will result in a deduction of $1500.00 per calendar day from payment due under the contract, except when Engineer extends such time period.

**2602.03, A.**

**Replace** the Article:

Prior to the preconstruction conference, furnish the Engineer an initial Erosion Control Implementation Plan (ECIP) for accomplishment of temporary and permanent erosion control. ~~In addition, furnish the proposed method of erosion control on haul roads and borrow pits as well as the plan for the removal of excess materials from the project.~~

In the ECIP, include stages for erosion control work to address Contractor's timetable and sequence for major activities or stages on the contract, including:

- Initial controls required prior to land disturbing activities,
- Number of earthwork balances for the contract,
- Sensitive areas requiring special consideration,
- Anticipated suspension of work,
- Compliance with Pollution Prevention Plan (PPP),
- Method of erosion control on haul roads and borrow pits, and
- Removal of excess materials from project.

**2602.04, Method of Measurement.**

**Add** the Articles

**M.** Mobilizations, Erosion Control.
By count for each mobilization in the accepted ECIP and acceptably performed, as well as additional mobilizations ordered or approved by Engineer and acceptably performed.

**N.** Mobilizations, Emergency Erosion Control.
By count for each mobilization directed in writing by Engineer and acceptably performed.

**2602.05, Basis of Payment.**

**Renumber** Articles, B, C, and D and **Add** the Article:

**B.** Payment for Mobilizations, Erosion Control, and Mobilizations, Emergency Erosion Control, will be at unit prices stipulated in the proposal. If bid items are not included in the proposal then mobilizations for erosion control will paid at unit prices stipulated below. Mobilization for Erosion Control costs are not included as part of the contract item for "Mobilization" described in Section 2533.

**1. Mobilizations, Erosion Control.**
The quantity will be paid for at the unit price of $500.00 each for Mobilizations, Erosion Control, which is full compensation for staged movement of labor, equipment, and materials; and labor, tools, equipment, and incidentals necessary to complete the movement.

**2. Mobilizations, Emergency Erosion Control.**
The quantity will be paid for at the unit price of $1000.00 each for Mobilizations, Emergency Erosion Control, which is full compensation for movement of labor, equipment and materials; and for labor, tools, equipment, and incidentals necessary to complete the movement.

~~**B**~~ **C.** When it is necessary for the Contractor to clean out, repair, or reconstruct a silt ditch, dike, or basin, the additional payment will be 100% of the contract unit price for construction of that item. When applicable bid items are not in the contract documents, payment for clean out, repair, or reconstruction will be according to Article 1109.03, B.

~~**C**~~ **D.** If water control measures are required due to the Contractor's negligence, carelessness, or failure to install the controls as a part of the work as scheduled, and are ordered by the Engineer, perform this work at no additional cost to the Contracting Authority.

~~D~~ **E.** All water pollution control features are to be in functional condition before final acceptance of the contract.

# Division 41. Construction Materials.

## Section 4100

### 4100.08, Concrete Compression Test Specimens.

**Replace** the Article:

~~A.~~ Cast concrete compression test specimens ~~may be cast:~~

- ~~A~~ according to Materials I.M. 315~~, or~~ unless otherwise specified in the contract documents.
- ~~Horizontally in molds with a diameter of 4 1/2 inches (114.3 mm) and length of 9 inches (228.6 mm) or a diameter of 6 inches (152.4 mm) and length of 12 inches (304.8 mm).~~

~~**B.** When compressive strength is a specification requirement, use of horizontal molds is subject to agreement of the Contractor.~~

## Section 4112

### 4112, Intermediate Aggregate for Portland Cement Concrete.

**Replace** the Section:

**4112.01 DESCRIPTION.**

**A.** Crushed carbonate stone chips or pea gravel from approved sources as described in Materials I.M. 409. ~~Coarse natural sand resulting from disintegration of rock through erosional processes, without addition of crushed over-sized material may be used in place of the intermediate and fine aggregate.~~

**B.** For crushed limestone or dolomite chips, meet the durability class required for the coarse aggregate. Acquire uncrushed pea gravel ~~or coarse sand~~ from any PCC approved durability class gravel. When the gravel durability is lower than the coarse aggregate durability requirements, the pea gravel is not to exceed 15% of total aggregate in the mix. ~~Aggregate meeting the requirements of Section 4117 will be considered coarse sand.~~

**4112.02 GRADATION.**

~~**A. Intermediate Aggregate.**~~

~~For gradations, intermediate aggregate is considered coarse aggregate. Meet the following gradation limits:~~

| ~~Sieve Size~~ | ~~%Passing~~ |
|---|---|
| ~~1/2 inch (12.5 mm)~~ | ~~95-100~~ |
| ~~No. 8 (2.38 mm)~~ | ~~0-10~~ |

~~**B. Coarse Sand.**~~

~~Meet the following gradation limits:~~

| ~~Sieve Size~~ | ~~% Passing~~ |
|---|---|
| ~~1/2 inch (12.5 mm)~~ | ~~100~~ |
| ~~3/8 inch (9.5 mm)~~ | ~~90-100~~ |
| ~~No. 4 (4.75 mm)~~ | ~~75-95~~ |
| ~~No. 8 (2.36 mm)~~ | ~~60-90~~ |
| ~~No. 30 (600 µm)~~ | ~~10-60~~ |
| ~~No. 200 (75 µm)~~ | ~~0-1.5~~ |

Intermediate aggregate shall meet the requirements for gradation No. 2 of the Aggregate Gradation Table, Article 4109.02.

**4112.03 QUALITY.**

**A. Intermediate Crushed Stone.**
Meet the requirements of Table 4112.03-1:

**Table 4112.03-1: Aggregate Quality**

| Aggregate Quality | Maximum Percent Allowed | Test Method |
|---|---|---|
| Alumina[(a)] | 0.5 | Office of Materials Test Method No. Iowa 222 |
| A Freeze | 6 | Office of Materials Test Method No. Iowa 211, Method A |
| Clay Lumps and Friable Particles | 0.5 | Materials I.M. 368 |
| [(a)] If the Alumina value fails, determine the A Freeze value for specification compliance. | | |

**B. Pea Gravel ~~and Coarse Sand~~.**

~~**1.** For the portion of coarse sand passing the No. 4 (4.75 mm) sieve, meet the quality requirements of Section 4110.~~

~~**2.** For pea gravel and the portion of coarse sand retained on the No. 4 (4.75 mm) sieve, m~~Meet the ~~quality~~ requirements of Table 4112.03-2:

**Table 4112.03-2: Maximum Permissible Amounts of Objectionable Materials**

| Objectionable Materials. | Maximum Percent Allowed | Test Method |
|---|---|---|
| Coal and carbonaceous shale | 0.5 | AASHTO T 113 |
| Total of all shale, similar objectionable materials, coal and iron combined | 1.0 | AASHTO T 113 |
| Organic Materials, except coal | 0.01 | Office of Materials Test Method No. Iowa 215 |
| Unsound chert particles retained on 3/8 inch (9.5 mm) sieve (Nonstructural concrete) | 3.0 | Materials I.M. 372 |
| Unsound chert particles retained on 3/8 inch (9.5 mm) sieve (Structural concrete) | 2.0 | Materials I.M. 372 |
| Note: Chert particle which break into three or more pieces when subjected to the freezing and thawing test will be considered unsound.<br><br>Chert in aggregate produced from limestone sources is defined as unsound when any of the fractions of the crushed or uncrushed chert do not meet the soundness requirements. | | |

## Section 4118

**4118, Pipe Bedding Material.**

**Add** the Section:

**Section 4118. Pipe Bedding Material.**

**4118.01 DESCRIPTION.**
Gravel or crushed stone. Crushed PCC may be used if approved by the Engineer.

**4118.02 GRADATION.**
Meet the requirements for Gradation No. 3 of the Aggregate Gradation Table, Article 4109.02 (Appendix). Restrictions on the No. 200 sieve do not apply.

**4118.03 QUALITY.**
The requirements of Table 4118.03-1 apply to individual virgin aggregates:

**Table 4118.03-1: Coarse Aggregate Quality (Virgin Material)**

| Coarse Aggregate Quality | Maximum Percent Allowed | Test Method |
|---|---|---|
| Abrasion | 50 | AASHTO T 96 |
| C - Freeze | 15 | Iowa 211, Method C |

For crushed PCC, meet requirements of Materials I.M. 210.

## Section 4145

**4145.03, Materials.**

**Replace** the Article:

~~Comply with the applicable requirements of Division 41.~~ Apply Section 2419.

## Section 4149

**4149.04, J, 1, Chimney Seal.**

**Rename** and **Replace** the first sentence of the Article:

**1. ~~Chimney Seal~~ Infiltration Barrier.**

**a. External ~~Rubber~~ Chimney Seal.**

**1) Rubber Sleeve and Extension.**

**a)** Corrugated; minimum thickness of 3/16 inches (5mm), according to ASTM C 923/C 923M.

**b)** Minimum allowable vertical expansion of at least 2 inches (50 mm).

**2) Compression Bands.**

**a)** One-piece band assembly to compress sleeve or extension against manhole and casting surfaces.

**b)** 16 gage ASTM A 240/A 240M, Type 304 stainless steel, minimum 1 inch (25 mm) width, minimum adjustment range of 4 inches (100 mm) more than the manhole outside diameter.

**c)** For standard two-piece castings, shape top band to lock sleeve to manhole frame's base flange. For three-piece adjustable castings, shape top band to lock sleeve to upper piece of adjustable frame.

**d)** Stainless steel fasteners complying with ASTM F 593 and ASTM F 594, Type 304.

**b. Internal ~~Rubber~~ Chimney Seal.**

**1) Rubber Sleeve and Extension.**

**a)** Double pleated, minimum thickness 3/16 inch (5 mm) thick, according to ASTM C 923/C 923M.

**b)** Minimum allowable vertical expansion of at least 2 inches (50 mm).

**c)** Integrally formed expansion band recess top and bottom with multiple sealing fins.

**2) Expansion Bands.**

**a)** One-piece band assembly to compress sleeve or extension against manhole and casting surfaces.

**b)** 16 gage ASTM A 240/A 240M, Type 304 stainless steel, minimum 1 3/4 inch (45 mm) width, minimum adjustment range of 2 inches (50 mm) more than the manhole inside diameter.

**c)** Stainless steel locking mechanism of studs and nuts complying with ASTM F 593 and ASTM F 594, Type 304.

**c. Molded Shield.**

**1) Barrier Shield.**

**a)** Medium Density polyethylene, according to ASTM D 1248.

**b)** Certified for 40,000 pound (18,150 kg) proof-load according to AASHTO M 306.

**c)** Diameter to match cone section and internal dimension of casting.

**2) Sealant.**

Butyl material according to AASHTO M 198.

## Section 4169

### 4169.12, Perimeter and Slope Sediment Control Device.

**Replace** Articles A and B:

**A. Wattles and Sediment Logs.**
Wood excelsior or straw contained in a tube of photodegradable open weave fabric (synthetic netting). ~~Install according to manufacturer's recommendations.~~

**B. Filter Socks.**
Continuous, tubular, knitted, photodegradable, synthetic mesh netting with a maximum 3/8 inch (10 mm) opening ~~fabricated using 5 mil (0.125 mm) thickness photodegradable HDPE~~ and filled with a compost/wood blend filter material consisting of compost from an approved source meeting Article 4169.08. Fill sock by blowing filter material into tube with a pneumatic blower truck or similar device. Hand filling will not be allowed. ~~Install according to manufacturer's recommendations.~~

## Section 4170

### 4170.02, Materials.

**Add** the Article:

**C.** Comply with rules and regulations of State Entomologist of Iowa relative to nursery inspection of Nursery Stock according to provisions set forth in Section 177A.5 of Iowa Crop Pest Act, Chapter 177A, Code of Iowa

### 4170.09, D, Mulch.

**Replace** the Article:

~~As specified in the contract documents.~~

**A.** Unless stated elsewhere on the contract documents, use material consisting of shredded bark or shredded wood, or a mixture containing no more than 50% wood chips. Allow Engineer to visually inspect material prior to application.

**B.** Comply with the following requirements:

- Use tree bark and wood chips consisting of either hardwood or softwood as produced by a mechanical debarker or chipping machine.
- Ensure mulch is reasonably free from leaves, twigs, dust, toxic substances, and other foreign materials.

**C.** Mulch material consistently delivered in excessively wet condition may be rejected by Engineer.

## Section 4183

### 4183.06, A, Removable Marking Tape.

**Rename** and **Replace** the Article:

**Wet, Retroreflective Removable ~~Marking~~ Tape Markings.**
Comply with Materials I.M. 483.06 and meet the following requirements:

~~**1. Thickness.**~~
~~Average thickness of the film, including glass spheres, no less than 30 mils (0.76 mm) or more than 70 mils (1.78 mm).~~

~~**2. Retroreflectance.**~~
~~For white or yellow tapes, meet the following initial minimum retroreflectance values at 1.05 degree observation angle and 88.76 degree entrance angle, measured by a LTL 2000 retroreflectometer.~~

| | ~~White~~ | ~~Yellow~~ |
|---|---|---|
| ~~Specific luminance, mcd/sq.ft./ft. cdl. (lux•m$^2$)~~ | ~~550~~ | ~~325~~ |

**1.** Ensure film is free of lead, chrome, and other heavy metals as defined by the EPA.

**2.** Precoat markings with pressure sensitive adhesive capable of adhering to the pavement at temperatures as low as 50°F (10°C) in accordance with the manufacturer's recommendations.

**3. Retroreflectance.**

**a.** Ensure white and yellow markings have initial expected retroreflectance values as shown in Table 1 under dry, wet, and rainy conditions.

**b.** Measure wet retroreflectance values under a "condition of wetness" according to ASTM E 2177. Test may be performed with marking installed on road. Perform laboratory measurements using a 3 to 5 degree lateral slope. Use wetting agent to improve wetting of pavement marking with water. Use of a 0.1% (by volume) liquid soap solution is recommended. Report measurements as an average for each roll tested, in a minimum of three locations.

**c.** Measure wet retroreflectance values under a "condition of continuous wetting" (simulated rain) according to ASTM E 2176, in a controlled laboratory environment while the marking is positioned with a 3 to 5 degree lateral slope. Use wetting agent to improve wetting of pavement marking with water. Use of a 0.1% (by volume) liquid soap solution is recommended. Report measurements as an average for each roll tested, in a minimum of three locations.

**Table 4183.06-1: Expected Initial $R_L$ under dry, wet, and rainy conditions**

| **WHITE** | **Dry, Wet, & Rainy** |
|---|---|
| Entrance Angle | 88.76 degrees |
| Observation Angle | 1.05 degrees |
| Retroreflected Luminance $R_L$ [(mcd • $ft^{-2}$) • $fc^{-1}$] ($R_L$ [(mcd • $m^{-2}$) • $lx^{-1}$]) | 150 |
| **YELLOW** | **Dry, Wet, & Rainy** |
| Entrance Angle | 88.76 degrees |
| Observation Angle | 1.05 degrees |
| Retroreflected Luminance $R_L$ [(mcd • $ft^{-2}$) • $fc^{-1}$] ($R_L$ [(mcd • $m^{-2}$) • $lx^{-1}$]) | 100 |

**4. Removability.**

Pavement markings shall be removable from the pavement intact or in large pieces, at temperatures above freezing without the use of heat, solvents, grinding, or blasting; and with no permanent scarring of the roadway surface.

**5. Patchability.**

Pavement marking material shall be capable of being patched in accordance with manufacturer's instructions.

## Section 4186

**4186.10, Sign Posts.**

**Add** the Section:

**D. Perforated Square Steel Tube (PSST) Posts and Anchors**

Use PSST posts and anchors on the approved list in Materials I.M. 486.10 and meet the following. When not specified elsewhere in the contract documents, the post and anchor system shall meet the minimum manufacturer's size requirements for 90 mph (145 km/hr) wind load criteria and be approved by the Engineer.

**1. PSST Posts.**

**a.** Provide PSST posts of the dimensions and gauge required by the contract documents.

**b.** Posts shall be designated "crashworthy" as defined by NCHRP Report 350 Category 2, Level 3 or by AASHTO *Manual for Assessing Safety Hardware* (MASH) for post systems evaluated after January 1, 2011 and be FHWA accepted.

**c.** Galvanized posts shall conform ASTM A 653, SS, Grade 50, Designation G-90 or greater.

**d.** Cross section of post shall be a square tube roll formed and corner welded. Corner weld shall be zinc coated after scarfing operation.
**e.** Pre-punch 7/16 inch (11 mm) holes on 1 inch (25 mm) centers on all sides, vertically aligned and centered horizontally.
**f.** Furnished post shall be straight and have a smooth uniform finish. It must be possible to freely insert post into anchors and telescope consecutive sizes with a minimum amount of play.
**g.** If post is to be field cut, cut ends shall be coated with zinc rich paint as required per specification.

**2. PSST Post Anchors.**

**a.** Break-away, soil installation.
42 inch (1065 mm) minimum length, 7 gauge (4.76 mm) heavy duty winged anchor.

**b.** Break-away, concrete installation.
Posts installed in a concrete island, use a 48 inch (1220 mm) minimum length, 7 gauge (4.76 mm) heavy duty anchor. Core an 8 inch (200 mm) diameter hole through pavement at least 8 inches (200 mm) deep. After placing anchor, fill hole with concrete mix approved by the Engineer and level off top of concrete.

**c.** Triangular Slip Base Assembly.

**1)** Ensure design is in accordance with the AASHTO Standards and Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, current edition and meets or exceeds NCHRP Report 350 or the AASHTO MASH criteria for any assembly system evaluated after January 1, 2011 and be FHWA accepted.

**2)** Triangular Slip Base Assembly consists of four parts: one-piece anchor, top half slip base, hardware, and concrete foundation.

**a)** One-piece anchor shall meet the following requirements:
- Anchor shall have a triangular slip plate (1 inch (25 mm) thick) welded directly to anchor leg.
- Anchoring portion shall be 3 inches (75 mm) square 7 gauge (4.76 mm) material and 42 inches (1065 mm) long.
- Galvanize by hot dip process, complying with ASTM A 123, grade 85.

**b)** Top-half slip base shall meet the following requirements:
- Cast unit from Ductile Iron meeting ASTM A 536 Class 65-45-12.
- Top half slip base shall have a triangular dimension to match 8 inch (200 mm) standard triangular slip plate, and shall receive 2.5 inch (63 mm) square sign support.

**c)** Hardware shall meet requirements of Article 4186.09.

**d)** Concrete Footings: Apply Section 2403.

## Section 4188

**4188, Traffic Control Devices.**

**Add** the Article:

**4188.05 Temporary LED Floodlighting Luminaires.**

Furnish luminaires made for portable, mobile self contained, floodlights for temporary traffic control zones. Luminaire shall have IES LM-79-08 report from qualified independent laboratory verifying luminaire performance, including the following requirements:

- L70 @ 25°C of 70,000 hours.
- LED color temperature of 4,000 cct - 5,000 cct.
- LED light engines meet dust and moisture rating of IP-66.
- Designed and tested to comply with ANSI C136.31 2001 for 100,000 cycles at 3G acceleration for normal and bridge applications.
- Surge protection for LED driver and electronics - category C high (20kV, 10kA).
- Totally enclosed glass refractor lenses with type IV distribution.
- IES glare control rating of "full cut off".
- Minimum initial output rating of 7,200 lumens.
- Meets State of Iowa Energy Code requirements for LED roadway lighting (66 lm/W).
- Photoelectric controlled for dusk to dawn operation.
- Comply with Materials I.M. 488.06 for inspection and acceptance of Temporary LED Floodlighting Luminaires.

# Appendix.

**Replace** the Aggregate Gradation Table- English and Notes:

| AGGREGATE GRADATION TABLE - ENGLISH | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grad. No. | Section No. | Std. Sieve Sz. | 1 1/2" | 1.00" | 3/4" | 1/2" | 3/8" | 4 | 8 | 30 | 50 | 100 | 200 | |
| | | Intended Use | Percent Passing | | | | | | | | | | | Notes |
| 1 | 4110, 4125, 4133, 4134 | PCC FA, Cover Agg. | | | | | 100 | 90-100 | 70-100 | 10-60 | | | 0-1.5 | 1 |
| 2 | 4112 | PCC Intermediate | | | | 95-100 | | | 0-10 | | | | | |
| 3 | 4115 (57, 2-8), 4118 | PCC CA | 100 | 95-100 | | 25-60 | | 0-10 | 0-5 | | | | 0-1.5 | 2, 11 |
| 4 | 4115 (2-8) | PCC CA | 100 | 50-100 | 30-100 | 20-75 | 5-55 | 0-10 | 0-5 | | | | 0-1.5 | 11 |
| 5 | 4115 (67, 2-8) | PCC CA | | 100 | 90-100 | | 20-55 | 0-10 | 0-5 | | | | 0-1.5 | 11 |
| 6 | 4115.06 (Repair & Overlay) | PCC CA | | | 100 | 97-100 | 40-90 | 0-30 | | | | | 0-1.5 | 11 |
| 7 | 4117 (Class V) | PCC FA & CA | 100 | | | | | 80-92 | 60-75 | 20-40 | | | | |
| 8 | 4117.03 (Class V) | Fine Limestone | | | | | 100 | 90-100 | | | | | 0-30 | |
| 10 | 4120.02, 4120.03 (C gravel) | Granular Surface | | | 100 | | | 50-80 | 25-60 | | | | | 3, 12 |
| 11 | 4120.02, 4120.04, 4120.05, 4120.07, (A, B Cr. St.) | Granular Surface & Shoulder | | 100 | 95-100 | 70-90 | | 30-55 | 15-40 | | | | 6-16 | 4, 5, 12 |
| 12a | 4121 (Cr. St.) | Granular Subbase | 100 | | | 40-80 | | | 5-25 | | | | 0-6 | 6, 12 |
| 12b | 4121 (Cr. Gravel) | Granular Subbase | 100 | | | 50-80 | | | 10-30 | | 5-15 | | 3-7 | 7, 12 |
| 13 | 4122.02 (Cr. St.) | Macadam St. Base | 3" nominal maximum size screened over 3/4" or 1.00" screen. | | | | | | | | | | | |
| 14 | 4123 | Modified Subbase | 100 | | 70-90 | | | | 10-40 | | | | 3-10 | 5, 7, 12 |
| 19 | 4125 (1/2") Cr. Gr. or Cr. St.) | Cover Aggregate | | | 100 | 97-100 | 40-90 | 0-30 | 0-15 | | | | 0-2 | 12 |
| 20 | 4125 (1/2" Scr. Gr.) | Cover Aggregate | | | 100 | 95-100 | 40-80 | 0-15 | 0-7 | | | | 0-1.5 | 12 |
| 21 | 4125 (3/8") | Cover Aggregate | | | | 100 | 90-100 | 10-55 | 0-20 | 0-7 | | | 0-1.5 | 12 |
| 22 | 4124 | Fine Slurry Mixture | | | | | 100 | 85-100 | 40-95 | 20-60 | 14-35 | 10-25 | 5-25 | 10, 12 |
| 23 | 4124 (Cr. St.) | Coarse Slurry Mixture | | | | | 100 | 70-90 | 40-70 | 19-42 | | | 5-15 | 12 |
| 29 | 4131 | Porous Backfill | | | 100 | 95-100 | 50-100 | 0-50 | 0-8 | | | | | 12 |
| 30 | 4132.02 (Cr. St.) | Special Backfill | 100 | | | | | | 10-40 | | | | 0-10 | 5, 12 |
| 31 | 4132.03 (Gravel) | Special Backfill | | 100 | 90-100 | 75-100 | | | 30-55 | | | | 3-7 | 12 |
| 32 | 4133 (Sand/Gr./Cr. St.) | Granular Backfill | 100% passing the 3" screen | | | | | | 10-100 | | | | 0-10 | 8, 9, 12 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35 | 4134 (Natural Sand/Gr.) | Floodable Backfill | 100 | | | | | | 20-90 | | | | 0-4 | 12 |
| 36 | 4134 (Natural Sand) | Floodable Backfill | | | | | | | 100 | | | | 0-2 | 12 |

Notes: (Gradations No. 2, 9, 15, 16, 17, 18, 24, 25, 26, 27, 28, 33, and 34 have been deleted)

1. For Section 4110, when the fine aggregate is sieved through the following numbered sieves - 4, 8, 16, 30, 50, and 100 - no more than 40% shall pass one sieve and be retained on the sieve with the next higher number.
2. When used in precast and prestressed concrete bridge beams, 100% shall pass the 1.00" sieve. When used for pipe bedding the No. 200 restriction does not apply.
3. When compaction of material is a specification requirement, the minimum percent passing the No. 200 sieve is 6%.
4. See specifications for combination of gravel and limestone.
5. Unwashed air dried samples of crushed composite material shall be tested for gradation compliance except that no gradation determination will be made for material passing the No. 200 sieve.
6. The gradation requirement for the No. 8 sieve shall be 5% to 20% when recycled material is supplied.
7. For Section 4121 gravel, one fractured face on 30% or more of the particles retained on the 3/8 inch sieve. For Section 4123 gravel, one fractured face on 75% or more of the particles retained on the 3/8 inch sieve.
8. Crushed stone shall have 100% passing the 1½" sieve.
9. Gradation limitations for the 30, 50, and 100 sieves shall not apply when slurry mixture is applied by hand lutes, such as for slurry leveling.
10. Maximum of 2.5% passing the No. 200 sieve allowed ~~if generated from the parent material~~ for crushed limestone or dolomite when documented production is 1% or less ~~as determined by the Office of Materials~~.
11. When Producer gradation test results are used for acceptance, test results representing at least 90% of the material being produced shall be within the gradation limits and the average of all gradation results shall be within the gradations limits. Stockpiled material not meeting the criteria may, at the District Materials Engineer's discretion, be resampled using Materials I.M. 301 procedures. One hundred percent of the stockpile quality control and verification test results shall be within the gradation limits.

**Replace** the Aggregate Gradation Table- Metric and Notes:

**AGGREGATE GRADATION TABLE - METRIC**

| Grad. No. | Section No. | Std. Sieve Sz. | 37.5mm | 25mm | 19mm | 12.5mm | 9.5mm | 4.75mm | 2.36mm | 600µm | 300µm | 150µm | 75µm | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Intended Use | Percent Passing | | | | | | | | | | | Notes |
| 1 | 4110, 4125, 4133, 4134 | PCC FA, Cover Agg. | | | | | 100 | 90-100 | 70-100 | 10-60 | | | 0-1.5 | 1 |
| 2 | 4112 | PCC Intermediate | | | | 95-100 | | | 0-10 | | | | | |
| 3 | 4115 (57, 2-8), 4118 | PCC CA | 100 | 95-100 | | 25-60 | | 0-10 | 0-5 | | | | 0-1.5 | 2, 11 |
| 4 | 4115 (2-8) | PCC CA | 100 | 50-100 | 30-100 | 20-75 | 5-55 | 0-10 | 0-5 | | | | 0-1.5 | 11 |
| 5 | 4115 (67, 2-8) | PCC CA | | 100 | 90-100 | | 20-55 | 0-10 | 0-5 | | | | 0-1.5 | 11 |
| 6 | 4115.06 (Repair & Overlay) | PCC CA | | | 100 | 97-100 | 40-90 | 0-30 | | | | | 0-1.5 | 11 |
| 7 | 4117 (Class V) | PCC FA & CA | 100 | | | | | 80-92 | 60-75 | 20-40 | | | | |
| 8 | 4117.03 (Class V) | Fine Limestone | | | | | 100 | 90-100 | | | | | 0-30 | |
| 10 | 4120.02, 4120.03 (C gravel) | Granular Surface | | | 100 | | | 50-80 | 25-60 | | | | | 3, 12 |
| 11 | 4120.02, 4120.04, 4120.05, 4120.07 | Granular Surface & Shoulder | | 100 | 95-100 | 70-90 | | 30-55 | 15-40 | | | | 6-16 | 4, 5, 12 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (A, B Cr. St.) | | | | | | | | | | | | | |
| 12a | 4121 (Cr. St.) | Granular Subbase | 100 | | | 40-80 | | | 5-25 | | | | 0-6 | 6, 12 |
| 12b | 4121 (Cr. Gravel) | Granular Subbase | 100 | | | 50-80 | | | 10-30 | | 5-15 | | 3-7 | 7, 12 |
| 13 | 4122.02 (Cr. St.) | Macadam St. Base | 75 mm nominal maximum size screened over 19 mm or 25 mm screen. | | | | | | | | | | | |
| 14 | 4123 | Modified Subbase | 100 | | 70-90 | | | | 10-40 | | | | 3-10 | 5, 7, 12 |
| 19 | 4125 (12.5mm Cr. Gr. or Cr. St.) | Cover Aggregate | | | 100 | 97-100 | 40-90 | 0-30 | 0-15 | | | | 0-2 | 12 |
| 20 | 4125 (12.5mm Scr. Gr.) | Cover Aggregate | | | 100 | 95-100 | 40-80 | 0-15 | 0-7 | | | | 0-1.5 | 12 |
| 21 | 4125 (9.5mm) | Cover Aggregate | | | | 100 | 90-100 | 10-55 | 0-20 | 0-7 | | | 0-1.5 | 12 |
| 22 | 4124.02B | Fine Slurry Mixture | | | | | 100 | 85-100 | 40-95 | 20-60 | 14-35 | 10-25 | 5-25 | 10, 12 |
| 23 | 4124.02B (Cr. St.) | Coarse Slurry Mixture | | | | | 100 | 70-90 | 40-70 | 19-42 | | | 5-15 | 12 |
| 29 | 4131 | Porous Backfill | | | 100 | 95-100 | 50-100 | 0-50 | 0-8 | | | | | 12 |
| 30 | 4132.02 (Cr. St.) | Special Backfill | 100 | | | | | | 10-40 | | | | 0-10 | 5, 12 |
| 31 | 4132.03 (Gravel) | Special Backfill | | 100 | 90-100 | 75-100 | | | 30-55 | | | | 3-7 | 12 |
| 32 | 4133 (Sand/Gr./Cr. St.) | Granular Backfill | 100% passing the 76.2 mm screen | | | | | | 10-100 | | | | 0-10 | 8, 9, 12 |
| 35 | 4134 (Natural Sand/Gr.) | Floodable Backfill | 100 | | | | | | 20-90 | | | | 0-4 | 12 |
| 36 | 41334 (Natural Sand) | Floodable Backfill | | | | | | | 100 | | | | 0-2 | 12 |

Notes: (Gradations No. ~~2~~, 9, 15, 16, 17, 18, 24, 25, 26, 27, 28, 33, and 34 have been deleted)

1. For Section 4110, when the fine aggregate is sieved through the following numbered sieves - 4.75 mm, 2.36 mm, 1.18 mm, 600 µm, 300 µm, and 150 µm - not more than 40% shall pass one sieve and be retained on the sieve with the next higher number.
2. When used in precast and prestressed concrete bridge beams, 100% shall pass the 25 mm sieve. When used for pipe bedding the 75µm restriction does not apply.
3. When compaction of material is a specification requirement, the minimum percent passing the 75 µm sieve is 6%.
4. See specifications for combination of gravel and limestone.
5. Unwashed air dried samples of crushed composite material shall be tested for gradation compliance except that no gradation determination will be made for material passing the 75 µm sieve.
6. The gradation requirement for the 2.36 mm sieve shall be 5% to 20% when recycled material is supplied.

7. For Section 4121 gravel, one fractured face on 30% or more of the particles retained on the 9.5 mm sieve. For Section 4123 gravel, one fractured face on 75% or more of the particles retained on the 9.5 mm sieve.
8. Crushed stone shall have 100% passing the 37.5 mm sieve.
9. Gradation limitations for the (600 µm, 300 µm, and 150 µm) sieves shall not apply when slurry mixture is applied by hand lutes such as for slurry leveling.
10. Maximum of 2.5% passing the 75 µm sieve allowed ~~if generated from the parent material~~ for crushed limestone or dolomite when documented production is 1% or less ~~as determined by the Office of Materials~~.

11. When Producer gradation test results are used for acceptance, test results representing at least 90% of the material being produced shall be within the gradation limits and the average of all gradation results shall be within the gradations limits. Stockpiled material not meeting the criteria may, at the District Materials Engineer's discretion, be resampled using Materials I.M. 301 procedures. One hundred percent of the stockpile quality control and verification test results shall be within the gradation limits.