

STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 800
REVISIONS TO THE 2010 CONSTRUCTION & MATERIAL SPECIFICATIONS
DATED 10-21-2011

101.03

On pages 6-10, **Add** the following definitions:

Construction Limits. These limits must encompass all Work. This includes removals, room for construction equipment to complete work, site access, etc.

Project Limits. Project limits are points on the mainline centerline of construction where the proposed improvement, as described in the project description on the Title Sheet (excluding incidental construction), begins and ends

Work Limits. Work Limits are the extreme limits of the contractor's responsibility on a project, including all temporary and incidental construction, with the exception of work zone traffic control devices required for maintenance of traffic.

104.05

On page 19, **Replace** the subsection title and first paragraph with:

104.05 Partnering and Dispute Resolution.

It is the intent of the Department to partner every project in accordance with the Partnering Manual available on the Departments website:

www.dot.state.oh.us/Divisions/ConstructionMgt/Pages/Partnering.aspx.

Partnering will not affect the terms and conditions of the Contract. The Contractor and the Department will share equally appropriate costs of the Facilitated Partnering Process. The Contractor will pay all costs directly and the Department will authorize its share to the Contractor by Change Order. The Contractor is not entitled to any mark ups on these costs. There will be no additional costs paid for the Self-facilitated Partnering Process.

Whenever a dispute cannot be resolved by the use of the Partnering process the parties shall exhaust the Department's Dispute Resolution and Administrative Claim process as set forth below prior to seeking additional compensation or contract time by filing an action in the Ohio Court of Claims. The following procedures do not compromise the Contractor's right to seek relief in the Ohio Court of Claims.

104.05

On page 20, replace last paragraph with the following:

F. Step 2 (District Dispute Resolution Committee). Each District will establish a District Dispute Resolution Committee (DDRC) which will be responsible for hearing and deciding disputes at the Step 2 level. The DDRC will consist of the District Deputy Director, the District Construction Engineer and the Planning and Engineering Administrator or designees (other than the project personnel involved).

104.05.G

On page 22, replace first paragraph with the following:

1. The Director's Claims Board Hearing. The Director's Claims Board (the Board) will consist of the Deputy Director of the Division of Construction Management, Deputy Director of Engineering and a District Construction Engineer from a district not involved in the claim or designees. A representative from the Division of Chief Legal Counsel and Equal Opportunity may be present to observe the hearing. The Director or designee will be responsible for deciding claims.

105.16

On page 29, **Replace** the first sentence of the third paragraph with the following:

Perform all engineering, including any field investigation, necessary to ensure long term stability of all side slopes and foundations of all borrow and waste areas.

105.19 Value Engineering Change Proposals.

On page 30 and 32, Replace the entire section with the following:

The Department will consider the Contractor's submission of a Value Engineering Change Proposal (VECP) which will reduce construction costs and possibly time on projects that do not contain Design Build provisions or incentive provisions based on time. The purpose of this provision is to encourage the use of the ingenuity and expertise of the Contractor in arriving at alternate plans, specifications or other requirements of the contract. Savings in construction costs and possibly time will be shared equally between the Contractor and the Department. The Contractor's costs for development, design and implementation of the VECP are not eligible for reimbursement. The VECP must not impair any of the essential functions and characteristics of the project such as service life, reliability, economy of operation, ease of maintenance, safety and necessary standardized features. The submission of the value engineering change proposal shall conform with the current Guidelines on Value Engineering Change Proposals adopted by the Director. Acceptance of a VECP is at the sole discretion of the Director.

The Department will not approve VECPs with any of the following characteristics:

- A. Consist only of non-performing items of work contained in the plans.
- B. Include plan errors identified by the Contractor as part of the cost reduction.
- C. The VECP designer/consultant for the Contractor is also the designer of record for ODOT.

- D. Changes to any special architectural or aesthetic treatments.
- E. Requires concrete beams to be installed with less than 17' vertical clearance over a state highway.
- F. Changes the type or buildup of permanent pavement.
- G. Compromises controlling design criteria or would require a design exception as discussed in Volume I, Section 100, of the Location and Design Manual.
- H. Proposes a time savings for any project which has an Incentive / Disincentive clause, which was awarded based on A+B Bidding or Lane Rental.

Engineering and drawing development and implementation costs for the VECP are not recoverable.

The Contractor shall have no claim against the Department for any costs or delays due to the Department's review or rejection of the initial VECP.

If the Department already is considering revisions to the contract which are subsequently proposed as a VECP, the Department may reject the Contractor's initial VECP or portions thereof and may proceed with such revisions without any obligations to the Contractor.

107.10

On page 40, **Replace** the first paragraph with the following:

107.10 Protection and Restoration of Property.

Except for locations utilized specifically for parking of equipment between workdays for maintenance type projects, all areas proposed to be utilized by the Contractor outside the project construction limits shall be reviewed by environmental contractor(s) that are prequalified by the Department for each environmental resource. This exception applies to projects with "maintenance" in the project description. Have the consultant(s) certify that the proposed site to be utilized for the contractor will not impact:

107.13

On page 44, **Replace the first paragraph of with the following:**

Reporting, Investigating, and Resolving Motorist Damage Claims.

When a motorist reports damage to its vehicle either verbally or in writing to the Contractor, the Contractor shall within 3 days make and file a written report to the District's construction office. In the event that the Department directly receives the motorist's claim, the Department shall within 3 days send the claim report to the Contractor. In the event the Contractor has not agreed to resolve the motorist claim, the District's construction office shall forward the report to the Department's Court of Claims Coordinator who, as a co-insured party, may then contact the Contractor's insurance company and request that the insurance company investigate and resolve the claim. If the Contractor or their insurance company does not resolve the claim in a timely manner, the Department may advise the motorist of the option of pursuing the claim in the Ohio Court of Claims.

On page 44, replace the third paragraph with the following:

If the lawsuit claim amount is \$2,500 or less and the Court of Claims Coordinator determines that the Contractor is responsible for the claimed damages then the Department's Court of Claims Coordinator may, after notifying the Contractor, determine that it would be in the best interest of the Department to settle the claim. Any settlement amount including court costs may be assessed to the Contractor and deducted from the project. The Engineer will notify the Contractor prior to executing the deduction. The Contractor or the Contractor's insurance company may within 14 days appeal the assessment decision of the Court of Claims Coordinator to the District Construction Engineer. The decision of the DCE will be made within 14 days and will be administratively final.

107.21

On page 48, **Replace** the first paragraph with:

In accordance with ORC 4113.61, make payment to each subcontractor and supplier within 10 Calendar Days after receipt of payment from the Department for Work performed or materials delivered or incorporated into the Project, provided that the pay estimate prepared by the Engineer includes Work performed or materials delivered or incorporated into the public improvement by the subcontractor or supplier. Promptly release any retainage held, as set forth in any subcontractor or supplier agreement, within 10 days of department's acceptance of the work involving the subcontractor or supplier from whom retainage has been held. For the sole purpose of establishing a time frame for the release of the subcontractor or supplier retainage, acceptance of subcontractor or supplier work will occur when the subcontractor or supplier has complied with the requirements of 109.12.A, B and C.

108.02

On page 49, **Replace** the subsection title and first two paragraphs with:

108.02 Preconstruction Conference and Progress Schedule.

A. Preconstruction Conference. Meet with the Engineer for a preconstruction conference before beginning the Work. At or before the conference, submit the initial progress schedule to the DCE. Prepare the schedule according to 108.02.

Furnish a list of proposed subcontractors and material suppliers at or before the preconstruction conference. If the Contractor fails to provide the required submissions at or before the preconstruction conference, the Engineer may order the conference suspended until they are furnished. Do not begin the Work until the conference is reconvened and concluded or the Engineer gives specific written permission to proceed.

108.02.A

On page 49, **Delete** the subsection A. Partnering:

108.05

On page 51, after the first paragraph **Add** the following:

Ensure that no debarred individuals listed on the Federal website: www.epls.gov or State debarment list at the website: www.dot.state.oh.us/divisions/contractadmin/ act in any ownership, leadership, managerial, or other similar position that could influence the operations of an entity doing business with the Department.

108.06.A

On page 52, In the third paragraph of the section, **Replace** the first sentence with:

The Department will not evaluate a request for extension of the Completion Date unless the Contractor notifies the Engineer as specified in 104.05. Notification shall be in writing to the Engineer within 30 days following the termination of the event giving rise to the request and shall be accompanied by supporting analysis and documentation.

108.07

On page 56 Replace the existing table with the following:

TABLE 108.07-1 SCHEDULE OF LIQUIDATED DAMAGES

Original Contract Amount (Total Amount of the Bid)		Amount of Liquidated Damages to be Deducted for Each Calendar Day of Overrun in Time
From More Than	To and Including	
\$0.00	\$500,000	\$500
\$500,000	\$2,000,000	\$1,000
\$2,000,000	\$10,000,000	\$1,500
\$10,000,000	\$50,000,000	\$2,600
Over 50,000,000		\$3,200

109.05

On page 75, **Replace** the following:

109.05.D Delay Costs.

2. Allowable Delay Costs.

d. Material Escalation or Material Storage. The Department will pay the Contractor for increased material costs or material storage costs due to the delay. Obtain the Engineer’s approval before storing materials due to a delay. Payment will be based upon the accepted quantity of work

performed during the period for which escalated costs have been approved. The Department will pay increased material costs with an 8% mark-up to cover administrative costs and any material waste inherent to the Work.

109.05.D.2.b

On page 75, **Replace** the last sentence with:

The Department will pay wages and fringes with a 20% mark-up to cover administrative costs.

109.05.D.2.e(2)

On page 75, **Replace** the first sentence with:

The delay for which payment of field overhead is sought is only due to delays defined in 108.06.D.2, 108.06.D.3, 108.06.D.5 or for delays due to revised Work as specified in 104.02.B or 104.02.F.

109.09 Estimates. If satisfactory progress is being made, the Contractor will receive monthly payments equaling the Work and materials in place. The monthly payment is approximate, and all partial estimates and payments are subject to correction in the Final Estimate and payment. Payment for Work and materials shall not, in any way, prevent later rejection when defective Work or material is discovered, or constitute acceptance under 109.11 or 109.12.

Except for estimates generated during Project finalization, The Department will not pay an estimate until the Contractor certifies to the Engineer that the work for which payment is being made was performed in accordance with the contract. Certification will be made on forms provided by the Department.

109.12 Final Acceptance.

C. Finalization. The Contractor shall accept the final quantities as determined by the Engineer or provide a written notice indicating the reason for disagreement within 30 Calendar Days of receiving the Engineer's list of final quantities. The prescribed 30 Calendar Day period can be modified by mutual agreement of the Contractor and the District Construction Engineer. If no notice of disagreement is received, then the final payment will be based on the Engineer's list of final quantities.

Supply all documents necessary for Project finalization within 60 Calendar Days from the date that the Work is physically complete. These documents include:

1. Delinquent material certifications.
2. Delinquent certified payrolls or required revised payrolls.
3. Wage affidavit required by ORC Chapter 4115 on projects without any Federal funding.
4. Delinquent force account records.
5. If applicable, DBE affidavits.
6. Any other document required to complete finalization of the project.

Failure to submit these acceptably completed documents will result in an administrative fee of \$100 per Calendar Day for every day that any of the required documents remain delinquent, starting 30 Calendar Days after receipt of written notification from the Engineer of a document deficiency.

201.02.B,

On page 83, **Replace** 201.02.B with the following:

B. In order to retard and prevent the spread of destructive insects, including the emerald ash borer and Asian longhorned beetle, limit the movement of regulated articles according to Ohio Administrative Codes 901:5-56 and 901:5-57. Observe requirements for handling and transporting of regulated articles in quarantined areas as defined by the Ohio Department of Agriculture (www.agri.ohio.gov).

The following are considered regulated articles and are subject to the quarantine established by the Ohio Department of Agriculture:

1. Deciduous trees of any size.
2. Deciduous limbs and branches
3. Any cut non-coniferous (non-evergreen) firewood.
4. Deciduous tree bark and deciduous tree wood chips larger than 1 inch (25 mm).
5. Deciduous logs and lumber with the bark, outer inch of sapwood, or both attached.
6. Any item made from or containing deciduous tree wood capable of spreading emerald ash borer or Asian longhorned beetle.
7. Any means of conveyance capable of spreading emerald ash borer or Asian longhorned beetle.

Follow all other federal and state emerald ash borer and Asian longhorned beetle quarantines.

202.13

On page 90, **Add** the following text after the last paragraph in 202.13:

If removal of steps is measured by the foot (meter), the Department will measure the number of feet (meters) along the front edge of each tread. If the steps have an integral wall, the Department will include the thickness of the integral wall with the tread width measurement.

On page 91, **Add** the following pay item after “Steps Removed”:

202	Foot (Meter)	Steps Removed
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203.02,

On page 93, **Add** the word “siltstone” to the definition of rock in 203.02.O.

On page 93, **Delete** the word “siltstone” from the definition of shale in 203.02.P.

On page 94, **Delete** the words “or durable siltstone” from 203.03.D.

205.04.A,

On page 110, **Revise** the table title from Table 206.05-1 to Table 205.04-1.

205.07,

On page 111, **Replace** the last sentence in the first paragraph with the following:

The Department will pay one-third of the lump sum amount bid when the chemically stabilized embankment is completed and accepted by the Department, and the field verification test results are all submitted.

206.05.C,

On page 114, **Replace** the last paragraph of 206.05.C with the following:

The Contractor may either shape and fine grade the chemically stabilized subgrade before the curing period, or shape the subgrade before the curing period and fine grade after the curing period. If fine grading before the curing period, fine grade the same day as mixing, compacting, and shaping. If fine grading after the curing period, shape the subgrade approximately 1 inch (25 mm) above the profile grade and typical sections. In either case, fine grade the subgrade to the profile grade and typical sections within the tolerances in 203.08.

206.08,

On page 115, **Replace** the last sentence in the first paragraph with the following:

The Department will pay one-third of the lump sum amount bid when the chemically stabilized subgrade is completed and accepted by the Department, and the field verification test results are all submitted.

401.04

On page 170, **Replace** section 401.04 *Reclaimed Asphalt Concrete Pavement* with the following:

401.04 Reclaimed Asphalt Concrete Pavement and Reclaimed Asphalt Shingles.

Provide reclaimed asphalt concrete pavement (RAP) and/or reclaimed asphalt shingles (RAS) per the following requirements when choosing to use the in a mix. Failure to follow these requirements will result in a rejection of the Contractor QCP (403.03); restriction of any RAP or RAS use at the facility; and/or a change to Unconditional Acceptance at the facility.

Job Mix Formula. The Contractor may use a blend of new materials in combination with RAP obtained from verifiable Department or Ohio Turnpike Commission projects and/or RAS obtained from un-used manufactured shingle waste or used roofing tear-off shingles as listed in Tables 401.04-1 and 401.04-2 and as follows. If the RAP is not from the above sources or the source is unknown, process and blend the RAP into a single uniform stockpile, test according to Level 3 Asphalt Mix Design requirements and obtain District approval for use. Obtain written Laboratory approval for use of unusually large, old RAP stockpiles of unknown content and/or age. Include approved methods in the QCP for ongoing processing and testing of these piles. Ensure no foreign or deleterious material (703.04, 703.05) is present in RAP. All RAS suppliers must meet the requirements of Supplemental Specification 1116.

Ensure that the JMF falls within the specified limits of the required mix item. Ensure the JMF submittal includes the percentages of RAP, RAS, virgin aggregates, and virgin asphalt binder required for the mix item. Report all RAP and RAS test results, including binder blend analysis, in the JMF submittal. Identify the RAP in the JMF submittal as to project origin and mix type(s). Identify the manufactured shingle waste manufacturer source or the approved tear-off RAS processor in the JMF submittal.

Determine RAP properties and uniformity as follows. Determine the final RAP gradation and asphalt binder content on a minimum of four separate stockpile (or roadway for concurrent grinding) samples all agreeing within a range of 0.4 percent for asphalt binder content and 5 percent passing the No. 4 (4.75 mm) sieve. If fractionated RAP is used use a suitable sieve for determining gradation uniformity.

Determine RAS properties and usage as follows. Use no more than 5.0% RAS by dry weight of mix. For design assume 18.0% available RAS binder. Determine gradation and specific gravity per AASHTO PP 53-09, Section 5 or subsequent AASHTO applicable standard. Provide the required certification forms in the JMF submittal documenting that the RAS meets AASHTO MP 15-09, sections 3.2 or 3.3 and that RAS from roofing tearoffs conforms to the EPA's NESHAP, 40 CFR 61 Subpart M, and other applicable agency requirements for asbestos.

RAP and RAS Usage Limits and Requirements. Process and use RAP and RAS as follows.

Process and use RAP by one of the following two methods. Note on the JMF submittal RAP page which of Method 1 or Method 2 methods described below apply to the RAP.

1) Method 1 Standard RAP. Include RAP in a JMF submittal per the Standard RAP/RAS Limits Table 401.04-1 unless specified differently in the applicable mix specification. For mixes that will contain up to 10 percent RAP the JMF submittal is not required to include the RAP except when a virgin polymer asphalt binder is used in a surface course. For surface course JMFs having polymer asphalt binder only submit at 0 or 10% RAP. If greater than 20 percent RAP is used in a JMF submittal include an analysis of the recovered asphalt binder and blend per Level 3 Mix Design procedures to determine the grade of virgin asphalt binder to use.

**TABLE 401.04-1
METHOD 1 – STANDARD RAP/RAS LIMITS**

Asphalt Mix Application	Percent RAP by Dry Weight of Mix, Max.	RAS Usage*	Total Virgin Asphalt Binder Content, Min.	Comments
Heavy Traffic Polymer Surface Course	10	None	5.2	Polymerized binder is virgin. (For non-polymer virgin binder allow 20% max RAP and 5.0 min. virgin.)
Medium Traffic Surface Course	20	Manufacturing waste only	5.0	Polymer or non-polymer virgin.
Light Traffic Surface Course		Manufacturing waste only	5.2	
Intermediate Course	35	Manufacturing waste and tear-offs	3.0	Any mix type used as an intermediate course.
Base Course 301	50	Manufacturing waste and tear-offs	2.7	The Laboratory will establish the asphalt binder content.
Base Course 302	40 (30)	Manufacturing waste and tear-offs	2.0	A lower RAP limit of 30 percent will be required if poor production mixing or coating is evident.

* No more than 5.0% RAS by dry weight of mix

RAP Processing for Table 401.04-1 Method 1-Standard RAP. For surface courses process RAP to less than 0.75 inch (19 mm) and place a 0.75 inch (19 mm) screen on the cold feed. For other courses place a 2-inch (50 mm) screen on the cold feed. Ensure that the RAP is the proper size to allow for complete breakdown in the plant. If mixing is incomplete, place a smaller screen on the cold feed.

2) Method 2 Extended RAP. Include RAP in a JMF submittal per the Extended RAP/RAS Limits Table 401.04-2 unless specified differently in the applicable mix specification. Only use Method 2 with counter flow drum plants or mini-drum batch plant configurations meeting 402. For mixes that will contain up to 15 percent RAP the JMF submittal is not required to include the RAP unless a virgin polymer asphalt binder is used in a surface course. For JMFs having polymer asphalt binder do not submit at 1 through 9% RAP.

If greater than 25 percent RAP is used in a JMF submittal include an analysis of the recovered asphalt binder and blend per Level 3 Mix Design procedures to determine the grade of virgin asphalt binder to use. If the blending shows a grade change is required use a PG64-28 for heavy intermediate courses or PG 58-28 or 64-28 for medium intermediate or base courses. No grade change is required with RAP at 26% to 40% if Warm Mix Asphalt (WMA) technology is used in a manner to maintain the mix temperature below 275 °F (135°C). Use WMA technology meeting 402.09. Other WMA technologies

must be approved by the Laboratory. If desired, WMA may be used to control plant temperatures when producing mixes using RAP above 40%, but a grade change is required if shown necessary by the blending index.

**TABLE 401.04-2
METHOD 2-EXTENDED RAP/RAS LIMITS**

Asphalt Mix Application	Percent RAP by Dry Weight of Mix, max.	RAS Usage*	Total Virgin Asphalt Binder Content, min.	Comments
Heavy Traffic Polymer Surface Course	15	None	5.0	Polymerized binder is virgin. (For non-polymer virgin binder allow 25% max RAP and 4.6 min virgin.)
Medium Traffic Surface Course	25	Manufacturing waste only	4.8	Polymer or non-polymer virgin.
Light Traffic Surface Course		Manufacturing waste only	5.0	
Intermediate Course	40	Manufacturing waste and tear-offs	3.0	Any mix type used as an intermediate course.
Base Course 301	55	Manufacturing waste and tear-offs	2.5	The Laboratory will establish the asphalt binder content.
Base Course 302	45 (35)	Manufacturing waste and tear-offs	1.8	A lower limit of 35 percent will be required if poor coating is evident. The virgin requirement of 302.02 does not apply.

* No more than 5.0% RAS by dry weight of mix

RAP Processing for Table 401.04-2 Method 2-Extended RAP. Process RAP by means of fractionation or by additional in line processing. Include in the QCP additional methods and procedures to dictate how this is to be accomplished at plants. Specify documentation method for RAP measurement. Fractionation is the process of creating separate piles of RAP from one pile when split over a specific sieve or sieves. Test fractionated piles to show uniformity. For additional in line processing only process RAP from a uniform, tested and approved stockpile by passing the RAP over a double deck screen placed in-line between the RAP cold feed bin and the mixer. Use a 9/16 inch (14.3 mm) screen for surface and intermediate mixes and a 1.5 inch screen for base mixes. Do not use concurrent project RAP in a stream process.

3) RAS Processing and Usage. Include RAS in a JMF submittal per the Standard RAP/RAS Limits Table 401.04-1 or Extended RAP/RAS Limits Table 401.04-2 unless specified differently in the applicable mix specification.

Ensure RAS is processed to have 100 percent passing the ½ inch sieve and at least 85 percent passing the No. 4 sieve. Ensure RAS has less than 1.0 percent deleterious materials and 0.1 percent metals by weight. Do not blend RAS from manufacturing waste and RAS from roofing tearoffs.

Ensure the approved QCP includes RAS usage methods before using RAS. Include in the contractor QCP what contractor requirements apply to the RAS processor.

Introduce and control RAS in asphalt plants in the same manner as RAP is introduced and controlled. RAS for base courses may be preblended with RAP if using rate control equipment to ensure uniformity of blending and if satisfactory blend and production is achieved. RAS may be preblended with a small amount of virgin aggregate meeting 703.05 to minimize stockpile agglomeration. Include in the contractor QCP blending equipment type and operation and uniformity testing requirements for preblended RAP and RAS or RAS and virgin aggregate. Other methods must be approved by the Laboratory.

RAP and RAS QC and Management Requirements. Maintain as part of the QC records the signed certification forms as required in Supplemental Specification 1116.

Always note on the daily quality control report how much RAP and RAS is actually being used. Apply a tolerance of +/-5.0% on the amount of RAP used if needed for a quality control adjustment but do not exceed the limits of Table 401.04-1 or Table 401.01-2, whichever applies. If this adjustment is not adequate for maintaining control of the mix submit a new JMF for approval. Do not apply this tolerance to RAS.

Include in the QCP methods to be used to meet Method 1 and Method 2 requirements above and the following requirements:

Provide enough space for meeting all RAP and RAS handling requirements at a hot mix facility. Provide a clean, graded base for stockpiles that does not collect water. Test blended RAP and RAS stockpiles to assure uniform gradation and asphalt binder content. Ensure uniform stockpile properties match the JMF submitted RAP and RAS properties unless the uniform stockpile will be processed into the asphalt plant using plant cold feed in line processing.

If the uniform stockpile will be processed into the asphalt plant using plant cold feed in line processing determine the processed RAP properties for use in the mix design. Record in the JMF submittal both the uniform stockpile and in line processed RAP properties.

If desired, when applying Method 1 Standard RAP requirements, use concurrent Department project RAP in a stream process in place of stockpiling and testing for uniformity but do so in the following manner. Concurrent project RAP must be taken from one existing mix type on the concurrent project or two existing mix types if both mix types are taken at the same time in one pass of the milling machine. Submit a new JMF for each existing mix type on the project (or each milling pass of two types) desired for use as concurrent project RAP. Include in the QCP methods of validating RAP properties when using concurrent project RAP. If these requirements are not met blend and test for uniformity and apply the stockpile requirements of this specification.

Maintain in the plant lab and control room an up to date and dated site map of all tested and untested RAP and RAS stockpiles. Give each stockpile a unique identification and identify if RAS piles are from un-used manufactured shingle waste or used roofing tear-off shingles. Provide in the plant lab RAP and

RAS properties for each uniform, blended stockpile cross referenced with its identification. In addition, provide the date the stockpile processing was completed and the stockpile estimated size in tons. The DET may require RAP and RAS pile staking for failure to maintain the above. Do not add to a stockpile once it is tested for uniformity. Provide signage at all uniform stockpiles to inform haulers that uniform piles are not to be added to.

Stockpiles and processing methods are subject to inspection and approval by the DET at any time. Rejection of stockpiles can occur for the presence of foreign or deleterious materials, lack of uniformity, incomplete mixing in the asphalt mixture, adding to piles, or moving RAP or RAS in a way not traceable through the QCP records and methods. The Laboratory will resolve disputes over acceptability of RAP or RAS.

401.05 Mixing Plants.

On page 173, in the 1st paragraph of this section, add after the 1st sentence the following sentences:

Schedule a date with the Department for approval inspection to be at least 1 week before mix production. Do not produce mixtures for projects from unapproved plants.

401.15

On page 178, **Replace** the third paragraph with the following:

Spread and finish the mixture using approved equipment or methods such that compaction can follow immediately. Preheat screeds and extensions before placing any asphalt concrete. Use side plates sufficient to contain the mixture laterally during spreading. Use only screed extensions, rigid or extendable, having the same features as the main screed including, but not limited to, vibration, heating, pre-strikeoffs, and tamping bars. When using front-mounted hydraulically extendable screeds at a fixed paving width use full width auger extensions and full tunnel extensions. When using fixed screed extensions use full width auger extensions and full tunnel extensions. Do not allow a buildup of excess material in front of any extended screed. Where excessive buildup of material is not controlled in front of the extended screed, the Engineer will require paver changes to correct the problem. The Contractor may use strike-off plates/strike-off extensions on irregular areas such as mailbox turnouts, driveway turnouts, and other irregular non-travelled roadway areas. The Engineer may approve the use of strike-off plates/extensions on variable width shoulders if the use of a standard extendable screed extension with the same features as the main screed is not practicable. Perform supplemental hand forming and tamping where irregularities develop and where placing the mixture by hand methods.

401.15

On page 179, **Replace** the 3rd, 4th, and 5th full paragraphs with the following:

When the total project includes more than 1 continuous lane mile (including bridges) of surface course paving in combination with night paving provide a Material Transfer Vehicle (MTV) with paver hopper

insert; a Material Transfer Device (MTD) with paver hopper insert; or a remixing paver specifically manufactured to eliminate segregation.

Provide equipment that:

- a. is equipped with mixing augers that continuously reblends the paving material prior to laydown by the paving machine, eliminates segregation, and provides a uniform temperature throughout the mixture;
- b. limits temperature differentials to less than 25° F (14° C);
- c. is used on all mainline lanes of the traveled way including express lanes, collector-distributor lanes, continuous center turn lanes, acceleration/deceleration lanes, and ramp lanes;

Use paver hopper inserts with a minimum capacity of 14 tons. Remixing may be done by the MTV or MTD, in the paver hopper insert, or by the remixing paver.

Demonstrate to the Engineer that the selected equipment eliminates physical segregation and limits the temperature differential of the mat surface measured transversely to 25° F. Provide a method before the start of paving that ensures non-segregation and thermal differential requirements are met, continuously during placement operations.

401.15 Spreading Finishing and Night Work.

On page 178 after the 3rd paragraph in this section add the following paragraph:

Ensure the paver operation, screed, screed extension, and, or, mix design provide a mat, prior to compaction, that is free of texture inconsistencies, shadowing, streaking, tearing, pulling, or other deficiencies. Take immediate action to correct the paver operation, screed, screed extensions, or, mix design. The Engineer may stop placement until corrections are completed.

401.16

On page 180, Section 401.16 Compaction, **Replace** the 6th paragraph with the following:

For surface courses using a polymer modified asphalt binder give a copy of the JMF approval letter containing the design compaction temperature to the Engineer before any mix is placed. Unless otherwise specified ensure that the mix temperature immediately before rolling is not less than 290 °F (145 °C) if placing hot mix asphalt, and not less than 250 °F (121 °C) if placing warm mix asphalt according to 402.09. Do not compact polymer asphalt concrete surface courses with pneumatic tire rollers.

On page 180, Section 401.16 Compaction, **Add** the following new paragraph after paragraph 8:

When using pneumatic tire rollers, ensure for any mix, that surface deviations and deformations caused by the tires are removed with steel wheel rollers. Do not use pneumatic tire rollers if any resultant surface deformations cannot be removed.

401.17

On page 181, Section Joints, **Replace** paragraph 6 with the following:

Seal all cold longitudinal construction joints by coating the entire face of the cold joint with a certified 702.01 PG binder or 702.13 SBR Asphalt Emulsion to provide 100 percent coverage of the joint. Overlap the joint edges by at least 1/2 inch (13 mm). Seal all cold transverse construction joints with a certified 702.01 PG binder or 702.13 SBR Asphalt Emulsion to provide 100 percent coverage of the joint or with a certified 702.04 asphalt material applied at a rate of 0.25 gallon per square yard (1 L/m²).

401.19

401.19 Spreading and Surface Tolerances

On Page 182, Paragraph 6, **Delete** paragraph 6 of 401.19 and replace with the following paragraph:

Check the surface course for variations in slope or surface at locations where bumps are suspected when directed by the Engineer.

402

On page 183 **Replace** the entire section with the following:

ITEM 402	ASPHALT CONCRETE MIXING PLANTS
402.01	Description
402.02	Calibration
402.03	Polymer Binders
402.04	Water Injection System for Warm Mix Asphalt

402.01 Description. This specification consists of the minimum requirements for an asphalt concrete mixing plant to produce asphalt concrete mixes according to Department specifications.

Ensure asphalt concrete mixing plants conform to the requirements of Supplement 1101 in addition to the following.

402.02 Calibration. Ensure the plant is calibrated according to Supplement 1101 when producing any asphalt concrete for the Department. Ensure that the calibration is accurate within 1.0 percent. When performing a complete calibration for ODOT projects notify the ODOT district 24 hours in advance of the calibration.

402.03

402.03 Polymer Binders

402.03 Polymer Binders. If an asphalt binder is modified by SBR at an asphalt concrete mixing plant, equip the plant with an automated SBR flow control and monitoring system. Obtain the

Department's approval of the system before operating and demonstrate the system calibration to the District. If the District waives the demonstration, provide a letter documenting calibration data for the flow system to the DET for each project. Obtain written approval from the Laboratory for the use of SBR and ensure the QCP contains methods for properly controlling SBR.

For drum mix plants, introduce the SBR directly into the asphalt binder line through means of an in-line motionless blender or other device approved by the Laboratory which is able to provide a homogeneous blend. Locate a sampling valve between the in-line blender and the plant drum.

For batch plants, add the SBR after the aggregate has been completely coated with asphalt binder. Continue mixing for a minimum of 20 seconds after SBR is added and long enough to provide a uniform mixture.

Ensure the SBR pumping and metering system is capable of adding the SBR within the limits of 702.01. For drum plants ensure the SBR pump is automatically controlled by an independent computer and interfaced with the asphalt binder flow to automatically maintain the SBR flow within specification limits. Produce asphalt mixtures for placement in automatic SBR control mode only.

Ensure the SBR meter is accurate to +/- 2.0 percent over a flow range typical of that used at the asphalt plant (typically 0.8 to 12 gpm at drum plants and 10 to 25 gpm at batch plants). Ensure the SBR meter is a magnetic flow meter consisting of a metering flow tube which utilizes Faraday's Law of Induction to measure the flow and includes a transmitter to transmit the flow signal to a totalizer located in the control room of the asphalt plant. Locate the SBR meter downstream of any recirculation lines. Provide a means for removing the SBR line at the in-line blender to be able to obtain a sample of the SBR for calibration purposes.

Obtain Laboratory approval for use of any other type of SBR meter. Ensure the totalizer displays total volume measured and flow rate in standard engineering units. Ensure the totalizer is interfaced with a data logger which produces printouts of the logged data every five minutes for a drum plant or every batch for a batch plant. Ensure the logged data includes time, date, flow rate, and flow total except flow rate is not necessary for batch plant production.

Balling or wadding of SBR or uncoated aggregate indicates improper mixing; cease production immediately and until corrected to District satisfaction.

402.04 Water Injection System for Warm Mix Asphalt.

When allowed by specification use a Department-approved water injection system for the purpose of foaming the asphalt binder and lowering the mixture temperature. Only use equipment that has been proven stable and effective through project use on non-ODOT projects. Ensure equipment for water injection meets the following requirements:

1. Injection equipment computer controls are in the plant control room and are tied to the plant computer metering.

2. Injection equipment has variable water injection control controlled by the plant operation rate and the water injection can never exceed 1.8% by weight of asphalt binder.
3. Water injection rate cannot be manually overridden by the plant operator once in the computer.
4. Injection equipment stops water flow when a control or equipment failure in the injection system occurs.
5. The water injects into the asphalt binder flow before the asphalt binder spray hits aggregate. Do not allow water to touch aggregate before the binder spray.
6. Injection equipment includes water storage and pump control tied to the injection computer controls.
7. Water storage low water alarm installed in the control room.
8. Provide a PG binder sampling valve between the last piping tee on the tank side of the line and the injection equipment to sample PG binder before water is injected.
9. Provide a PG Binder sampling valve at the injection equipment to sample binder prior to spray.

402.04 Water Injection System for Warm Mix Asphalt.

Remove Item 9 from the list of requirements.

403.03 Quality Control Program (QCP), H.

On page 189, **Replace** entire paragraph with the following:

H. All procedures to meet the processing, testing and documentation requirements for RAP and RAS in 401.04 including test forms, record keeping, technician responsibilities, etc.

403.06 Verification Acceptance (VA), A. Sampling.

On page 191 replace paragraphs 3 and 4 with the following paragraphs:

Provide a clean area of sufficient size and a hard surface to perform sample splitting. Split samples by quartering and recombining according only as described in to AASHTO T 248, Method B for hard surfaces and recombining for the Department and Contractor's sample. The Department split sample size required is generally 22 to 27 pounds (10,000 to 12,000 g). A mechanical quartering device approved by the Laboratory may be used in lieu of the above but only split according to the procedure outlined in the Contractor QCP. Ensure that every quality control or Item 448 Sublot sample taken by the technician has a labeled split for the Department. Wrap and label the Department split samples as to Lot or Sublot, time, location (tonnage), and accompanying Contractor test identification. The Monitoring Team will pick up all Department split samples within 4 workdays. Sample mishandling (careless identification, changing sample size, consistency, or pre-testing) will result in a change to Unconditional Acceptance.

For Item 448 mixes, conform to the procedures of Supplements 1035, 1038, 1039, and 1043 except take samples from a truck at the plant. If workmanship problems continue on the project (segregation, etc.) or if quality control problems persist, the Monitoring Team may require sampling on the road according to Supplement 1035. Lots will be 3000 tons (3000 metric tons), and Sublots will be 750 tons

(750 metric tons). However, when production is limited to less than 3000 tons (3000 metric tons), consider the quantity produced as a partial Lot. For partial Lots of 1500 tons or less sample and test at least two subplot samples regardless of the tons produced. Split and test all Sublot sample locations, as selected by the Monitoring Team or project and taken by the Contractor. The Contractor may test a Sublot QC sample at the required Sublot sample location instead of the required random quality control test as both a QC and Sublot test provided the sample is tested in the half day in which the Sublot sample mix was produced sample and is tested for all required quality control properties. Test results will apply for both QC and subplot requirements. A change in the location of the Sublot sample must be approved by the District and be reasonably close to the original location. This allowance does not apply to any other samples including Department VA sample locations selected by the Monitor. Label Department split samples as Sublot or quality control samples.

403.06 Verification Acceptance (VA), B. Reporting

On page 192, In 2nd paragraph of this section, **replace** the 2nd sentence with the following:

When the figures to be dropped in rounding off are exactly one-half of unity in the decimal place to be retained, round the value up to the nearest number in the decimal place to be retained.

407.06 Tack Coat, Application of Asphalt Material.

On page 199 replace paragraphs 5 and 6 in this section with the following paragraphs:

Apply the tack coat in a manner that offers the least inconvenience to traffic. Do not allow tack pick up and tracking by traffic or by construction vehicles. Take immediate steps to eliminate tack pick up and tracking. Only apply the tack coat to areas that will be covered by a pavement course during the same day unless using a lane closure lasting more than 24-hours.

Obtain the Engineer's approval for the quantity, rate of application, temperature, and areas to be treated before application of the tack coat. The Engineer will determine the actual application in gallons per square yard (Liters per square meter) by a check on the project. The application is considered satisfactory when the actual rate is within ± 10 percent of the required rate and the material is applied uniformly with no visible evidence of streaking or ridging. The Engineer will require repairs to equipment when ridging, streaking, or other non-uniform coverage is observed, and a subsequent test strip to demonstrate proper application.

If the application is not uniform and not corrected or there is pick up, and, or tracking the total square yardage of non-uniform application will be considered non specification material. The Engineer will determine the number of gallons (liters) for non-payment by using the approved rate of application times the total square yards (square meters) of non-uniform application, pick up, and or tracking.

421

On Page 206, **Replace** entire section 421.02 Materials with the following:

421.02 Materials. Use a polymer modified emulsified asphalt binder (Binder) consisting of the following materials milled together:

A. Natural SBR latex modifier or synthetic SBR latex modifier conforming to 702.14. Use only one type of latex.

B. CSS-1h or CSS-1m (as required below) emulsified asphalt conforming to 702.04, except the cement-mixing test is waived. Use only emulsion certified per Supplement 1032.

C. Other emulsifiers.

Use CSS-1mL (as defined below) if the project ADTT is less than 2000, otherwise use CSS-1hL (as defined below). Do not use port addition of the polymer to the emulsified asphalt. Provide to the Engineer certified test data and a statement from the Binder manufacturer with each load of Binder that the Binder is the same formulation as used in the mix design. Ensure the Binder meets one of the following.

CSS-1hL: Combine CSS-1h and SBR latex modified (L) to yield 3 percent SBR solids based on the weight of the asphalt binder content of the Binder. Ensure that the SBR latex modified residue conforms to the following requirements:

Test	Description	Specification
AASHTO T 59 (Note 1)	Residue	62 %
AASHTO T 53	Softening Point	60 °C minimum
AASHTO T 202	Absolute Viscosity @ 60 °C	8000 poise minimum

Note 1 - 24 hours at 77 °F (25 °C) in forced draft oven

CSS-1mL: Combine CSS-1m and SBR latex modifier (L) to meet the following properties.

Tests on emulsion, ASTM D 244, unless otherwise designated:	
Viscosity, Saybolt Furol, ASTM D 88, at 25 °C (sec)	20 to 100
Storage Stability Tests, 24-hr (% difference)	1 maximum
Particle Charge Tests	Positive
Sieve Tests (%) (Distilled Water)	0.10 maximum
Distillation to 260 °C, % by Weight, Residue, min[1]	62
Tests on distillation residue:	
Penetration, 25 °C, 100 g, 5 sec (dmm) ASTM D 5	70 to 90
Ductility, 4 °C, 5 cm/min, ASTM D 113	40 minimum
Elastic Recovery, 4 °C, 10 cm (%) [2]	65 minimum
Softening Point, Ring & Ball (°C) ASTM D 36	60 minimum

[1] ASTM D 244, with modifications to include a 400 °F ± 10 °F (204 °C ± 6 °C) maximum temperature to be held for 15 minutes.

[2] Straight molds. Hold at test temperature for 90 minutes. Place in ductilometer and elongate 10 cm at 5 cm/min. Hold for 5 minutes and cut. After 1 hour retract the broken ends to touch and measure the elongation (*X*) in centimeters. Use the following formula to calculate the elastic recovery:

$$\text{Elastic Recovery (percent)} = \left(\frac{10 - X}{10} \right) \times 100$$

Conform to 703.01 and 703.05 for aggregate, except as follows:

Percent by weight of fractured pieces	100
Sand Equivalence (ASTM D 2419)	45 minimum

Conform to Gradation A for the aggregate for leveling and surface courses and to Gradation B for the aggregate for rut fill courses according to the following:

Sieve Size	Total Percent Passing	
	A	B
3/8 inch (9.50 mm)	100	100
No. 4 (4.75 mm)	85 to 100	70 to 90
No. 8 (2.36 mm)	50 to 80	45 to 70
No. 16 (1.18 mm)	40 to 65	28 to 50
No. 30 (600 µm)	25 to 45	19 to 34
No. 50 (300 µm)	13 to 25	12 to 25
No. 100 (150 µm)	--	7 to 18
No. 200 (75 µm)	5 to 15	5 to 18

Screen the aggregate for oversize material prior to use. For mineral filler, use Portland cement conforming to ASTM C 150, Type I. Use water conforming to 499.02. Use mix set additives as required.

421.02 Microsurfacing, Materials.

Replace the 1st table in this section with the following table:

Test	Description	Specification
AASHTO T 59	Residue by Evaporation	62 %
AASHTO T 53	Softening Point	60 °C minimum
AASHTO T 202	Absolute Viscosity @ 60 °C	8000 poise minimum

422.02

On Page 213, **Replace** the 2nd paragraph with the following:

Provide cover aggregate for the chip seal Job Mix Formula (JMF) of washed limestone or dolomite meeting 703.05. Do not use an aggregate source designated with “SR” on the Aggregate Source Group list in accordance with 703.01F. Additionally the following requirements apply:

422.06

Binder Application On Page 216, Replace 1st paragraph with the following

Remove all existing pavement markings 740.03 (polyester), 740.04 (thermoplastic) and 740.07(epoxy) using an abrasion method conforming to 641.10.

422.13

Basis of Payment On Page 224, **Replace** the 2nd paragraph under the subsection with the following:

The cost of removal of all existing pavement markings according to 422.06 is incidental to this item.

424.03 Materials

On page 224, **Replace** the 1st sentence in the 3rd paragraph with the following:

Ten percent reclaimed asphalt concrete pavement may be used in a Type B mix if all requirements of footnote 3 are met by the reclaimed asphalt concrete.

424.03 Fine Graded Polymer Asphalt Concrete, Materials.

On page 224 replace the 2nd paragraph in this section with the following paragraph:

Use a PG 76-22M asphalt binder; or a PG 64-22 asphalt binder modified by adding 5.0 +/- 0.3 percent by weight Styrene Butadiene Rubber (SBR) solids and meeting the requirements of PG 76-22 . Provide SBR conforming to 702.14. Provide mineral filler conforming to 703.07. Provide binders conforming to 702.01.

424.03 Materials

On page 224, (3) Fine Aggregate– After the last sentence of this section add the following sentence:

Contact the office of Materials Management, Asphalt Materials section for guidance on submitting RAP aggregate silicon dioxide data.

424.03 Materials

On page 224, (4) Coarse Aggregate – **Replace** entire paragraph with the following:

(4) Coarse Aggregate - For medium mixes, for the final blend of all coarse aggregate use a minimum 10 percent two - or more fractured faces aggregate. For heavy mixes, use 100 percent two or more fractured faces aggregate. Meet the two or more fractured faces aggregates criteria of ASTM D5821 (reapproved 2006).

424.04

On page 325, **Replace** section 424.04 Mixing with the following:

424.04 Mixing. Ensure the mixing plant conforms to 402. Discharge the mix from the plant at temperatures between 335 °F to 370 °F (168 °C to 188 °C) for hot mix asphalt or 300 °F to 340 °F (149 °C to 171 °C) for warm mix asphalt.

441.09 Contractor Mix Design and AC, Quality Control Tests, A. Asphalt Binder Content.
On page 234 at the end of paragraph 2 in this section, add the following sentence:

Only take SBR PG-Modified Binder samples using a five gallon bucket, stirring its contents and transferring to the required sample containers.

442

On page 239 **Replace** Table 442.02.02 with the following:

TABLE 442.02-2 AGGREGATE GRADATION REQUIREMENTS

Sieve Size	9.5 mm mix (% passing)	12.5 mm mix (% passing)	19 mm mix (% passing)
1 1/2 inch (37.5 mm)			100
3/4 inch (19 mm)		100	85 to 100
1/2 inch (12.5 mm)	100	95 to 100	90 max
3/8 inch (9.5 mm)	90 to 100	96 max	
No. 4 (4.75 mm)	70 max	52 min	
No. 8 (2.36 mm)	34 to 52	34 to 45	28 to 45
No. 200 (75 µm)	2 to 8	2 to 8	2 to 6

442.01

On page 238, **Delete** the last sentence of the second paragraph that states:

“Do not use the warm mix...”

451.02

On page 253 **Replace** the first line under the subsection heading with:

Concrete, Class C 499 or Class RCA 499.10

451.09

On page 261, Finishing **Replace** paragraph 3 with the following two paragraphs:

Texture the surface in the longitudinal or transverse direction using a broom to produce a uniform, gritty, texture. Immediately following the broom drag texture, tine the pavement in the longitudinal direction using an approved device that produces uniform tine spacing 3/4 inches wide (19 mm), 1/8 inch deep (3 mm) and 1/8 inch wide (3 mm). Do not tine within 3 inches (75 mm) of pavement edges or longitudinal joints. Only use equipment that will tine the full width of the pavement in one operation and uses string line controls for line and grade to assure straight tining texture.

Use transverse tining in small areas only with the approval of the Engineer. Use equipment that produces a random pattern of grooves [0.05 inch (1.3 mm) to 0.08 inch (2.0 mm) deep and 0.10 inch (3 mm) wide] spaced at 3/8 to 1-3/4 inches (10 to 45 mm), with 50 percent of spacings less than 1 inch (25 mm).

446.05 Asphalt Concrete, Density Acceptance.

On page 247 in the 2nd paragraph of this section replace the 1st sentence with the following sentence:

Obtain 10 ten, 4-inch cores for the Department to test to determine the in-place density of the compacted mixture as a percentage of the average Maximum Specific Gravity (MSG) for the production day the material was placed.

499.07 Concrete, Handling, Measuring and Batching Materials.

On page 278 delete the last sentence of the 1st paragraph of the section and insert the following between the 1st and 2nd paragraphs:

Prior to and during batching, maintain all coarse aggregates at a uniform moisture content.

For all slag aggregates or other aggregates with a reported absorption above 3.0 percent, only use aggregates with moisture contents at or above the ODOT-reported SSD for that aggregate as follows:

1. Use appropriate stockpile watering systems capable of raising and maintaining aggregate moisture at or above SSD. Sample and test the moisture content of the watered aggregate stockpiles from at least five (5) locations of the stockpile to ensure the stockpile is at or above SSD.
2. Have processes to maintain the aggregate stockpile at SSD until stockpile draining for SSD consistency has begun. Twenty-four (24) hours before batching concrete with the aggregate, shut down the stockpile watering process to allow drainage and to establish a uniform moisture content.
3. Run moisture content tests at least twice a day during concrete production. If the moisture content varies between tests by more than 1% increase the moisture testing frequency to assure correct batching information.
4. Provide the moisture content test results as part of all quality control plant ticket information.

499.10

On page 281, **Add** after the last paragraph of subsection 499.09 the following:

499.10 Class RCA. A concrete mix design using recycled concrete as a coarse aggregate conforming to the requirements of Supplement 1117. RCA is a stand-alone concrete mix design with no standard batching requirements.

ITEM 501 STRUCTURES – GENERAL

501.04 Shop Drawings.

501.04.A. Contractor Acceptance of Shop Drawings for Items 513 and 515.

On page 283, In the 1st paragraph, **Replace** the second sentence to the following:

The Registered Engineer shall seal and date each drawing confirming that the drawings meet the intent of the plan, (as designed).

501.05 Submittal of Working drawings and Calculations.

On page 284 and 285, **Make** the following changes:

A. Projects with Railroad Involvement.

After the first paragraph, after the sentence:

Department acceptance is not required.

Add the sentence:

The absence of Department acceptance does not supersede the Engineer's authority as defined in 105.01.

After the second paragraph, after the sentence:

Department acceptance of revised working drawings is not required.

Add the sentence:

The absence of Department acceptance does not supersede the Engineer's authority as defined in 105.01.

B. Projects without Railroad Involvement.

After the second paragraph, after the sentence:

Department acceptance is not required.

Add the sentence:

The absence of Department acceptance does not supersede the Engineer's authority as defined in 105.01.

After the third paragraph, after the sentence:

Department acceptance of revised working drawings is not required.

Add the sentence:

The absence of Department acceptance does not supersede the Engineer's authority as defined in 105.01.

501.05.B.6

On page 288, **Replace** the entire subsection with the following:

When the total load applied to a structure during construction, (new or structure being rehabilitated), exceeds 75 % of the legal limit, (The Legal Limit is 80,000 lbs. or percentage thereof if posted), the load effects on the structure shall be analyzed based on the operating level calculated by the Load Factor Rating Method as given in the AASHTO Manual for Bridge Evaluation.

ITEM 503 EXCAVATION FOR STRUCTURES

503.08 Backfill.

On page 293, In the 1st paragraph, **Replace** the first two sentences with the following:

Backfill all excavations made under this item with materials conforming to 203.02.R., except behind abutments and below the approach slabs use materials conforming to Item 203 Granular Material Type B.

503.09 Method of Measurement.

On page 293, In the first paragraph, **Replace** the first sentence with the following:

After the requirements of Items 201, 202, and 203 have been met, the Department will measure excavation on a lump sum basis or by the number of cubic yards (cubic meters) as follows:

On page 294, **Delete** the following sentence: For abutment excavation quantities, the Department will include material removed above the bench (if any), in front of the vertical plane described in 503.09.C.1, and by the finished slope of the cut or embankment.

On page 294, **Delete** the following sentence: The Department will measure Unclassified Excavation on a lump sum basis when shown on the plans.

ITEM 504 SHEET PILING LEFT IN PLACE

On page 295, **Make** the following changes:

504.03 Driving.

After the first sentence:

Add the sentence:

Thread each sheet pile with adjacent sheets. Use corner piles and interlocking connectors as necessary so that all sheets are interlocked.

ITEM 507 BEARING PILES

On page 300, **Make** the following change;

507.03 Materials.

After Steel pile points, **remove** the reference to 711.01.

On page 301, **Make** the following change,

507.06 Cast-In-Place Reinforced Concrete Piles.

In part D., after the formula, **Change**

Where:

R= Ultimate bearing value in pounds(newtons).

507.04 Driving of Piles.

On page 301, **Replace** the last paragraph in the subsection with the following:

After being driven, cut off the piles at the elevation and angle shown on the plans. Ensure that the actual pile embedment into the concrete is within 2 inches (50mm) of the embedment shown in the plans.

On page 302, **Make** the following change;

507.09 Splices.

After the fourth paragraph, **add** the following paragraph,

Pile Points. When specified in the plans, select a product from the Department's approved list. Weld the pile points to the pile in accordance with AWS D1.5 or the manufacturer's written welding procedure supplied to the Engineer before the welding is performed. Submit a notarized copy of the mill test report to the Engineer.

507.13 Basis of Payment.

Change the first sentence to:

When the Contractor elects to prebore to facilitate the pile driving operation, include the cost for preboring in the unit price bid for piles driven.

ITEM 508 FALSEWORK AND FORMS

508.03 Forms.

On page 306, after the second paragraph in the section **Add** the following:

In forming Pier, Intermediate, or End Diaphragms for Prestressed or Post Tensioned Concrete members, do not place post installed anchors in these members. Properly brace diaphragm forms externally or use approved form tie inserts cast into these members.

ITEM 511 – CONCRETE FOR STRUCTURES

On page 314, **Make** the following changes:

511.06 Concrete Test Specimens. The Engineer will make test cylinders as follows:

- A. Structures over 20-foot (6.1 m) span. A set of test cylinders from each 200 cubic yards (150 m³) of concrete, or fraction thereof that is incorporated into the work each day.
- B. Structures of 20-foot (6.1 m) span or less. At least one set of test cylinders for each 50 cubic yards (35 m³) of concrete.

On page 315, **Make** the following changes:

511.10 Placing Concrete.

After the first paragraph, **add** the following:

Place and finish concrete to the lines and grades shown in the plans. Provide coverage over or around reinforcing steel as described in 509.04.

Conform to the following tolerances from plan dimensions:

Deviation from plumb for exposed surfaces	± 3/4 inch (19 mm)
Vertical alignment (Deviation from a line parallel to the grade line)	± 1/2 inch in 20 feet (13 mm in 6 m)
Longitudinal alignment (Deviation from a line parallel to the centerline or baseline)	±1/2 inch in 20 feet (13 mm in 6 m)
Width dimensions of walls for exposed surfaces	±1/2 inch (13 mm)
Bridge Slab thickness	±1/4 inch (6 mm)
Elevations of beam seats	±1/8 inch (3 mm)
Slope, Vertical Deviation from Plane	±0.2%
Slope, Horizontal Deviation from Plane	±0.4%

Change the first sentence of the seventh paragraph to:

Before placing concrete for backwalls above the approach slab seat with steel expansion joints, backfill the abutments to within 2-foot(0.6m) of the bridge seat elevation, erect structural steel or prestressed concrete beams and place superstructure concrete in the adjacent span.

On page 324, **Make** the following changes:

511.20 Bridge Deck Grooving. After Class S concrete has cured, saw longitudinal grooves into the deck.

After water curing Class HP concrete and either before applying curing compound or some period after applying curing compound and before opening the bridge to traffic, saw longitudinal grooves into the deck. If sawing grooves after applying the curing compound, and concrete deck is less than 30 days old, reapply the curing compound after removing standing water, within 12 hours after sawing grooves in the deck.

The grooving of both Class S concrete and Class HP concrete shall be performed as specified below.

Use diamond blades mounted on a multi blade arbor on a self-propelled machine that was built for grooving of concrete surfaces. The groove machine shall have a depth control device that detects variations in the pavement surface and adjusts the cutting head height to maintain the specified depth of the groove. The grooving machine shall have devices to control alignment. Do not use flailing or impact type grooving equipment.

Begin and end grooves 9 to 12 inches (220 to 300 mm) from curbs, parapet toes, or deck edges, and saw grooves parallel to the bridge centerline.

Provide an experienced technician to supervise the location, alignment, layout, dimension, and grooving of the surface.

Saw grooves in a continuous pattern across the surface. Stop sawing 9 to 12 inches (220 to 300 mm) from any device in place in a bridge deck, such as scuppers or expansion joints. Stop sawing 2 inches to 2 feet from skewed expansion joints. Saw grooves in a uniform pattern spaced at 3/4 inch minus 1/4 inch or plus 0 (19 mm minus 6 mm or plus 0). Saw grooves approximately 0.15 inches (4 mm) deep and 0.10 inches (3 mm) wide.

ITEM 512 – TREATING CONCRETE

512.03 Sealing of Concrete Surfaces.

On page 329, **Make** the following changes to Section E. Surface Condition:

E. Surface Condition. Apply sealers only to surfaces which are dry, free from dust, dirt, oil, wax, curing compounds, efflorescence, laitance, coatings and other foreign materials. Visually inspect all surfaces before applying sealer. Remove all structurally unsound surfaces and weak sections.

Perform all concrete patching prior to surface profiling. Perform concrete patching on areas identified by the Engineer according to 519. Cure repaired areas for at least seven (7) days.

Air dry all concrete surfaces for at least ten (10) days after completion of required curing.

For accelerated cure of precast concrete, obtain the required 28 day strength and air dry the surfaces at least ten (10) days after completing accelerated cure.

On page 329, **Make** the following changes to the first two sentences of Section **F. Surface Preparation and Profiling**:

F. Surface Preparation and Profiling. Remove dust, dirt, oil, wax, curing compounds, efflorescence, laitance, coatings and other foreign materials from surfaces to be sealed.

Use one or both of the following methods to produce a surface profile that feels and looks like 100 grit sandpaper or coarser. Provide the Engineer sandpaper for comparison

On page 330, **Add** the following sentence to the end of Section **F. Surface Preparation and Profiling**:

Ensure that all wastes generated by the surface preparation operation are managed to prevent the direct or indirect discharge to the environment.

512.03 G

On page 330, change the first sentence, add a new second sentence, and keep the last two sentences to Section G.

G. Application and Coverage. Apply the sealer between twelve and (12) hours and 48 hours after surface preparation by water blasting methods. Apply the sealer within 48 hours after surface preparation by abrasive blasting methods

512.03

On page 332, **Add** Section **N. Superintendent**.

In addition to the requirements of 105.06, the Superintendent must successfully complete a Sealing of Concrete Surfaces pre-qualification training course offered by the Department. The course must have been completed within the past four years and an individual course certificate must have been received by the Superintendent. Present certificate to the Engineer prior to beginning the sealing of concrete surfaces work. Work will not be permitted to begin until after the Superintendent provides a valid course certificate.

On page 338, **Make** the following changes:

512.08 Waterproofing

General.

After the fourth paragraph of this section **add**:

Do not apply waterproofing fabric or membranes over attachments and hardware. Seal the discontinuities in waterproofing with Asphalt, 702.06, or hot applied joint sealer, 705.04.

Primer Coat.

Change the first sentence to:

Apply the primer coat at the rate of 0.10 to 20 gallon (0.50 to 1.00 L) of asphalt material per square yard (square meter).

On page 340, **Make** the following changes:

Type 3 Membrane Waterproofing.

Change the first paragraph to:

This type of waterproofing consists of an primer coat conforming to 705.04 and a waterproofing membrane consisting of a high density asphalt mastic between two layers of polymeric fabric conforming to 711.29. The application of this product shall follow the Manufacturer's written recommendations, which shall be provided to the project.

After the last paragraph, **Add** the sentence:

If asphalt pavement is to be placed directly over the water proofing membrane, first apply tack coat as specified in 407 without damaging the membrane.

ITEM 513 STRUCTURAL STEEL MEMBERS

On page 355, **Make** the following changes:

513.22 Stud Shear Connectors.

In the third paragraph, **Add**:

For galvanized structures with welded shear connectors, remove the galvanic coating by grinding at each connector location prior to welding.

ITEM 514 PAINTING OF STRUCTURAL STEEL

514.02 Materials

On page 362, **Change** the last sentence at the end of the second paragraph to:

The Contractor is responsible for ensuring the compatibility of the intermediate and finish coats with the prime coat.

By **deleting** the phrase “may supply the prime coat from a manufacturer other than the manufacturer of the intermediate and finish coats” and **adding** “is responsible for ensuring the compatibility of the intermediate and finish coats with the prime coat”.

On page 363, **Make** the following changes:

514.04 Quality Control .

514.04 A. Quality Control Specialist.

Change the first sentence of the fifth paragraph to:

The quality control specialist will be immediately removed from their duties as the quality control specialist and disqualified from future duties as the quality control specialist if any quality control failure occurs.

514.05 Test Equipment.

On page 365, In the first paragraph, **Replace** the third sentence with the following:

The Contractor and fabricator shall maintain all testing equipment in good working order, and provide documentation or certification of calibration from the manufacturer.

514.05.D

On page 366, **Replace** the subsection with the following:

One Sling Psychrometer including Psychrometric tables, (or comparable electronic or digital equipment for the measurement of dew point, accurate within 2 °F (1 °C) and within 1% relative humidity).

514.20 Dry Film Thickness.

On page 379, **Replace** the paragraph that begins: “Certified test data proving...” with the following:

Certified test data proving that the excessive thickness will adequately bond to the steel when subjected to thermal expansion and contraction. The thermal expansion and contraction test shall take place over five cycles of a temperature ranges from -20° to 120 °F (-49° to 49°C). After the thermal contraction and expansion cycles have taken place, the tested system shall be subjected to pull off tests and the results compared to the results of pull off tests that have been performed on a paint system with the proper thicknesses.

Perform the adhesion tests per ASTM D 4541 Type IV. Document the preparation methods for the panels, including profile and level of cleanliness. Document the application methods, conditions and if any thinner, (percentage), was used. Test the panels according to the following:

1. Lightly sand the coating surface and aluminum dolly, and apply a quick set adhesive. Document the type of adhesive.
2. Allow adhesive to cure overnight.
3. Scribe the coating and adhesive around the dolly before testing.
4. Make a minimum of 4 trials to failure, and report the 4 trials. Reject trial if fracture occurs at the primer-substrate interface or pressure at failure is less than 400 pounds per square inch (2.8 MPa).
 - a. Describe the test specimen as substrate A, upon which successive coating layers B, C, D, etc. have been applied including the adhesive Y which secures the dolly Z to the topcoat.
 - b. Designate cohesive failures by the layers within which they occur as B, C, etc., and the percent of each.
 - c. Designate adhesive failures by the interfaces at which they occur as A/B, B/C, C/D, etc, and the percent of each.

In addition to the certified test results, the Contractor shall provide the Office of Construction Administration a written statement from the paint manufacturer stating that the excessive thickness is not detrimental.

ITEM 515 PRESTRESSED CONCRETE BRIDGE MEMBERS

On page 388, **Make** the following changes:

515.15 Concrete. The fabricator shall provide concrete mix designs to Office of Material Management. The submittal will include:

- A. Test data showing the mix achieves the required 28-day strength when cured by methods used for member fabrication. The strength of the concrete for the mix design approval and during production is determined using sets of two – 6” x 12” cylinders or three – 4” x 8” cylinders.

ITEM 516 EXPANSION AND CONTRACTION JOINTS, JOINT SEALERS AND BEARING DEVICES.

On page 395, **Make** the following changes:

516.04 Materials.

Add:

Neoprene Sheeting 705.13

516.05. Expansion and Contraction Joints.

At the end of the second paragraph, **add:**

For Integral and Semi-Integral Abutment Expansion Joint Seals, install a 3 foot wide neoprene sheet for waterproofing of the backside of the joint between the integral backwall and the bridge seat at locations shown in the plans. Secure the neoprene sheeting to the concrete with 1 1/4" x #10 gage (length x shank diameter) galvanized button head spikes through a 1 inch outside diameter, #10 gage galvanized washer. Maximum fastener spacing is 9 inches. Use of other similar galvanized devices, which will not damage either the neoprene or the concrete, will be subject to the approval of the Engineer.

Center the neoprene strips on all joints. For horizontal joints, secure the horizontal neoprene strip by using a single line of fasteners, starting at 6 inches, +/-, from the top of the neoprene strip. For the vertical joints secure the vertical neoprene strip by using a single vertical line of fasteners, starting at 6 inches, +/-, from the vertical edge of the neoprene strip nearest to the centerline of roadway.

For vertical joints, install 2 additional fasteners at 6 inches, center to center, across the top of the neoprene strip on the same side of the vertical joint as the single vertical row of fasteners is located. The vertical neoprene strips shall completely overlap the horizontal strips. Lap lengths of the horizontal strips that are not vulcanized or adhesive bonded, shall be at least 1 foot in length, or 6 inches in length if the lap is vulcanized or adhesive bonded. No laps are acceptable in vertically installed neoprene strips. The neoprene sheeting shall be 3/32" thick general purpose, heavy-duty neoprene sheet with nylon fabric reinforcement.

On page 396, **Make** the following changes:

516.07 Bearing Devices.

After the sentence in the fourth paragraph, Set elastomeric bearing pads directly on the concrete surface.

Add: If the beams seats are sealed with an epoxy or non-epoxy sealer prior to setting the bearings, do not apply sealer to the concrete surfaces under the proposed bearing locations. If these locations are sealed, remove the sealer to the satisfaction of the Engineer prior to setting the bearings. The Department will not pay for this removal.

After the sentence in the fifth paragraph, Position rockers, elastomeric bearing, and rollers so that, when the completed bridge is at 60 F (16 C), the rockers and elastomeric bearings are vertical and the rollers are centered on the base.

Add: If the steel is erected at an ambient temperature higher than 80°F or lower than 40°F and the bearing shear deflection exceeds 1/6 of the bearing height at 60°F (+/-) 10°F, raise the beams or girders to allow the elastomeric bearings to return to their undeformed shape at 60°F (+/-) 10°F.

After the sentence in the last paragraph, Permanently fasten bearing devices to the abutments, steel beams, or girders after backfilling the abutments to within 2 feet (0.6m) of the top of the bridge seat.

Add: Where the load plate of an elastomeric bearing is to be connected to the structure by welding, control welding so that the plate temperature at the elastomer bonded surface does not exceed 300°F as determined by use of pyrometric sticks or other temperature monitoring devices.

ITEM 518 DRAINAGE OF STRUCTURES

On page 400, **Make** the following changes:

518.05 Porous Backfill.

Change the paragraph to:

Place porous backfill as shown on the plans. When not shown on the plans, place backfill at least 2 feet (0.6 m) thick behind the full length of abutments, wing walls, and retaining walls. Measure the thickness of porous backfill normal to the abutment or wall face. The Contractor may leave undisturbed rock or shale within 2 feet (0.6 m) of the abutment or wall. Place 2 ft³ (0.23 m³) of bagged No. 3 aggregate at each weep hole to retain the porous backfill. Compact porous backfill according to Item 603.11 D.

On page 401, **Make** the following changes:

518.10 Basis of Payment.

After the first sentence, **Add:**

The Department will include bagged aggregate with porous backfill for payment .

ITEM 519 PATCHING CONCRETE STRUCTURES

On page 402, **Make** the following changes:

519.03 Removal of Disintegrated Concrete.

Change the third paragraph to:

If working around reinforcing steel, avoid damaging or debonding any reinforcing steel that is uncorroded and completely embedded in sound concrete. Ensure no shattering of the concrete, beyond the

area to be patched. Adequately support reinforcement that is loose, and tie it back into place. Replace reinforcement damaged during removing concrete.

ITEM 523 DYNAMIC LOAD TEST

523.02 Materials.

On page 409, **Replace** the first and second paragraph with the following:

Perform dynamic tests on a minimum of two piles. Perform signal matching analysis of the dynamic test data on at least one of the two test piles. Perform the test according to ASTM D 4945 to determine driving requirements to achieve the required ultimate bearing values for the piles to be installed in the structure.

Perform restrike tests after piles have been driven and a minimum time specified in the plans has elapsed. When performing a restrike, warm the hammer before restriking the pile by applying at least 20 blows to another pile. Each restrike consists of performing dynamic testing on two piles and performing a signal matching analysis on one of the two piles tested.

523.03 Equipment.

On page 409, **Change** the second sentence in the paragraph to:

Supply personnel with an Advanced Master, or Expert Level Certification in High Strain Dynamic Pile Testing (HSDPT) from either Foundation QA or the Pile Driving Contractors Association (PDCA) to operate this equipment.

523.04 Method of Measurement.

On page 410, **Replace** the section with the following:

Perform the dynamic test and signal matching analysis and immediately provide the Engineer driving criteria for any piles to be driven within the next 48 hours. Within 48 hours after performing the dynamic pile test or restrike tests, supply the Engineer with a written report confirming driving requirements for piles represented by the test. Include in the report, the required blow count for:

A. The different strokes of the ram at 6-inch (150 mm) intervals within the expected range of operation as determined by a wave equation analysis, when open ended diesel hammers and drop hammers are used.

B. The selected bounce pressures when closed end diesel hammers are used.

C. The operating air pressure and stroke when an air operated hammer is used.

D. The selected output energy or stroke when a hydraulic hammer is used.

Also include in the report a minimum depth of penetration if applicable.

Submit an electronic version of the report and data files from the testing and analysis to the Office of Structural Engineering.

ITEM 526 APPROACH SLABS

On page 419, **Make** the following changes:

526.04 Placing and Sampling Concrete. Immediately before placing concrete according to Item 511.10, thoroughly moisten the subgrade or subbase with water in the amount and manner directed by the Engineer. The Engineer will make at least one set of test cylinders for each 50 cubic yards (35 cubic meters) of concrete.

602.03.E

On page 428, **Replace** the first sentence in 602.03.E with the following:

E. Pre-cast structures for slab footers, cut off walls, wingwalls, and headwalls for use with Items 706.05, 706.051, 706.52, and 706.053 must conform to the manufacturer's pre-approved design.

603.02,

On page 430, **Replace** the material requirement for joint wrap with the following:

Joint wrap.....ASTM C 877, Type III

On page 430, **Add** the following after "precast reinforced concrete arch sections":

Precast reinforced concrete round sections.....706.053

On page 433, under Type F conduits, Replace the material requirement for corrugated steel conduits with the following:

Corrugated steel conduits (steep slope conduit)..... 707.05, Type C or 707.07

603.02

On pages 431 and 432, under Type B conduits and Type C conduits, Delete the material requirements for "polyvinyl chloride plastic pipe (non-perforated) ... 707.41", and "polyvinyl chloride sanitary pipe ... 707.44", and **Add** the following after "polyvinyl chloride ABS composite pipe":

Polyvinyl chloride large-diameter solid wall pipe.....707.48

On page 432, under Type D conduits, **Delete** the material requirements for "polyvinyl chloride sanitary pipe ... 707.44", and **Add** the following after "polyvinyl chloride solid wall pipe":

Polyvinyl chloride large-diameter solid wall pipe.....707.48

On pages 432 and 433, under Type E conduits and Type F conduits, **Replace** the material requirements for "polyvinyl chloride plastic pipe (non-perforated) ... 707.41" with the following:

Smooth-wall polyvinyl chloride underdrain pipe
(non-perforated).....707.41

On page 433, under Type E conduits, **Delete** the material requirements for "polyvinyl chloride sanitary pipe ... 707.44", and **Add** the following after "polyvinyl chloride ABS composite pipe":

Polyvinyl chloride large-diameter solid wall pipe.....707.48

On page 433, under Type F conduits, **Replace** the material requirement for corrugated steel conduits with the following:

Corrugated steel conduits (steep slope conduit).....707.05, Type C or 707.07

603.03.A

On page 433, **Replace** 603.03.A with the following:

A. Long span structure includes all of the following material kinds: 706.05, 706.051, 706.052, 706.053, 707.15, and 707.25.

603.04.G

On page 434, **Replace** the first sentence of 603.04.G with the following:

If a 706.05 structure is specifically itemized or specified in the Contract, the Contractor may submit to the Department for approval a request to supply a 706.051 structure placed on precast slab bottom, a 706.052 structure placed on precast slab bottom, or a 706.053 structure placed on a precast slab bottom that is hydraulically equivalent and meets all cover requirements.

603.04.H

On page 435, **Replace** 603.04.H with the following:

H. If 706.051, 706.052 or 706.053 is specifically itemized or specified in the Contract, on footers, the Contractor may substitute each one for the other upon structure approval for hydraulics and cover. The manufacturer shall submit shop drawings and hydraulic calculations that are signed and sealed by a Registered Engineer for review and approval before manufacture. If 706.051, 706.052 or 706.053 is specifically itemized or specified in the Contract, on pedestal walls, the Contractor may substitute each one for the other upon structure approval for hydraulics, cover and pedestal wall design. 706.051, 706.052 and 706.053 require different pedestal wall designs.

603.04.I

On page 435, **Replace** 603.04.I with the following:

I. For 706.051, 706.052 and 706.053 provide shop drawings that are signed and sealed by a Registered Engineer. The manufacturer shall submit shop drawings to the Department for review and approval before manufacture..

603.06

On page 436, **Replace** the second paragraph of 603.06 with the following:

Use Type 1 bedding for 706.05, or 706.051, 706.052, and 706.053 on slab bottoms. Also use Type 1 bedding for 707.03, 707.15, and 707.25 on corrugated invert plates.

603.07

On page 437, **Replace** the third full paragraph on the page to the sixth paragraph with the following:

Set the 706.051 units on the concrete footing shown on the plans. Unless otherwise shown on the plans, provide a 3-inch (75 mm) deep keyway centered on the precast leg. The width of the keyway shall be 6 inches (150 mm) greater than the thickness of the precast leg. Place the units in a 1/2-inch (13 mm) bed of mortar. If proper line and grade of the structure cannot be maintained on the bed of mortar, set the units on 5 × 5-inch (125 × 125 mm) masonite or steel shims. Fill the entire keyway joint with mortar.

Set the 706.052 units on the concrete footing shown on the plans. Unless otherwise shown on the plans, provide a 3-inch (75 mm) deep keyway centered on the precast leg. The width of the keyway shall be 6 inches (150 mm) greater than the thickness of the precast leg. Place the units on 5 × 5-inch (125 × 125 mm) masonite or steel shims to provide a minimum 1/2-inch (13 mm) gap between the footing and bottom of the unit's bottom leg. Fill the entire keyway joint with mortar.

Set the 706.053 arches on the concrete footing shown on the plans. Unless otherwise shown on the plans, provide an 8-inch (200 mm) deep keyway for spans up to 24 feet (7.3 m) and a 10-inch (250 mm) deep keyway for all spans greater than 24 feet (7.3 m). Center the keyway on the precast arch base. The width of the keyway must be 8 inches (200 mm) greater than the thickness of the precast arch base. For non-vertical leg arches set on pedestal walls, a one-sided keyway is acceptable if the required pedestal wall design thickness is not sufficient for a full keyway. Place masonite or steel shims to provide a minimum of 1.5-inch (38 mm) gap between the footing and the bottom of the precast arch base. Fill the entire keyway joint with mortar. Provide 5000 psi (34.5 MPa) mortar. For arches that gain structural continuity by a cast-in-place closure at the project site, provide concrete with the same compressive strength as the precast arch.

If reinforced concrete pipe has elliptical reinforcing, the top and bottom of the pipe are clearly marked on the pipe. Handle and place reinforced concrete pipe with elliptical reinforcement and reinforced concrete horizontal elliptical pipe with single cage reinforcement with the reinforcement markings along a vertical plane as marked on the pipe. Handle and place reinforced concrete pipe with auxiliary supports (S-stirrups) with the centerline of the auxiliary support system (S-stirrups) in a vertical plane as marked on the pipe.

For 706.05, 706.051, 706.052, or 706.053 structures fill the lifting devices with mortar. Cover the exterior of the lifting devices with joint-wrap material if outside the limits of the membrane waterproofing. Use joint-wrap with a minimum width of 9 inches (225 mm). Use only lifting devices that do not require a hole through the structure.

603.08.B

On page 439, **Replace** the first sentence of 603.08.B with the following:

B. Filling Joints. After placing 706.05, 706.051, 706.052, or 706.053 in their final position with a maximum joint gap of 1 inch (25.4 mm), clean the joint gap or joint of all debris and perform the following:

603.08.B.2

On page 439, **Replace** 603.08.B.2 with the following:

2. For 706.051, fill the top keyway joint with 705.22. The side or leg joints shall also be filled with 705.22 for the keyway type joint or filled per 706.05 for a tongue and groove type joint. Clean the joint of all debris immediately before installing the joint filling material. Wet all surfaces of the keyway joint, but do not allow free standing water in the joint. Prepare, place, and cure the 705.22 according to the manufacturer's recommendations. Next cover the exterior joint with a 12-inch (300 mm) wide strip of joint wrap. Center the joint wrap on the joint. Use a continuous length of joint wrap sufficient to extend from the bottom of the vertical face on one side to the bottom vertical face on the other side. Apply membrane waterproofing to the precast sections after they are installed.

603.08.B.3

On page 439, **Replace** 603.08.B.3 with the following:

3. For 706.052 and 706.053, install a $7/8 \times 1\ 3/8$ -inch (24 × 34 mm) 706.14 joint filler along the outside joint chamfer. Use a continuous length of joint filler sufficient to extend from the bottom of the vertical face on one side to the bottom vertical face on the other side. Before installing the joint filler, prime the joint chamfer with a primer according to manufacturer's recommendations. For 706.052 and 706.053, cover all exterior joints with a 12-inch (300 mm) wide strip of joint wrap centered on the joint. Use a continuous length of joint wrap sufficient to extend from the bottom of the vertical face on one side of the structure to the bottom vertical face on the other side. Next, apply all waterproofing as shown on the plans. Apply membrane waterproofing to the precast sections after they are installed.

603.08.C

On page 439, **Replace** 603.08.C with the following:

C. Sealing Concrete Surfaces. For 706.05, 706.051, 706.052, or 706.053 apply an approved epoxy-urethane sealer per the plans to all top surfaces not covered by membrane waterproofing. Extend the sealer 1 foot (0.3 m) below the backfill on all sides of the culvert sections including the joint.

The Engineer and Contractor will visually inspect all conduit and joints before any backfill is placed. Rejoin, re-lay, or replace all conduit out of joint tolerance, alignment, settled, or damaged.

603.09

On pages 439 and 440, **Replace** 603.09 with the following:

603.09 Exterior Coatings and Membrane Waterproofing. If shown on the plans, externally apply membrane waterproofing to 706.05, 706.051, 706.052 or 706.053. Apply the membrane waterproofing to the top surface and extend it vertically down both sides of the structure. Clean the concrete surfaces when the membrane waterproofing does not adhere to the structure. Apply the membrane waterproofing to all surfaces that will be in contact with the backfill. Apply the waterproofing according to the appropriate requirements of Item 512.

Apply waterproofing to 707.03, 707.15, 707.23, and 707.25 conduits with less than eight feet (2.4 m) of cover by one of the following methods.

A. Coat the exterior of the conduit above the limits of the bedding and within the limits of backfill. Ensure that all plate seams and bolts are thoroughly sealed. The coating material and application shall conform to AASHTO M 243. Allow asphalt mastic material to dry 48 hours and tar base material to dry 28 hours before placing the conduit backfill. Rib stiffeners do not need to be coated.

B. Construct Buried Liner Waterproofing Membrane protection in the fill per the manufacturer's recommendations. The Buried Liner Waterproofing Membrane protection will be a seamless continuous sheet placed over the conduit and extend at least 10 feet (3.3 m) outside of the paved shoulder and for the width of the trench.

603.10.B

On page 440, **Replace** 603.10.B with the following:

B. Long Span.

1. For all long span structures except 706.053 in cut, place and compact structural backfill over the top of the section to a minimum depth 4 feet (1.2 m) or to the subgrade elevation whichever is less and for a width of 2 feet (0.6 m) on each side of the section. Use soil, granular embankment, or structural backfill to construct the adjacent embankment and for the remaining depth to the subgrade. Construct the adjacent material according to Item 203.

2. For all long span structures except 706.053 in fill, place and compact structural backfill over the top of the section to a minimum depth of 2 feet (0.6 m) or to the subgrade elevation whichever is less and for a width of 2 feet (0.6 m) on each side of the section. Use soil, granular embankment, or structural backfill to construct the adjacent embankment and for the remaining depth to the subgrade. Construct the adjacent material according to Item 203.

3. For 706.053 structures in cut or fill, place and compact structural backfill on both sides of the structure to the following minimum limits: vertically from the base up to a height of 75 percent of the rise; horizontally on each side of the structure to a sloping line that begins 2 feet (0.6 m) from the base of the structure and slopes up and away from the structure at a 1H:1V slope (45 degree angle). Use soil, granular embankment, or structural backfill to construct the adjacent embankment and for the remaining depth to the subgrade. Construct the adjacent material according to Item 203.

603.10.D,

On page 441, **Change** the measurement of 12 inches (300 mm) to 6 inches (150 mm) in 603.10.D.1 and 603.10.D.2.

603.15

On page 444, after the pay item for precast reinforced concrete arch sections, **Add** a pay item as follows:

603 Foot (Meter) Type ___ Precast Reinforced Concrete Round Sections,
___' (___ mm) Span x ___' (___ mm) Rise

604.06

On page 446, **Add** the following paragraph to the beginning of 604.06:

Furnish precast structures according to the contract documents. Extra openings or excessive diameter of openings are cause for rejection of the precast structure.

605.02.B

On page 449, **Replace** the last paragraph of 605.02.B with the following:

If the specified size of the underdrains a 6-inch (150 mm) shallow pipe underdrain or base pipe underdrain and the kind of pipe material is not specifically itemized, then the Contractor may use 4-inch (100 mm) 707.31 perforated corrugated polyethylene drainage tubing.

605.02,

On page 448, in 605.02.A and 605.02.B, **Replace** the material requirements for “polyvinyl chloride plastic pipe ... 707.41” with the following:

Smooth-wall polyvinyl chloride underdrain pipe707.41

608.02

On page 457 **Replace** the third line under the subsection heading with:

Concrete, Class C499 or Class RCA 499.10

609.02

On page 459 **Replace** the first line under the subsection heading with:

Concrete, Class C499 or Class RCA 499.10

614.03

On page 472, **Revise** the eighth paragraph to reads as follows:

Furnish warning signs in advance of channelizing devices such as barricades, drums, vertical panels, and cones.

Keep retroreflective materials clean and in good condition.

614.03

On page 472, **Add** the following paragraphs after the eighth paragraph of the section:

Equip all project motor vehicles with photo strobe lights, LED warning lights, or rotating beacons meeting Class 1 or Class 2 specifications for color and intensity as defined by the Society of Automotive Engineers (SAE).

Photo strobe lights, LED warning lights, or rotating beacons shall be horizontally visible from all directions (360 degrees) at a distance of 100 feet minimum. In order to ensure this visibility, the light shall in no way be obstructed from view by any signs or appurtenances on the vehicle.

Activate the photo strobe lights, LED warning lights, or rotating beacons and all hazard lights anytime the vehicle is entering, exiting or operating in a traveled lane at a speed less than the posted speed within the limits of the work zone or one mile of either end of the work zone.

In addition, equip all project motor vehicles and trailers having a gross vehicle weight rating of 10,000 pounds or greater, in single or combination, with conspicuity tape. Also, delineate all NCHRP 350 Category IV equipment (lighted arrows, changeable message signs, etc.) with conspicuity tape.

Conspicuity Tape: Use red and white, Type G, H, or J retroreflective sheeting that complies with 730.19, 730.192, and 730.193.

a. Apply one 2-inch wide (minimum) horizontal stripe of Type G, H, or J retroreflective sheeting to a minimum of 50 percent of the length of each side of the payload portion of the motor vehicle, rearward from the back of the cab, NCHRP 350 Category IV equipment and trailers. Space lengths of tape evenly over the length of the payload portion of the motor vehicle rearward from the back of the cab, NCHRP 350 Category IV equipment, and trailers. The centerline for each strip of retroreflective sheeting shall be between 15 inches and 60 inches above the road surface when measured with the vehicle empty or unladen, or as close as practicable to this area.

b. Outline the lower rear facing area of the motor vehicle, NCHRP 350 Category IV equipment, and trailers with 2-inch wide (minimum) horizontal stripe of Type G, H, or J retroreflective sheeting. Apply the lower horizontal markings extending the width of the motor vehicle, NCHRP 350 Category IV equipment, and trailer as close as practical to the edge of the motor vehicle, NCHRP 350 Category IV equipment, and trailer. The centerline for each strip of lower horizontal retroreflective sheeting shall be between 15 inches and 72 inches above the road surface when measured with the vehicle empty or unladen, or as close as practicable to this area.

c. Outline the upper rear facing area with two pairs of strips of 2-inch wide (minimum) retroreflective Type G, H, or J sheeting, each pair consisting of strips 12 inches long, must be positioned horizontally and vertically on the right and left upper corners of the rear of the body of each motor vehicle or trailer, as close as practicable to the top of the motor vehicle or trailer and as far apart as practicable. If the perimeter of the body, as viewed from the rear, is not square or rectangular, the strips may be applied along the perimeter, as close as practicable to the uppermost and outermost areas of the rear of the motor vehicle or trailer on the left and right sides.

Escort transport or delivery vehicles without proper photo strobe lights, LED warning lights, or rotating beacons or conspicuity tape to and from the work zone only with the approval of the Engineer. This exception is intended for limited use at the discretion of the Engineer and will only be considered

following a written request by the contractor. Otherwise, equip all project vehicles with photo strobe lights, LED warning lights, or rotating beacons and conspicuity tape as described herein.

Equip all project vehicles with photo strobe lights, LED warning lights, or rotating beacons and conspicuity tape as set forth in this section no later than October 1, 2010.

Equip all project vehicles with photo strobe lights, LED warning lights, or rotating beacons meeting Class 1 specifications for color and intensity as defined by the Society of Automotive Engineers (SAE) no later than January 1, 2012.

614.07

On page 474, **Replace** the fourth paragraph with the following:

Whenever it is necessary to divert the flow of traffic from its normal channel into another channel, clearly mark the channel for such diverted traffic with cones, drums, barricades, vertical panels, pavement markings, or arrow boards. Also use this method of marking where working adjacent to the part of the highway in use by the public.

614.10

On page 474, **Add** the following after the first sentence in the paragraph;

“Furnish and install Uninterruptible Power Supplies (UPS) conforming to 733.09. “

614.15

On page 484, **Add** the following to the end of the second paragraph;
“Line quantities will be the length of the completed stripe, including gaps, intersections and other sections of pavement not normally marked. Work Zone Pavement Markings will include the layout, application and removal of the markings, when required.”

614.11.B

On page 475, **Add** “or Type 1A” in the first sentence of the second paragraph after “740.02 Type 1”.

614.11.F.1

On page 476, **Replace** the first paragraph with the following:

1. Class I Markings (Full Pattern, Full Rate). Use Class I Markings on all surfaces exposed to traffic for more than 14 days prior to application of final markings and to over-winter the project, with the following exception: Do not use Class I Markings on a surface course if thermoplastic, spray thermoplastic or epoxy final markings are to be applied to the surface course. If thermoplastic, spray thermoplastic or epoxy final markings are to be applied to the surface course, use Class III Markings on that course.

614.11.F.3

On page 477, **Replace** the first paragraph with the following:

3. Class III Markings (Full Pattern, Low Rate). Use Class III Markings on surface courses that are expected to receive thermoplastic, spray thermoplastic or epoxy final markings within 30 days. Class III Markings use a lower application rate which reduces the surface preparation needed prior to application of thermoplastic, spray thermoplastic or epoxy final markings. If Class III Markings have been applied and weather conditions are expected to prevent thermoplastic, spray thermoplastic or epoxy final markings application for 30 days or more, re-apply Class III Markings if thermoplastic, spray thermoplastic or epoxy final markings application is expected to occur within 30 days or apply Class I Markings as necessary to carry the project through the season or over the winter.

614.11.G.1.a

On page 477, **Replace** the entire section with the following:

“Removal Methods. Remove the markings so that less than 5% of the line remains visible. Repair damage to the pavement that results in the removal of more than 1/8 inch of pavement thickness. Use sand, shot, or water blasting to remove markings on all asphalt or concrete pavement surfaces. Use only sand, shot, or water blasting for removal of all pavement markings in preparation for placing Item 422 Chip Seal or Item 421 Microsurfacing. A grinder may only be used to remove markings on temporary pavement or pavement that will be covered or removed prior to project completion (e.g., intermediate asphalt course). When a grinder drum is mounted to a skid steer loader, the drum must be able to accommodate a minimum of 150 teeth.”

614.11.H.1

On page 478, **Replace** the first paragraph with the following:

1. No Passing Zones. When existing permanent no-passing-zone markings are removed or obliterated as the result of a construction operation (pavement grinding, asphalt concrete pavement overlays, etc.) and the section of pavement continues to be used by the traveling public, place Class I Center Line Markings or final center line markings as specified by the plan within 3 Calendar Days unless thermoplastic, spray thermoplastic or epoxy final markings are to be applied on the surface course. If thermoplastic, spray thermoplastic or epoxy final markings are to be applied on the surface course, place Class III Center Line Markings or final center line markings as specified in the plan within 3 Calendar Days.

614.11.H.2

On page 479, **Replace** the section with the following:

2. Passing Zones. Sections of pavement where passing is permitted in both directions must be marked with Class I Center Line Markings or final center line markings as specified by the plan within 14 Calendar Days unless thermoplastic, spray thermoplastic or epoxy final markings are to be applied on the surface course. If thermoplastic, spray thermoplastic or epoxy final markings are to be applied on the surface course, place Class III Center Line Markings or final center line markings as specified in the plan within 14 Calendar Days.

614.11.H.3

On page 479, **Replace** the first paragraph with the following:

3. Allowable Duration of Class II Lane Lines and Gore Markings and Absence of Edge lines. Any time existing permanent lane lines, gore markings, or edge lines have been removed or obliterated as the result of a construction operation (pavement grinding, asphalt pavement overlays, pavement widening, etc.) and the section of pavement continues to be used by the traveling public, place Class I Markings or final markings as specified by the plan within 14 Calendar Days unless thermoplastic, spray thermoplastic or epoxy final markings are to be applied on the surface course. If thermoplastic, spray thermoplastic or epoxy final markings are to be applied on the surface course, place Class III Markings or final markings as specified in the plan within 14 Calendar Days.

614.115A

On page 480, **Replace** the first paragraph with the following:
“Furnish materials according to the Department’s Approved List.”

614.16

On page 484, **Replace** the words “Flashing arrow panels” with “Arrow boards”.

615.01

On page 486, **Replace** entire section with the following:

615.01 Description. This work consists of providing, maintaining, and subsequently removing roads and appurtenances, and pavements for maintaining traffic.

615.05

On Page 487, Paragraph 8

Delete the last sentence and replace with the following paragraph:

Use a PG 64-22 asphalt binder for temporary asphalt pavement. If any part of the temporary pavement will be incorporated into the project permanently, then use the contract-specified PG asphalt binder grade for the pavement course.

615.10

On page 488, **Replace** entire section with the following:

615.10 Basis of Payment. Payment for Roads for Maintaining Traffic will not include those specified for Item 410 Traffic Compacted Surface or Item 616 Calcium Chloride.

Payment for Roads for Maintaining Traffic includes the installation, maintenance, and removal of all fencing, earthwork, guardrail, sidewalk, and all other items as necessary to provide a complete, functional, and safe installation for public use. The Department will pay for areas requiring undercut and replacement conforming to 204.04 according to 204.09.

The Department will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
615	Square Yard	Pavement for Maintaining Traffic, Class A

	(Square Meter)	
615	Square Yard (Square Meter)	Pavement for Maintaining Traffic, Class B
615	Lump Sum	Roads for Maintaining Traffic

617.05,

On page 490, **Replace** the second paragraph in 617.05 with the following:

Where the shoulder is relatively level, compact the material using crawler-type tractors, tamping rollers, trench rollers, suitable pneumatic tire rollers, or other suitable equipment. Use a minimum of four passes with compaction equipment weighing at least 6 tons (5 metric tons). Perform the final compaction of the surface of the shoulder using a pneumatic tire roller. Where it would be unsafe to use the above compaction equipment due to the grade or width of the shoulder, use a side-mounted roller or side-mounted vibrating plate compactor that is securely attached to a tractor or other construction equipment. The side-mounted roller or side-mounted vibrating plate compactor must be able to adequately compact the aggregate while the equipment to which it is mounted remains on the paved surface. Use a minimum of four passes with the side-mounted roller and two passes with the side-mounted vibrating plate compactor. Compact the aggregate immediately after the spreading operation to prevent the loss of contained moisture and displacement of the material.

620.01

On Page 494, **Delete** the words “or reflectors” from the first sentence.

620.01

On page 494, **Delete** the following from the first sentence in the paragraph:

“storage or “

620.02

On page 494, **Replace** the section with the following:

620.02 Materials. Furnish materials conforming to:

Reflectors	720.01
Posts, flexible	720.03
Steel hardware	730.08
Brackets	730.09
Stainless steel hardware	730.10
Aluminum hardware.....	730.17
Reflective sheeting	730.192, 730.193

Delineators consist of reflectors mounted on flexible posts or brackets. Reflectors are reflective sheeting adhered to either a flexible post or an aluminum plate. The colors of reflectors of each type are:

Type C White
Type D Yellow
Type E Red

620.02

On page 494, **Add** the following sentence to the end of the section:

Delineator reflector and flexible post color shall match that of the nearest edge line.

620.06

On Page 495, **Delete** the second sentence in the section.

620.07

On Page 495, **Replace** the section with the following:

The Department will pay for accepted quantities at the contract prices as follows:

Item	Unit	Description
620	Each	Delineator
620	Each	Removal of Delineator

621.02

On page 496, **Replace** the entire section with the following:

621.02 Materials. Furnish materials conforming to :

Castings.....	721.01
Prismatic Retroreflectors and Adhesive	721.02
Casting adhesive	721.03

626.02

On page 518, **Replace** the first sentence in the first paragraph with;
“Furnish materials conforming to”

621.05

On page 498, **Delete** the following from the third paragraph;
“an ODOT approved”

622.02

On page 499, **Replace** the first line of the paragraph with the following

622.02 Materials. Furnish materials conforming to:

Concrete, Class C 499 or Class RCA 499.10

626.02

On Page 518, **Replace** the second paragraph with the following:

Barrier Reflectors.....726.01

626.02

On page 518, **Replace** the first sentence in the first paragraph with; “Furnish materials conforming to”

630.04

On page 524 in Figure 1 Alternate design, **Replace** “08 09 10 11 12” with “10 11 12 13 14”.

630.06.B

On page 526, **Delete** the second sentence of the first paragraph. “Furnish supports that include brackets for attaching disconnect switch, and pipe couplings for sign wiring.”

630.06.B

On page 526, **Delete** the last sentence of the third paragraph. “Furnish luminaire support assemblies for lighted signs.”

630.14

On page 530, in the tenth paragraph **Delete** "luminaire support assemblies when required,".

630.14

On page 530, in the eleventh paragraph **Delete** "luminaire support assemblies when required,".

631.03

On page 533, in the materials list **Delete** "Mercury vapor".

631.06

On page 535, **Add** “screened” before “1/4 inch” in the third sentence of the second paragraph.

631.09

On page 535, **Replace** the fourth paragraph with the following: Furnish school speed limit sign assemblies that conform to the Contract Documents. School speed limit sign assemblies consist of a reflectorized SCHOOL (S4-3P) plaque, SPEED LIMIT 20 (R2-1) sign and DURING RESTRICTED HOURS (S4-H5P) plaque fitted with a pair of flashing beacons arranged above and below.

632.15

On page 543, **Add** the following paragraph at the end of the section:
Do not erect signal supports unless at least one signal, sign or damping device approved by the Engineer is installed within 24 hours.

632.16

On page 543, **Delete** the fourth paragraph at the end of the section:

632.225

On page 544, **Replace** the section with the following:

632.225 Tether Wire. Arrange tether wire with accessories to stabilize signal heads and prevent excessive swinging and twisting. Install shim washers on hanger pin adjacent to wire entry to prevent any twisting of the head on the hanger. Accessories included with tether wire include anchor shackles, S-hooks yielding element, thimbles, turnbuckles, guy grips, wire rope clips, lock wire, safety tie wire, and signal head tether anchors and extenders.

Adjust the tether span to be horizontal on simple spans. On all spans, install tether horizontally and tighten with turnbuckles. Bull Rings will be used at all internal corners of the tether span. Safety ties shall be installed at all yielding (S-hook) locations to prevent the span end from dropping into the roadway if the S-hook opens. No electrical or communication cables of any kind shall be attached to the tether wire. No signs or other devices shall be suspended from or attached to the tether wire.

632.225

On page 544, in the second sentence of the first paragraph, add the words “pole clamps” before anchor shackles.

632.29

On page 548, in the first sentence of the fourth paragraph, add the words “pole clamps” before anchor shackles.

632.23

On Page 544, **Replace** the fourth paragraph with the following:

Install signal cable between signal heads and controller cabinets. Signal cables shall not be stripped beyond a length necessary to attach individual conductors within the signal head . The jacket shall extend into the signal head enclosure. Install interconnect cable between controller cabinets of different intersections. Route signal and interconnect cable by aerial installation supported by messenger wire or within underground conduit. If specified, use aerial self-supporting integral messenger type interconnect cable with a figure “8” cross-section and include pole clamps and splice enclosures. Ground the supporting messenger wire of interconnect cable.

632.30

On page 550, **Delete** “(LED)” from the bid item descriptions for Vehicular Signal Head and Pedestrian Signal Head.

641.03

On page 573, **Replace** the fourth paragraph with the following:

Ensure that lines are sharp, well defined, and uniformly retroreflective. Apply the lines to the width specified $\pm 1/4$ inch (6 mm). Fuzzy lines, excessive overspray, or non-uniform application are unacceptable. The Engineer will inspect lines at night to verify proper retroreflectivity. Correct pavement markings that are improperly applied, located, or reflectorized. Reapply lines applied with insufficient material quantities according to 641.11, 644.04 or 817.05. Remove improperly located lines according to 641.10, and apply new lines in the correct locations.

641.08

On page 575, **Replace** the first paragraph with the following:

Apply marking materials at the rate or thickness specified in 642.04, 643.04, 644.04, 645.03, 646.05, 647.04, or 817.05 and, except for parking lot stall markings, ensure that they are uniformly retroreflective. However, ensure that portions of parking stalls that are adjacent to street traffic are retroreflective. Pavement markings consist of the following types:

641.08

On page 576, **Replace** the last paragraph with the following:

The term long lines, when used in sections 642 through 647 and 817 includes edge lines, lane lines, center lines, and channelizing lines over 200 feet (60 m) long. The term auxiliary markings, when used in Items 642 through 647 includes channelizing lines 200 feet (60 m) or shorter, stop lines, crosswalk lines, transverse lines, diagonal lines, curb markings, island markings, symbol markings, parking lot stall markings, lane arrows, and dotted lines.

641.13

On page 577, **Replace** the first sentence with the following:

The Department will pay for accepted quantities of work performed under Items 642, 643, 644, 645, 646, 647 and 817.

671.03.A

On page 626, **Delete** references to Type D erosion control mat.

671.03.C

On page 627, **Delete** 671.03.C, Type H.

700.00

On page 630, **Add** a section for **499**:

499	Various Concrete Items	A sample for concrete strength testing consists of a set of three 4" x 8" cylinders when the maximum nominal aggregate is 1 inch or less. For concrete with maximum nominal aggregate sizes greater than 1 inch, a sample consists of a set of two 6" x 12" cylinders.	Within 24 to 48 hours after sampling, ship cylinders to Laboratory with required documentation.
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On page 630, **Make** the following changes to **511**:

511	Concrete for Structures	Make one set of cylinders for spans over 20 ft each day, each 200 yd ³ . For spans 20 ft span and under, make one set of cylinders each 50 yd ³ or less. Document in CMS. Field or Standard Cure according to ACI/ODOT specifications.	Within 24 to 48 hours after sampling, ship cylinders to Laboratory with required documentation.
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On page 631, **Make** the following changes to **526**:

526	Approach Slabs	Make one set of cylinders for each day, each 200 yd ³ . Document in CMS. Field or Standard Cure according to ACI/ODOT specifications.	Within 24 to 48 hours after sampling, ship cylinders to Laboratory with required documentation.
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700 Minimum Requirements for Sampling Materials

On page 633 replace existing rows 1, 2, and 3 with the following:

Spec No.	Material	Material only Inspection or Sampling Requirements	Post Inspection Instructions
702.02 702.03 702.04 702.07 702.13	Cut Back Asphalt Cut Back Asphalt Emulsions Emulsified Asphalts Asphalt Emulsion MWS SBR Asphalt Emulsion	Certified material: At the refinery or source as directed by the Lab. Project and/ or Plant: One sample per each 25,000 gallons. None for less than 300 gallons. Non-certified material: Will be sampled and approved by the Department before use.	Certified material: Submit to Lab. Non-certified material: Submit to Lab. Do not use until approved by Lab.
702.05 702.06	Asphalt Primer Waterproofing Asphalt Waterproofing	Verify type and brand name of material is on QPL at the time of use. Document in CMS (Trns.port SiteManager™)	If rejecting material because material non-performs or looks defective during use, notify District Testing and OMM Asphalt Cement Section.

ITEM 700 MATERIAL DETAILS

700 MINIMUM REQUIREMENTS FOR SAMPLING MATERIALS

On page 637, **Add** the following to the table:

Spec. No.	Material	Material only Inspection or Sampling Requirements	Post Inspection Instructions
705.13	Neoprene Sheeting	Verify type and brand name of material is on QPL at time of use. Inspect for condition and appearance. Document in CMS (Trns.port Site Manager™)	Notify District Testing and OMM, structural welding and metals section, if rejecting material because material non-performs or looks defective during use.

700 Materials Details, Minimum Requirements for Sampling Materials.

On page 633 replace row 702.16 with the following row:

702.16	Polymer Emulsified Binder	Type A: Certified Material. At the refinery or source as directed by the Lab. Project and/ or Plant Sample per 422.10. Non-certified material: Will be sampled and approved by the Department before use. Type B: Certified test data	Type A: Certified material: Submit to Lab. Non-certified material: Submit to Lab. Do not use until approved by Lab.
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702.01 Asphalt Binders.

On page 659 replace the 1st and 4th paragraphs of this section with the following paragraphs respectively:

General. According to AASHTO M 320-05AASHTO M 320-10 Table 1 except as follows.

Materials and Manufacture. Replace the requirements of AASHTO M 320-05AASHTO M 320-10 Table 1 Section 5 “Materials and Manufacture” Section with the following:

702.01 Asphalt Binders.

On page 660 replace Item 5.7 of this section with the following:

5.7 Ensure that PG 64-22 has a Penetration (ASTM D5AASHTO T 49) of no more than 75.

702.05

On page 662, **Replace** section 702.05 Asphalt Primer for Waterproofing with the following:

702.05 Asphalt Primer for Waterproofing. Provide asphalt primer for waterproofing according to ASTM D 41.

Furnish materials according to the Department’s Qualified Products List (QPL).

702.05 Asphalt Primer for Waterproofing.

Replace the 1st paragraph of this section with the following:

Provide asphalt primer for waterproofing according to ASTM D 41 Type 1.

702.06

On page 663, **Replace** section 702.06 Asphalt for Waterproofing with the following:

702.06 Asphalt for Waterproofing. Provide asphalt for waterproofing according to ASTM D 312, Type III.

Furnish materials according to the Department's Qualified Products List (QPL).

702.13

On page 663 and 664, **Replace** section 702.13 Rubberized Asphalt Emulsion with the following 702.13 SBR Asphalt Emulsion.

702.13 SBR Asphalt Emulsion. Provide material consisting of asphalt emulsion SS-1, SS-1h, CSS-1 or CSS-1h per 702.04 and Supplement 1032, blended with SBR emulsion per 702.14, to produce a residual mixture of asphalt binder and SBR solids having a composition of 97.0 ± 0.3 percent asphalt binder and 3.0 ± 0.3 percent SBR solids by weight.

Furnish a certification to the Engineer and signed by the contractor containing the following:

- A. The weight of SBR emulsion blended with the asphalt emulsion.
- B. The weight of asphalt emulsion blended with the SBR emulsion.
- C. The SBR emulsion manufacturer certification per 702.14.
- D. The percent of asphalt binder in the asphalt emulsion (residue by distillation).
- E. The percent of SBR solids in the SBR emulsion.
- F. The percent of SBR solids in the mixture of asphalt binder residue and SBR solids.
- G. Name of Certified asphalt emulsion producer and asphalt emulsion.

Determine the weight of the SBR emulsion to be added to a designated weight of asphalt emulsion to provide the percent of SBR solids in the mixture of asphalt residue and SBR solids using the following formula:

$$X = \frac{0.0309(B)(W)}{(A)}$$

where:

- X = pounds (kilograms) of SBR emulsion
- A = percent SBR solids in the SBR emulsion
- B = percent of asphalt residue of the asphalt emulsion
- W = pounds (kilograms) of the asphalt emulsion

For field blending, ensure the asphalt emulsion and SBR emulsion are thoroughly mixed as follows before application: Add to the distributor the asphalt emulsion and the required amount of the SBR

emulsion of the appropriate SBR emulsion type (i.e. cationic or anionic). Heat and circulate the distributor contents for at least 30 minutes to ensure complete blending. Re-circulate the distributor contents for 10 minutes just prior to application. If the distributor has set for 12 hours without circulation, repeat the heating and circulating of the distributor contents for 30 minutes prior to application.

Draw samples of the mixed SBR and asphalt emulsion after mixing the materials as indicated above.

702.14

On page 664, **Replace** 702.14 Rubber Compound with the following 702.14 SBR Emulsion:

702.14 SBR Emulsion. Ensure the SBR emulsion is a cold polymerized Styrene Butadiene synthetic rubber (SBR) in latex form specifically compounded for use in asphalt binders and asphalt emulsions. Ensure the manufacturer of the SBR emulsion furnishes a written certification of the total SBR solids content of the SBR emulsion and actual test results showing compliance with both of the following requirements:

On page 664, **Replace** 702.14 A SBR Emulsion with following:

A. SBR Emulsion:

Type of SBR Emulsion:	Anionic	Cationic
SBR solids Styrene Butadiene Ratio	27±5 : 73±5	27±5 : 73±5
Total SBR solids, % by weight	60-72	60-72
SBR solids Residual Styrene, % by weight	0.1 max	0.1 max
Ash, % of total SBR solids by weight	3.5 max	3.5 max
pH	9-11	4-6

702.14 B.

Replace 702.14 B. with the following:

B. Combination of 3.0 – 4.0 % SBR solids with 96.0 – 97.0 % PG 64-22 meeting 702.01 by weight:

- Toughness inch-pounds (N×m), Minimum..... 133 (15)
- Tenacity, inch-pounds (N×m), Minimum.....80 (9)

702.16 Polymer Emulsified Binder. Replace the table and table notes in this section with the following:

702.16 POLYMER EMULSIFIED BINDER

Emulsion (AASHTO T 59)	Type A (b)	Type B (b,c,g)
Saybolt Furol Viscosity	100-550 (50 °C)	20-100 (25 °C)
Storage stability, 24 hrs., % difference, max (a)	1	1
Demulsibility, 35 ml of 0.8% Dioctyl Sodium Sulf., min	50	60
Demulsibility, 35 ml of 0.02N, CaCl ₂ , %, min		60
Sieve test, (distilled water), %, max	0.1	0.05
Distillation to 190 °C, residue % solids (d)	68	63
Oil distillate, %, max	2	2
Distillation Residue		
Penetration, 100g, 5 sec @77 °F(25°C) AASHTO T 49	70-100	90-150
Softening point, ° C, min AASHTO T 53	60	
Solubility in TCE, %, min ASTM D 2042 or D 5546	97.5	97.5
Elastic Recovery, 50 °F (10° C), %, min AASHTO T 301, (e),(g)	70	58
Toughness/Tenacity, 77 °F (25° C), 50 cm/min, Nm ASTM D 5801 (f)	report 16.0/ 9.0	
Ductility, 39 °F (4° C),1cm/min, min AASHTO T 51, (f)	70	

Notes:

- (a) After standing undisturbed for 24 hours, the surface will show no white, milky colored substance, but will be a smooth homogeneous color throughout.
- (b) CRS-2P, test within 20 days of project sampling. Limits for both certified source and project samples.
- (c) HFRS-2P, test within 20 days of project sampling.
- (d) See Supplement 1013.
- (e) Straight molds. Hold at test temperature for 90 minutes. Place in ductilometer and elongate 10 cm at 5 cm/min. Hold for 5 minutes and cut. After 1 hour retract the broken ends to touch and note elongation in cm (X). Percent Recovery = $((10-X)/10) \times 100$.
- (f) SBR
- (g) SBS, SB

703.01

On page 668, **Add** the following text:

Pre-qualified Aggregate Supplier Program (Supplement 1069). Provide aggregate materials to the Ohio Department of Transportation from pre-qualified suppliers. The aggregate materials covered by the pre-qualified aggregate supplier program are those referenced to in the 703 section of the Construction and Material Specifications (CM&S).

703.02 Aggregate for Portland Cement Concrete, B. Coarse Aggregate.

On page 673, add the following after the last table in Item 2:

Additional requirement for ACBFS aggregate:

Sulfur as S, Max. (ASTM C114)	2.0%
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703.14

On page 680, **Replace** 703.14 with the following:

703.14 Non Pavement Open-Hearth, Electric Arc Furnace, and Basic Oxygen

Furnace Steel Slag Aggregate Use. Provide steel slag according to the following requirements.

1. Non-confined Applications. When using OH, EAF, and BOF slag in applications

where the steel slag will not be confined, ensure that the slag meets the requirements in 703.14.A (deleterious substances and crushing), and in 703.14.B (aging and stockpiling requirements).

Recycled steel slag from Department or non-Department projects may be used in applications where the recycled steel slag will not be confined.

2. Confined Applications. When using OH, EAF, and BOF slag in applications where

the steel slag will be confined, ensure the steel slag meets all requirements of 703.14. The use of recycled steel slag from Department or non-Department projects is not allowed in confined applications.

A. Deleterious Substances (soft pieces). Deleterious substances include soft lime, lime oxide, or magnesia agglomerations or any foreign materials prone to rapid disintegration under construction processing and weathering conditions.

Furnish steel slag with less than 3 percent deleterious substances (soft pieces) by weight.

The Department will use Supplement 1029 (hand crushing of soft pieces) to determine the soft pieces. Crushing of steel slag is not allowed.

B. Aging and Stockpiling Requirements. Stockpile and age all steel slag as follows:

1. Grade and stockpile the material into maximum size piles of 25,000 ton (23,000 metric tons). Before and during the stockpiling operation, add water to these materials to provide a uniform moisture content not less than their absorbed moisture. Ensure that the stockpile is maintained in a moist condition during the required stockpiling period.
2. Ensure that the producer mixes the stockpile when the outside surface of the pile has crusted over. The Department will inspect the stockpile every 2 months to ensure no crusting occurs. Do not mix frozen stockpile material. Suspend the aging period when the stockpile is frozen for more than one month.
3. Ensure that this aging period is at least 6 months in duration and starts over if any new material is added to the pile during the aging period.

C. Identification of Steel Slag. Clear, definitive, and undisputable identification of the proposed material being steel slag is required.

The producer will show the Department evidence that the material supplied is steel slag.

This information will consist of, but is not limited to, the following:

1. Steel producer.
2. Production dates.
3. Production rates.
4. Stockpiling dates.
5. Type of steel furnace(s).
6. All known Department and non-Department projects where the material was previously used.

This identification of steel slag and the source may be supplemented by other information approved by the Department or by using 10 years of good performance data. Ensure that the producer submits to the Department projects where the steel slag has been used without expansion or tufa problems. The Department will review the above projects as part of the identification approval process.

D. Tufa Performance Verification of Steel Slag. Tufa is a precipitate form of calcium carbonate that can clog up the underdrain systems. Some steel slag sources clog up underdrain

systems and some do not. Tufa performance verification is based on field performance and Department's inspection of the underdrain systems.

Tufa performance verification is required.

Ensure that the producer submits past projects that are at least 10 years old that used the proposed steel slag source to the Department. The Department may consider projects that are less than 10 years old for tufa performance verification if it can be determined by the Department that the age of the steel slag incorporated in the project was 10 years old or greater. Ensure the producer supplies the Department with construction plans with the underdrains and underdrain outlets marked on the plans, or other suitable method, approved by the Department, showing the underdrain system. Ensure the producer marks the underdrain outlets in the field for inspection. The Department will inspect the underdrain systems for tufa deposits. If tufa deposits are found in the outlets or in the underdrain system, the Department will reject the steel slag source.

E. Expansion Testing of Steel Slag. After the aging and stockpiling requirements are met, expansion testing is required for steel slag.

Perform expansion testing according to Pennsylvania Department of Transportation PTM No. 130, the ODOT equivalent to this test or expansion testing acceptable to the Department.

Ensure that the producer hires an independent AASHTO accredited and Department approved laboratory to perform at least half of the expansion testing. At the producer's option, up to half of the required expansion testing may be performed by the producer's laboratory. The Laboratory will observe the expansion testing and approve each independent and producer laboratory.

Perform expansion testing for every 2500 tons (2300 metric tons) or fraction thereof of the material stockpiled in accordance with 703.14.B. For steel slag less than 10 years old, retain a split portion of the expansion sample. Reduce the split sample to 5 lbs (2500 g) and test for total percent MgO by X-Ray florescence and total percent periclase (hard burned MgO) by X-Ray diffraction.

The maximum allowable total expansion for each test is less than 0.50 percent. If any one test fails in the stockpile, the Department will reject the entire stockpile.

When sampling for expansion, ensure that the producer notifies the Department at least 48 hours before the sampling. The Department will verify that the sample came from the correct stockpile and take independent split samples, if required.

Submit the expansion test data and a suitably presented summary of the expansion test data to the Department for approval. Submit X-Ray florescence and X-Ray diffraction data to the Department. The Department reserves the right to perform independent testing to verify the laboratory results at any time.

The Department expansion test data takes precedence over the producer or independent laboratory expansion testing results in the event of a conflict. The Department will make the final determination on all conflicting data.

If the material fails the expansion testing, then stockpile the material for a minimum of 2 additional months from the date of last sampling and retest for expansion. Only materials that pass the expansion test are approved for use.

703.16

On pages 682 and 683, **Replace** the paragraph that begins “Furnish OH, EAF, and BOF slag ...” and the paragraphs numbered 1 and 2 that follow with the following text:

Furnish steel slag according to 703.14.

When using steel slag, RPCC, or RACP, completely blend it with at least 30 percent natural soil or natural granular material.

703.17

On pages 684 and 685, **Replace** the words “OH slag” with “steel slag” in 703.17 (six replacements).

ITEM 705 CONCRETE INCIDENTALS.

On page 691, **Add** the following:

705.13 Neoprene sheeting. Provide material conforming to the following:

Test Description	Specification	Requirement
Thickness (Inches)	ASTM D751	0.094 +/- 0.01
Breaking Strength, Grab (lbs.)	ASTM D751	700 x 700 (Long. X Trans.)
Adhesive Strip, 1” wide x 2” long (lbs.)	ASTM D751	9

Burst Strength (psi)	ASTM D751	1400
Heat Aging, 70 hr., 212°F, 180° bend without cracking	ASTM D2136	No cracking of coating
Low temperature brittleness, 1 hr., -40°F, bend around ¼” mandrel	ASTM D2136	No cracking of coating

Furnish material according to the Department’s Qualified Products List (QPL).

706.051

On page 715, **Delete** list item 1, that begins “All structural design according to section 900 ...” and renumber the remaining list items from 2 through 10, to 1 through 9.

On page 716, **Replace** item 7.1 with the following:

7.1 Design according to *AASHTO LRFD Bridge Design Specifications*, Section 12.14. Include a future wearing surface loading of 60 psf.

706.052

On page 719, **Delete** list item 1, that begins “All structural design according to section 900 ...” and renumber the remaining list items from 2 through 10, to 1 through 9.

On page 719, **Replace** list item 2 that begins “For side mounted guardrail, ...” and replace it with the following:

2. The corrosion inhibitor being used, if any, and dosage rate. Dosage rate will be approved by the Laboratory.

706.052

On page 720, **Replace** item 7.1 with the following:

7.1 Design according to *AASHTO LRFD Bridge Design Specifications*, Section 12.14. Include a future wearing surface loading of 60 psf.

706.053

On page 723, **Add** section 706.053 after the end of 706.052 as follows:

706.053 Precast Reinforced Concrete Round Sections. Provide precast reinforced concrete elliptical and circular arch sections according to ASTM C 1504, with the following modifications:

This item shall consist of manufacturing precast reinforced concrete elliptical and circular arch sections for culverts.

Ensure that manufacturers of precast concrete members are certified according to Supplement 1073.

5. Ensure the manufacturer submits design calculations, a structural load rating and shop drawings for review and approval by the Department. Do not produce any units until receiving approval. Submit a minimum of five copies of the drawings. Allow a minimum of 4 weeks for approval. Ensure the shop drawings include the following:

1. Load rate the structure according to the requirements of section 900 of the Department's Bridge Design Manual.
2. All material specifications.
3. Plan view.
4. Elevation views.
5. Headwall and wingwall attachment requirements.
6. Dimensions.
7. All maintenance of traffic phases.
8. Section sizes.
9. Design handling strength.

The manufacturer may modify an approved shop drawing and resubmit for approval to the Department.

Ensure that the shop drawings also include the following special information as required:

1. For top mounted guardrail, the guardrail plate and bolt locations are shown in the plan view. Holes shall be a minimum of 6 inches (150 mm) from a joint.

2. The corrosion inhibitor being used, if any, and dosage rate. Dosage rate will be approved by the Laboratory.

6.2.1 In addition, provide cement according to 701, except 701.07.

6.2.2 Only use fly ash conforming to 701.13.

6.3 Provide aggregates conforming to the quality requirements of 703.02.

6.4 Use chemical admixtures conforming to 705.12. Use a corrosion inhibitor unless epoxy coated reinforcing steel is used. An approved list of corrosion inhibiting admixtures is on file at the Laboratory. Manufacturers should recognize that the corrosion inhibitors and admixtures may have an effect on strength, entrained air content, workability, etc. of their concrete mixes. The manufacturer's choice of one of these corrosion inhibitors does not alleviate meeting all design requirements of this structure.

6.4.1 Provide air-entraining admixture conforming to 705.10.

6.5 Provide epoxy coated reinforcement according to 709.00, Grade 60 (Grade 420), or 709.14. In lieu of epoxy coated reinforcement, an approved corrosion inhibiting admixture may be added to the concrete at the approved dosage; and provide reinforcement according to 709.01, 709.03 or 709.05; Grade 60 (Grade 420) or 709.08, 709.10, 709.11 or 709.12. Provide epoxy or galvanized coated

connections when connecting a precast structural unit into a cast-in-place structural component or between segments of adjacent precast structural units either manufactured as separate units or across construction joints when manufactured as one unit. Provide epoxy coated reinforcement according to 709.00 or 709.14, when these connections are designed using reinforcing steel. Provide galvanized coatings according to 711.02, when these connections are designed using connection plates, hardware or concrete inserts.

7.1 Modify the first sentence as follows: Design according to *AASHTO LRFD Bridge Design Specifications*, Section 12.14. Include a future wearing surface loading of 60 psf.

7.2 Ensure that the concrete cover dimension over the outside circumferential reinforcement is a minimum of 2 inches (50 mm). Ensure that the concrete cover dimension over the inside circumferential reinforcement is a minimum of 1 1/2 inches (38 mm). The clear distance of the end circumferential wires shall not be less than 1 inch (25 mm) nor more than 2 inches (50 mm) from the ends of the sections. Reinforcement shall be assembled utilizing single or multiple layers of welded wire fabric (three-layer maximum), or utilizing a single layer of deformed billet-steel bars. The welded wire fabric shall be composed of circumferential and longitudinal wires and shall contain sufficient longitudinal wires extending through the section to maintain the shape and position of reinforcement. Longitudinal distribution reinforcement may be welded wire fabric or deformed billet-steel bars. The ends of the longitudinal distribution reinforcement shall be not more than 3 inches (75 mm) from the ends of the sections.

Form the outside and inside circumferential reinforcing steel for the arch such that it is approximately equal to the configuration of the arch shape.

7.3 In addition, tension splices in the circumferential reinforcement shall not be made. For splices other than tension splices, the overlap shall be a minimum of 12 inches (300 mm) for welded wire fabric or deformed billet steel bars. The spacing center-to-center of the circumferential wires in a wire fabric sheet shall be not less than 2 inches (50 mm) or more than 4 inches (100 mm). For the wire fabric, the spacing center-to-center of the longitudinal wire shall not be more than 8 inches (200 mm). The spacing center-to-center of the longitudinal distribution steel for either line of reinforcing in the top slab shall be not more than 16 inches (410 mm).

8.1 Ensure the sections are produced with butt ends. The ends of the sections shall be such that when the sections are laid together they will make a continuous line of sections with a smooth interior free of appreciable irregularities, all compatible with the permissible variations in these Specifications and section 11 of ASTM C 1504. Provide a 3/4 × 3/4 inch (19 × 19 mm) minimum chamfer on the inside and outside surface at the sections joint.

Ensure that the design of the arch in its final constructed location is structurally continuous throughout the arch unit providing for flexural, compressive and shear force transfers. For arches that gain structural continuity by a cast in place closure at the project site, provide concrete with the same compressive strength as the precast arch. In addition, the cast in place closure shall provide continuity in the transverse direction (90 degrees to the span) along the lay length of the arches.

9.1 Ensure that the aggregate, cement, and water are manufactured according to 499.06, 499.07, and 499.09.

Ensure that the temperature requirements of 511.08 and 511.15 are met.

Ensure that the proportion of Portland cement is not less than 564 pounds per cubic yard (335 kg/m³) of concrete.

If used, add the corrosion inhibitor as an aqueous solution. Consider the water in the solution as mixing water for the purpose of determining the water-cement ratio of concrete.

9.2 Cure the arch sections in the forms for the length of time required to obtain the specified minimum design handling strength as defined in the shop drawings. Test a cylinder to check each section's design handling strength. Repeat this test as often as needed. Only one cylinder passing will ensure that the design handling strength has been met. If the shop drawing shows no design handling strengths, then the minimum handling strength is assumed to be 100 percent of the design strength. Ensure that the curing then continues either in or out of the forms until the specified minimum design strength is met.

9.2.1 Steam curing is an accelerated cure by low pressure steam or radiant heat within a suitable insulated enclosure to contain the live steam or heat. The initial application of the steam or heat is from 2 to 4 hours after the final placement of concrete to allow the initial set to take place. If retarders are used, increase the waiting period to 4 to 6 hours. As an alternative, determine the actual time of initial set according to ASTM C 403. Do not start curing until the actual time to initial set has elapsed.

During the waiting period, ensure that the temperature within the curing enclosure is not less than 50 °F (10 °C).

During the initial application of live steam or radiant heat, ensure that the ambient temperature within the curing enclosure increases at an average rate not exceeding 40 °F (22 °C) per hour until the curing temperature is reached.

Ensure that the maximum curing temperature does not exceed 150 °F (65 °C). Hold the design temperature until the concrete has reached the desired design strength. Do not direct the application of live steam on the concrete forms so as to cause localized high temperatures.

9.2.2 Provide water curing according to 511.15 and 511.17, Method A.

9.2.3 Delete.

9.3 Ensure that all forms are in place until the design handling strength is met.

Holes for handling or setting are not permitted. Do not move members before the design handling strength of the concrete is reached, or shipped before the design strength of the concrete is reached. Ensure that the manufacturers have equipment necessary to handle and transport the pieces without damaging them.

10 Ensure that the hardened concrete contains a minimum of 4 percent entrained air.

10.1 Cores drilled from the section are not permitted.

10.2.1 Keep the cylinders and matching arch section together to guarantee the cylinders are matched with the corresponding culvert section; or, upon agreement by the Department, keep the cylinders at a location that will provide the same environment as the arch sections.

10.2.2 For each section of the arch structure, produce and mark at least four cylinders so that they are identifiable with the matching arch section.

10.2.3 Conform to Supplement 1073 for acceptance.

10.2.3.1 Ensure that cylinder strengths conform to Supplement 1073.

11.0 The under-run in length of a section shall not be more than 1/2 inch (13 mm).

All changes to the project resulting from the manufacturer's dimensional changes in the structure are at no charge to the Department.

Ensure that the sections are free of fractures spalls and chips. Ensure that all surfaces have a smooth and regular finish being defined as a 1/4 inch variation within 4 feet (6 mm variation within 1.2 m).

11.1 The internal dimensions shall vary not more than 1 percent from the design dimensions or more than 1 1/2 inches (38 mm), whichever is less. The haunch dimensions shall vary not more than 3/4 inch (19 mm) from the design dimension.

11.4 Ensure that the maximum variation in the position of the reinforcement is 3/8 inch (9 mm), except that the cover over the reinforcement for the external surface of the top is not less than 2 inches (50 mm). The above tolerances or cover requirements do not apply to mating surfaces at the joint.

11.5 Resubmit any change in reinforcement from the shop drawings for approval.

11.6 All interior and exterior arch surfaces shall have a smooth steel form finish.

12.0 Make repairs according to the Department's requirements. The Department will not make additional payments for arch repairs. Repairs are acceptable if, in the opinion of the Department, the repairs are sound, properly finished, and cured.

13.0 The Department may perform inspection at the plant conforming to Supplement 1073 but final inspection and acceptance will be at the project site.

Furnish precast concrete components from suppliers certified according to Supplement 1073.

14.0 Form seams and slight surface irregularities that are expected from a steel panel forming system will not be cause for rejection. In addition, hairline cracks less than 0.01 inch (0.25 mm) will not be cause for rejection.

15.1 Ensure that the location of the product marking is on the interior of the arch section 4 feet (1.2 m) above the base of the arch. Measure the 4 feet (1.2 m) from the base of the arch along the circumference of the interior surface.

Add the product marking upon removal of the forms.

The manufacturer may be required to repeat the product markings before the project is final.

707.02,

On page 729 in the table, **Change** the wall thickness for a 142×91 pipe arch from 0.169 to 0.168 inch.

707.31,

On page 738, **Replace** 707.31 with the following:

707.31 Corrugated Polyethylene Drainage Tubing. Provide corrugated polyethylene drainage tubing according to AASHTO M 252 Type C, and CP. If Type S or SP is specified, provide corrugated polyethylene smooth lined pipe conforming to 707.33.

Only provide materials from manufacturers certified according to Supplement 1066.

707.32,

On page 738, **Replace** the words "Supplemental Specification" in the second sentence in 707.32 with the word "Supplement".

707.33,

On pages 738 and 739, **Replace** 707.33 with the following:

707.33 Corrugated Polyethylene Smooth Lined Pipe. Provide smooth lined corrugated polyethylene pipe, closed profile polyethylene pipe, couplings, and fittings conforming to AASHTO M 294, with the following modifications:

Provide Type S or Type D. If perforated is specified, provide Type SP.

1.1.1 Nominal sizes of 4 to 60 inches (100 mm to 1500 mm) are included.

7.2.1 In addition, nominal diameters of 4, 6, 8, and 10 inches (100, 150, 200, and 250 mm) are included.

7.2.2 For the additional nominal diameters listed for 7.2.1 the inner liner of Type S and SP pipe, and both inner and outer walls of Type D pipe shall have the following minimum thicknesses:

Diameter		Inner Wall Thickness	
(in)	(m)	(in)	(mm)
4	100	0.020	0.50
6	150	0.020	0.50
8	200	0.025	0.60
10	250	0.025	0.60

7.4 For the additional nominal diameters listed for 7.2.1 the pipe shall have a minimum pipe stiffness at 5 percent deflection as follows:

Diameter		Pipe Stiffness	
(in)	(m)	(P/I)	(N/m/m)
4	100	50	340
6	150	50	340
8	200	50	340
10	250	50	340

7.8.5 In addition, couplings for corrugated pipe shall be bell and spigot or bell-bell couplings, or clamp-on bands, for all sizes up to and including 36-inch (900 mm) diameter.

Couplings for Type D pipe shall be a bell-bell or bell and spigot coupling. The coupling may be welded on one end of each length of pipe by means of a full circumferential weld. Stitch welds are not permitted.

Couplings for pipe diameters 42 inches (1050 mm) and larger shall be bell-bell or bell and spigot.

11.1.3 In addition, pipe with diameters 4 through 10 inches (100 through 200 mm) inclusive may be marked "AASHTO M252".

12.1 Only provide materials from manufacturers certified according to Supplement 1066.

707.41,

On page 739, **Replace** 707.41 with the following:

707.41 Smooth-Wall Polyvinyl Chloride Underdrain Pipe. Provide smooth wall perforated and non-perforated PVC plastic pipe and fittings according to ASTM F 758, Type PS 46 minimum, with the following modifications:

7.2.4 Perforated pipe shall have a minimum of four rows of perforations.

Furnish materials according to the Department's Qualified Products List (QPL).

707.42,

On pages 739 and 740, **Replace** 707.42 with the following:

707.42 Polyvinyl Chloride Corrugated Smooth Interior Pipe. Provide PVC corrugated smooth interior pipe, joints and fittings according to ASTM F 949, with the following modifications:

5.2.4 Perforated pipe may be specified.

Furnish materials according to the Department's Qualified Products List (QPL).

707.43,

On page 740, **Replace** 707.43 with the following:

707.43 Polyvinyl Chloride Profile Wall Pipe. Provide PVC open profile wall pipe and fittings with integral bell joints according to ASTM F 794, with the following modifications:

7.2.4 Only molded or fabricated fittings conforming to the requirements of Specification F 794 may be used.

7.5 Ensure a pipe stiffness of 46 or greater.

Furnish materials according to the Department's Qualified Products List (QPL).

707.44,

On page 740, **Delete** 707.44.

707.45,

On pages 740 and 741, **Replace** 707.45 with the following:

707.45 Polyvinyl Chloride Solid Wall Pipe. Provide PVC solid wall pipe and fittings with nominal size of 4, 6, 8, 10, 12 and 15-inch (100, 150, 200, 250, 300 and 375 mm) diameter according to ASTM D 3034, SDR 35, with the following modifications:

10.1 The retest provisions do not apply.

Furnish materials according to the Department's Qualified Products List (QPL).

707.46,

On page 741, **Replace** 707.46 with the following:

707.46 Polyvinyl Chloride Drain Waste and Vent Pipe. Provide PVC drain, waste, and vent pipe and fittings according to ASTM D 2665, with the following modifications.

8.1 The retest provisions do not apply.

Furnish materials according to the Department's Qualified Products List (QPL).

707.47,

On page 741, **Replace** 707.47 with the following:

707.47 ABS and Polyvinyl Chloride Composite Pipe. Provide ABS and PVC composite pipe and fittings according to ASTM D 2680, with the following modifications.

11.1 The retest provisions do not apply.

13.1 Furnish certified test data as defined in 101.03 to the Engineer.

707.48,

On page 741, **Add** the following:

707.48 Polyvinyl Chloride Large-Diameter Solid Wall Pipe. Provide PVC solid wall pipe and fittings according to ASTM F 679, with the following modifications:

8.1 The retest provisions do not apply.

Furnish materials according to the Department's Qualified Products List (QPL).

707.51,

On page 741, **Replace** 707.51 with the following:

707.51 ABS Drain Waste and Vent Pipe. Provide ABS schedule 40 plastic drain, waste and vent pipe and fittings according to ASTM D 2661, with the following modifications:

6.4.1 Perform inspection at the project site.

9.18.1 The retest provisions do not apply.

10.1 Furnish certified test data as defined in 101.03 to the Engineer.

707.52,

On page 741, **Replace** 707.52 with the following:

707.52 ABS Sewer Pipe. Provide ABS sewer pipe and fittings according to ASTM D 2751, with the following modifications:

9.1 Perform inspection at the project site.

10.1 The retest provisions do not apply.

11.1 Furnish certified test data as defined in 101.03 to the Engineer.

707.42,

On page 740, **Delete** the first sentence in 707.42.A, Item 10.1, "The manufacturer shall furnish certified test data annually to the Laboratory or at any time when the method of manufacture has changed."

On page 740, **Delete** the first sentence in 707.42.B, Item 10.5, “The manufacturer shall furnish certified test data annually to the Laboratory or at any time when the method of manufacture has changed.”

707.43,

On page 740, **Delete** the first sentence in 707.43.A, Item 10.6, “The manufacturer shall furnish certified test data annually to the Laboratory or at any time when the method of manufacture has changed.”

On page 740, **Delete** the first sentence in 707.43.B, Item 10.5, “The manufacturer shall furnish certified test data annually to the Laboratory or at any time when the method of manufacture has changed.”

707.62, 707.65, and 707.69

On page 741, **Add** sections 707.62, 707.65, and 707.69 after the end of 707.52 as follows:

707.62 Polypropylene Corrugated Single Wall Pipe. Provide polypropylene corrugated single wall pipe for storm sewer pipe from 6 to 30-inch diameters according to ASTM F 2736, with the following modification.

9.1 Provide a letter of certification to cover each shipment of material verifying that it meets specification requirements.

707.65 Polypropylene Corrugated Double Wall Pipe. Provide poly propylene corrugated double wall pipe for non-pressure sanitary sewer and storm sewer pipe from 6 to 30-inch diameters according to ASTM F 2736, with the following modification.

9.1 Provide a letter of certification to cover each shipment of material verifying that it meets specification requirements.

707.69 Polypropylene Triple Wall Pipe. Provide polypropylene triple wall pipe and fittings for non-pressure sanitary sewer and storm sewer pipe from 30 to 60-inch diameters according to ASTM F 2764, with the following modification.

10.1 Provide a letter of certification to cover each shipment of material verifying that it meets specification requirements.

708.02 OZEU Structural Steel Paint.

C. Epoxy Intermediate Coat

On page 743, **Change** the first sentence to:

C. Epoxy Intermediate Coat. Provide a two-part epoxy intermediate coat composed of a base component and curing agent suitable for application over the zinc rich primer.

By **deleting** “epoxy polyamide”

709.08,

On page 747, **Change** the first sentence to: Provide cold drawn steel wire for concrete reinforcement according to ASTM A 82 or ASTM A 1064, with the following modification:

709.10,

On page 747, **Change** the first sentence to: Provide welded steel wire fabric for concrete reinforcement according to ASTM A 185 or ASTM A 1064.

709.11,

On page 748, **Change** the first sentence to: Provide deformed steel wire for concrete reinforcement according to ASTM A 496 or ASTM A 1064.

709.12,

On page 748, **Change** the first sentence to: Provide welded deformed steel wire fabric for concrete reinforcement according to ASTM A 497 or ASTM A 1064.

709.13 Coated Dowel Bars

On page 748, **Delete** the third and fourth sentence:

“5.2 is waived. Ensure that the coating thickness is as approved under 2.5 and is within the manufacturer’s stated tolerance”.

711.01,

On page 756, **Make** the following changes to the Value for the Min CVN for A709 Gr. 70W steel in the Table:

A709 Gr. 70W	Up to 4 in (100 mm) mechanically fastened or welded	25 ft-lb @ -10 °F ^[1] (34 J @ -23 °C)
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ITEM 711 STRUCTURAL STEEL AND STRUCTURE INCIDENTALS

On page 757, **Make** the following changes:

711.07 Steel Castings.

Change the section to:

Furnish steel castings according to ASTM A 27/A 27M, Grade 65-35 or Grade 70-36, or AASHTO M103, or ASTM A 148, Grade 90-60, with the following modification:

Ensure that steel casings are free from pouring faults, sponginess, cracks, blow holes, and other defects in positions affecting their strength and value for the service intended. No sharp, unfiltered angles or corners are allowed.

On page 761 and 762, **Make** the following changes:

711.23 Elastomeric Bearings.

Change the fourth paragraph to:

Ensure that the external connection or distribution plates of laminated bearings are the same material as the attached structural steel and are similarly cleaned and coated. Furnish internal plates according to ASTM A 709 grade 36 or **A1011/A1011M, SS** Grade 36 or Grade 40. Minimum thickness for the internal plates is 0.074 inch (1.88 mm). Debur all plates.

712.01,

On page 764, **Change** the following:

A. Type A. Federal Specification A-A-1923A, and A-A-55614.

B. Type B. Federal Specification A-A-1924A.

The supplier or producer of the anchors will provide a certification showing certified test results of the proof load required in the Federal Specifications .

Furnish materials according to the Department's Qualified Products List (QPL).

712.04.C,

On page 765, **Replace** the first table in 712.04.C with the following table:

Combined total calcium oxide and magnesium oxide	50 % minimum
Available calcium hydroxide (rapid sugar test, ASTM C25), plus total MgO content calculated to be equivalent Ca(OH) ₂	30 % minimum
Loss on ignition (carbon dioxide plus moisture, combined and free on as-received basis)	40 % maximum
Free water (as-received basis)	4 % maximum
Sulfur as SO ₃	10 % maximum

712.09,

On page 766, **Replace** 712.09 with the following:

712.09 Geotextile Fabrics. Furnish fabric composed of strong rot-proof polymeric fibers formed into a woven or non-woven fabric. Products must be tested by the National Transportation Product Evaluation Program (NTPEP). The Department will determine acceptance of Type A, B, C and D fabric according to data obtained in the most current NTPEP report— Laboratory Results of Evaluations on Geotextiles and Geosynthetics. The NTPEP testing results must meet or exceed the requirements listed in the table. For all tests except Ultraviolet Exposure, the products Minimum Average Roll Values (MARV), as published in the NTPEP report, must also meet or exceed the requirements listed in the table. If no MARV value is published in the NTPEP report, the manufacturer must submit to the Department certified test data showing the MARV values for the product will meet or exceed the requirements listed in the table.

Property	Test Method	Required Value	
Type A: Underdrains and Slope Drains			
Minimum tensile strength	ASTM D 4632	80 lb	355 N
Minimum puncture strength ^[1]	ASTM D 6241	140 lb	625 N
	or ASTM D 4833	25 lb	110 N
Minimum tear strength	ASTM D 4533	25 lb	110 N
Apparent opening size	ASTM D 4751		
Soil Type-1: Soils with 50% or less passing No. 200 (75 µm) sieve		AOS ≤ 0.6 mm	
Soil Type-2: Soils with 50 to 85% passing No. 200 (75 µm) sieve		AOS ≤ 0.3 mm	
Minimum permittivity	ASTM D 4491	0.5 sec ⁻¹	
Type B: Filter Blankets for Rock Channel Protection			
Minimum tensile strength	ASTM D 4632	200 lb	890 N
Minimum elongation	ASTM D 4632	15%	
Minimum puncture strength ^[1]	ASTM D 6241	440 lb	1955 N
	or ASTM D 4833	80 lb	355 N
Minimum tear strength	ASTM D 4533	50 lb	220 N
Apparent opening size	ASTM D 4751	AOS ≤ 0.6 mm	
Minimum permittivity	ASTM D 4491	0.2 sec ⁻¹	
Type C: Sediment Fences			
Minimum tensile strength	ASTM D 4632	120 lb	535 N
Maximum elongation	ASTM D 4632	50%	
Minimum puncture strength ^[1]	ASTM D 6241	275 lb	1225 N
	or ASTM D 4833	50 lb	220 N
Minimum tear strength	ASTM D 4533	40 lb	180 N
Apparent opening size	ASTM D 4751	AOS ≤ 0.84 mm	
Minimum permittivity	ASTM D 4491	0.01 sec ⁻¹	
Ultraviolet exposure strength retention ^[2]	ASTM D 4355	70%	
Type D: Subgrade-Base Separation or Stabilization			
Minimum tensile strength	ASTM D 4632	180 lb	800 N
Maximum elongation	ASTM D 4632	50%	
Minimum puncture strength ^[1]	ASTM D 6241	385 lb	1715 N
	or ASTM D 4833	70 lb	310 N
Minimum tear strength	ASTM D 4533	70 lb	310 N
Apparent opening size	ASTM D 4751	Same as Type A	
Permittivity	ASTM D 4491	0.05 sec ⁻¹	

[1] ASTM D6241 is now the standard puncture resistance test required by AASHTO and NTPEP. NTPEP will continue to publish product data, tested under ASTM D4833, until the product is retested under ASTM D6241.

[2] Provide certified test data to the Department. Include strength retention data at 0, 150, 300, and 500 hours

For Type E material, supply fabric conforming to the requirements of AASHTO M288, Section 10, Table 8. The Department will accept Type E material based on certified test data.

All minimum strengths shown are in the weakest principal direction.

Ensure that the fabric is free of any treatment that might significantly alter its physical properties.

During shipment and storage, wrap the fabric in a heavy-duty protective covering to protect it from UV deterioration, direct sunlight, dirt, dust, and other debris.

Furnish materials according to the Department's Qualified Products List (QPL).

712.11,

On page 769, **Delete** 712.11.D, Type D Temporary Erosion Control Mat, and 712.11.H, Type H Temporary Erosion Control Mat.

720

On Page 772, **Replace** the following section in its entirety:

720 DELINEATOR MATERIALS

720.01 Reflectors. For bridge parapet bracket or bridge rail bracket, furnish rectangular reflectors that are a minimum size of 3 x 6 inches (75 x 150 mm) and that consist of reflective sheeting according to 730.192 or 730.193 adhered to an aluminum plate. Furnish white, yellow, or red reflectors as specified. Furnish aluminum plate for reflectors according to ASTM B 209 (B 209M), 6061-T6 with a minimum thickness of 0.060 inch (1.5 mm).

For ground mounted delineators, furnish rectangular reflective sheeting according to 730.192 or 730.193 that is a minimum size of 3 x 6 inches (75 x 150 mm) adhered to a flexible post. Furnish white, yellow or red reflectors as specified.

For surface mounted delineators, furnish a 3 inch (75 mm) wide band of reflective sheeting according to 730.192 or 730.192 adhered completely around a flexible post. Furnish white or yellow reflectors as specified.

Furnish materials according to the Department's Qualified Products List (QPL).

720.03 Flexible Posts. Conform to Supplement 1020.

Furnish materials according to the Department's Qualified Products List (QPL).

721.03

On page 773, **Replace** the entire section with the following.

721.03 Casting Adhesive. Casting adhesives will follow a two-step acceptance procedure.

Step 1 will be materials testing and a flow test.

A. Furnish adhesive material conforming to AASHTO M 237, Type IV, except that the viscosity is 200 to 900 poise at 77 + 2 °F (25 + 1 °C) and the unit weight is 11.3 to 11.9 pounds per gallon (1.35 to 1.43 kg/L).

B. For materials conforming to the above requirements provide samples of the adhesives to the Department for flow testing. The casting adhesive flow test will meet the ranges in Table A.

The flow test procedure is:

1. In a standard 2x4 block of pine wood (3.5" wide x 1.5" deep x 22" long) cut a channel in the block that is 3/4" wide by 1/2" deep with a dado blade. The channel will run longitudinally

22 inches long in the center of the 3.5 inch wide face of the wood block. Use tape to block off the ends of the channel.

2. Condition epoxy (Part A and Part B) and the wood block for a minimum of 4 hours at each of the three different temperatures (77°, 100°, and 120°F).

3. Mix Part A and Part B epoxy separately for 15 seconds.

4. Mix Part A epoxy with Part B epoxy, at the manufacturer's required ratio, for 1.5 minutes. The total amount of sample mixed will equal 40ml.

5. Temporarily dam off 6.5 inches of the channel at one end of the wood block. Keep the wood block flat and level with the channel side facing up.

6. Pour mixed product into the blocked off end of the channel for 30 seconds. The product should fill this blocked off volume. Remove the temporary dam.

7. Immediately place wood block with the epoxy filled channel on a 15% grade incline, with epoxy placed at the top of the slope.

8. Immediately start a stop watch.

9. Stop the watch when the material completely stops flowing in the channel.

10. The time and length the epoxy traveled down the channel need to meet the requirements of Table A.

11. This test will be run at each of the 3 established temperatures.

Table 721.03 - A			
	Temperature 77°F	Temperature 100°F	Temperature 120°F
Distance traveled down 15% incline (inches)	$10 \leq X \leq 18$	$12 \leq X \leq 20$	$12 \leq X \leq 20$
Time for epoxy to stop flowing on 15% incline (minutes)	$5 \leq X \leq 14$	$2 \leq X \leq 9$	$1 \leq X \leq 4$

Step 2 will include a Department controlled field application and performance test

The epoxy adhesive will be field evaluated on two ODOT roadway projects in north eastern Ohio. One roadway will be new asphalt pavement and the other will new concrete or concrete that is less than 20 years old. The test sections on each roadway will be a minimum of 2 miles long and carry a minimum of 30,000 ADT. It will be the responsibility of the epoxy manufacturer to find routes in Ohio that meet these requirements and have them installed, at no cost to the Department, as a part of an existing ODOT contract. The casting adhesive will be evaluated after one year of service. Removal of any casting from the roadway after one year will be considered failure of the epoxy adhesive. If no castings are removed from the roadway and the product meets the requirements listed above, the epoxy adhesive will be granted Conditional Approval.

If the product continues to perform satisfactorily after 4 years, the product will be moved to Full Approval. If at any time during Conditional Approval status, the epoxy adhesive fails to perform to

the satisfaction of the Department, it will be removed from Conditional Approval status and from further consideration.

Approved and Conditionally Approved materials will be incorporated on the Department’s QPL. Only furnish materials listed on the Department’s QPL.

725.11C

On page 778, **Deleted** the following after the eighth paragraph;
 “Ensure that the starter ceases operation after the lamp has started and that the starter protects itself, the ballast, the capacitor, and the lamp socket against cycling, burned out, broken or missing lamps by ceasing the starting operation after the power has been applied to the luminaire for a period of not less than 3 minutes and no more than ten minutes and not beginning the starting operation again until power has been shut off and reapplied to the luminaire.”

726

On Page 791, **Add** the following section in its entirety:

726 BARRIER REFLECTOR MATERIALS

726.01 Barrier Reflectors. Furnish concrete barrier, retaining wall and bridge parapet reflector body housings that are made of acrylic or polycarbonate plastic, or corrosion resistant metal. Ensure that the minimum reflective surface area of the reflector is 7 square inches (4400 mm²).

Furnish white reflectors that reflect the following minimum candela of light at the indicated observation angles for each 1 foot-candle (10.76 lx) of incident light at the indicated entrance angles. Furnish amber reflectors that reflect at least 60 percent of these values.

MINIMUM SPECIFIC INTENSITY, CD/10.76 LX

		Observation Angle (degrees)	
		0.2	2.0
Entrance angle (degrees)	-4	62	0.25
	15	52	0.18

The entrance angle is measured in the horizontal plane between the direction of incident light and normal to the face of the reflector. The observation angle is measured in the vertical plane between the observer’s line of sight and the direction of light incident to the reflector face.

Furnish guardrail blackout reflectors that are a minimum size of 4.5 x 10 x 0.125 inches (112.5 x 250 x 3.1 mm) and made of corrosion resistant metal with 1/4" (6 mm) predrilled mounting holes. One or both sides shall be covered with a minimum 4.5 x 5 inches (112.5 x 125 mm) of Type G, H or J reflective sheeting.

Furnish materials according to the Department’s Qualified Products List (QPL).

730.017

On page 792, **Replace** “veneers” with “veneers” in the first sentence.

730.191

On page 794, **Replace** the section with the following:

730.191 Reflective Sheeting Reboundable. Furnish reboundable reflective sheeting according to Supplement 1049, and according to ASTM D 4956, Type III, IV, VIII, IX or XI, including supplemental requirements S1 and S2, with watermarks or other identification marks inconspicuously incorporated into the face of the sheeting on a repeating pattern if necessary to distinguish the sheeting from other similarly appearing sheetings.

Furnish materials according to the Department’s Qualified Products List (QPL).

730.193

On page 795, **Add** “or XI” after “Type IX”.

731.06

On page 797, **Replace** the word “incandescent” with the word “LED” from the last sentence in the first paragraph.

732.01,

On page 797, **Replace** the first and second paragraphs with the following:

732.01 Vehicular Signal Heads, Conventional. Ensure that vehicular traffic signal heads conform to the ITE “Vehicle Traffic Control Signal Heads” standard. In conformance with the above standard, provide signal heads that are of cast nonferrous corrosion resistant metal.

Traffic signals consist of specified assemblies of optical sections containing 8 or 12-inch (200 or 300 mm) diameter lens opening, a housing, a door frame with stainless steel hinge pins and latching device, gasketing, visor, wiring, and includes LED lamp in accordance with 732.04. Retention hardware for LED lamps, if sharing threaded hole with visor hardware, shall consist of minimum 1/2-inch (13 mm) long, set screw with retaining tab and captive wingnut or hex nut. All hardware shall be stainless steel and set screw shall be inserted into signal section door using visible, semi-permanent threadlocking compound. All hardware used to join optical sections together shall be stainless steel.

732.01

On page 798, **Replace** the seventh paragraph with the following:

The inside surface of the visors shall have a finish of flat black. All other exterior surfaces of the signal head and hardware shall have a finish of Federal Yellow or Gloss Black to closely agree with Federal Standard 595, Color 13655 or Color 17038, as specified in the plans. The coating system used shall be durable, uniform, and weather resistant.

732.01

On page 798, **Add** the following after the first sentence in the fourth paragraph;

“Cable entrance adapters shall be of the tri-stud type with stainless steel hardware. Tethered heads shall use unpainted cast aluminum cable entrance adapters with integral tri-studs (no inserts) and a single mounting hole. Tethered heads shall be shimmed with stainless steel shim washers to eliminate all slack between the span wire and the cable entrance adapter. Free swinging heads shall use cast iron cable entrance adapters with tri-studs. A neoprene gasket placed under the clamp washer in the top signal section shall effectively seal the entrance adapter on the signal to make a waterproof connection and shall have a minimum thickness of 3/32 inch (2.5 mm).”

On page 797, **Replace** the first and second paragraphs with the following;

732.01 Vehicular Signal Heads, Conventional. Ensure that vehicular traffic signal heads conform to the ITE “Vehicle Traffic Control Signal Heads” standard. In conformance with the above standard, provide signal heads that are of cast nonferrous corrosion resistant metal. Traffic signals consist of specified assemblies of optical sections containing 8 or 12-inch (200 or 300 mm) nominal diameter lens opening, a housing, a door frame with stainless steel hinge pins and latching device, gasketing, visor, wiring, and includes LED lamp in accordance with 732.04. Retention hardware for LED lamps, if sharing threaded hole with visor hardware, shall consist of minimum 1/2-inch (13 mm) long, set screw with retaining tab and captive wingnut or hex nut. All hardware shall be stainless steel and set screw shall be inserted into signal section door using visible, semi-permanent threadlocking compound. All hardware used to join optical sections together shall be stainless steel. Door hinges and visor mounting hardware shall be stainless steel.

On page 798, **Replace** the seventh paragraph with the following;

732.01

The inside surface of the visors shall have a finish of flat black. All other exterior surfaces of the signal head and hardware (except cast aluminum cable entrance adapters) shall have a finish of Federal Yellow or Gloss Black to closely agree with Federal Standard 595, Color 13538 or Color 17038, as specified in the plans. The coating system used shall be durable, uniform, and weather resistant.

732.02

On page 798, **Delete** “incandescent lamp or, if specified, a” from the last sentence of the second paragraph.

732.03

On page 799, **Delete** “incandescent lamp or when specified, a” from the last sentence of the second paragraph.

732.03

On page 799, **Delete** the following from the second paragraph;
“incandescent lamp or when specified, a”

732.04

On pages 799, 800 and 801, **Delete** paragraphs A and B.

732.04.C.2

On page 803, **Replace** the first sentence with the following:

a. The red and orange lamps shall be manufactured using AlInGaP (Aluminum-Indium-Gallium-Phosphide) technology or other LEDs with lower susceptibility to temperature degradation than AlGaS (Aluminum-Gallium-Arsenic).

732.04.C.2.a

On page 803, **Replace** the entire subsection with the following:

The red and orange lamps shall be manufactured using AlInGaP (Aluminum-Indium-Gallium-Phosphide) technology or other LEDs with lower susceptibility to temperature degradation than AlGaAs (Aluminum-Gallium-Arsenic). AlGaAs LEDs will not be permitted. Green and yellow lamps shall be manufactured using Indium Gallium Nitride.

732.05

On page 808, **Delete** “Clear lamp incandescent” from Table 732.05-1.

732.05

On page 807, **Delete** the fifth paragraph.

732.05

On page 808, **Replace** the tenth paragraph with the following: Finish signal exterior surfaces black with enamel coating. Finish interior surfaces of visors flat black.

732.05

On page 807, **Delete** the following from the fourth paragraph; “to ensure rated lamp life.”

732.05A

On page 807, **Delete** the following from the first paragraph; “Install a lamp in each section.”

732.05B

On page 807, **Delete** the following from the first paragraph; “Install a lamp in each section.”

732.05.C

On page 809, **Replace** the last two sentences with the following: “Install a lamp in each compartment. The upraised hand and the walking person symbols may be integral in the same compartment.”

732.05.C

On page 809, **Delete** the third and fourth sentences.

732.05.C

On page 809, **Delete** "When a LED light source is specified," from the beginning of the fifth sentence.

732.06

On page 810, in the first sentence of the third paragraph, **Delete** the words "per foot".

732.05.C

On page 809, **Replace** the last two sentences with the following: “Install a lamp in each compartment. The upraised hand and the walking person symbols may be integral in the same compartment.”

732.05.D.2

On page 809, **Delete** the last sentence. “The display numeral segments shall be comprised of two rows of discrete segments.”

732.05.D.3

On page 809, **Delete** the last sentence. “The display numeral segments shall be comprised of two rows of discrete segments.”

732.14

On page 812, **Replace** the entire section with the following:

732.14 Down Guy Assemblies. Furnish expanding or screw type anchors capable of withstanding a guy tension of 8000 pounds (35 kN) when installed in firm moist soil. Ensure that each anchor rod is 5/8 inch (16 mm) minimum diameter, 8 feet (2.4 m) minimum length galvanized steel with thimble eye.

Ensure that all pole and attachment hardware is hot dip galvanized in accordance with 711.02.

Furnish 3/8 inch (10 mm) minimum diameter guy wire that conforms to 732.18 and ensure that all accessories have a rated loading strength equal to or greater than the messenger wire minimum breaking strength.

Furnish porcelain strain insulators of the wet process type.

Furnish an 8 feet (2.4 m) minimum length guy guard made of impact and ultraviolet light resistant yellow plastic that is fastened to the guy wire.

Furnish materials according to the Department’s Qualified Products List (QPL).

732.18

On page 813, **Replace** the entire section with the following:

732.18 Messenger Wire and Tether Wire

a) Wire: Furnish seven strand ASTM A475 Class B Utilities Grade or stronger messenger wire except ¼ inch (6 mm) seven strand messenger wire must be High Strength Grade or stronger. Furnish ¼ inch (6 mm) seven strand ASTM A475 Class B High Strength Grade or stronger tether wire. Furnish all wire per ASTM A475 with the following modifications:

18.2 Tags are not required on lengths less than 1000 feet (300 m)

b) **Accessories: For messenger wire ensure** all accessories have a rated loading strength equal to or greater than (73 percent the messenger wire minimum breaking strength For breakaway tether installations, accessories within the turnbuckle-tensioned portion of the tether span shall have strength equal to or greater than 73 percent of the breaking strength of ¼-inch 7-strand ASTM A 475 High Strength Grade Wire rope , or 3460 pounds (15.4 kN). Furnish galvanized steel helical lashing rods in 5-foot (1.5 m) lengths. For tether wire ensure all accessories except S-hooks have rated load strength equal to or greater than the tether wire minimum breaking strength. S-hooks shall be made of mild low-carbon galvanized steel and of the wire size indicated on the plans; larger wire sizes and higher-strength steel S-hooks shall not be substituted. Safety tie wire shall be 304 or 316 stainless steel, 1x19 stranded, 1/8-inch (3 mm) with stainless steel wire rope clips. Lead sheet to wrap tether wire in breakaway anchors shall be commercially pure lead of thickness 0.030 to 0.042 inches (0.75 to 1.0 mm).

Furnish materials according to the Department's Qualified Products List (QPL).

732.185

On page 813, **Delete** the entire section.

732.22

On page 814, **Replace** the seventh sentence of the section, to the following:

A 2- inch (50 mm) wide continuous outside border of fluorescent yellow reflective sheeting shall be applied to the front of the backplate.

733.02B

On page 818, **Add** the following to the list right before the last paragraph;
“(4) 2070-6A,B.”

733.02B

On page 818, **Add** the following to the end of the last paragraph;
“and the vendor’s name.”

733.03

On page 820, **Add** the following to the end of the last paragraph;
“The door handle shall swing out away from the door edge, not toward the center of the door.”

733.03.A.2.o

On page 826, **Add** the following to the end of the paragraph;
“Route all wiring terminated on printed circuit boards (as commonly done for BIU backpanel connectors) at right angles to the pin array; no wires shall pass over the connector pins.”

733.03.B.1.f

On page 827, **Add** the following to the end of the sentence;
“Furnish momentary pushbuttons on the cabinet door for detector actuation of detector channels 1-16 of BIU #9 and opto-isolated pedestrian detector inputs 1-4 on BIU #1. Permanently label these pushbuttons as “VEH DET 1” through “VEH DET 16” and “PED DET 1” through “PED DET 4”.”

733.03.B.1.h

On page 827, **Replace** the entire section with the following;
“Section 7.3, unless otherwise specified in the plans, provide a Size 5 cabinet for four phase or less pole mounted cabinets, Size 5 for four phase or less ground mounted cabinets, and Size 6 for 5 phase or more ground mounted cabinets. Supply larger cabinets if required to house the equipment to meet the plan requirements; such as master controllers, preemption devices, 16 position backpanels or special detection units.
Furnish all wire passages through metal panels with edge protection polymer trim.”

733.03.B.1.k

On page 827, **Add** the entire section with the following;
“The following overrides NEMA requirements for signal bus relays. A solid state relay shall be used for the signal bus relay. The signal bus relay shall maintain output equal or above the rating of the cabinet main overcurrent protection device over the NEMA TS-2 Environmental Operating Range of -50 to +185 degrees F (-45 to +85 degrees C)”

733.03.B.6

On page 828, **Add** the following after the last sentence;
“Cabinet power distribution shall conform to Figure 5-4, NEMA TS-2 2003 v02.06. In addition, locate a non-GFCI NEMA 5-15 utility outlet on the right side power panel. If the cabinet is equipped with a UPS, this outlet shall be powered independently of the UPS.”

733.03.B.7

On page 828, **Add** the entire section;
“Furnish an 8-port SDLC expansion board on the left side of the cabinet. This board shall include in one of the slots an EDCO model SRS-BIU-15 surge suppressor or approved equal.”

733.03.B.8

On page 828, **Add** the entire section;

“Furnish an aluminum shelf with integral storage compartment in the rack below the controller. Ensure that the storage compartment has telescoping drawer guides for full extension. Ensure that the compartment top has a non-slip plastic laminate attached.”

733.03.C.4.a

On page 829, **Add** the following paragraph between the first and second paragraph:

"In addition to the requirements of Caltrans TEES, furnish detector unit with an LED or LCD display indication of call strength ($\Delta L/L$ or equivalent). This display shall be a bar graph or numerical display with at least eight (8) discrete levels indicated."

733.03.C.6.a

On page 830, **Replace** “24” in the third paragraph the following;

“60”

733.09.A

On page 846, **Replace** the first paragraph with the following;

“**Operation.** In addition to the material requirements below, furnish a UPS system with a minimum two and one half (2.5) hours of full run-time operation for an “LED-only” intersection with 1000 watts of active output power.”

733.09.A

On page 846, **Add** the following paragraphs at the end of this section:

Furnish a UPS with available buck/boost mode operation, programmable over a minimum input voltage range of 85 - 150 vrms. The unit display shall indicate when buck/boost mode is engaged.

Furnish a UPS with an Ethernet port for remote monitoring and control. Provide interface software unless the Ethernet port has a built-in web browser compatibility.

Ensure the UPS cabinet has a mastic tape seal between the cabinet bottom flange and the concrete foundation. Minimum tape thickness shall be 1/8-inch (3 mm) and the tape shall be continuous with no gaps between tape pieces or between cabinet and foundation.

740.02

On page 848, **Delete** the following from the first paragraph;

“Prequalify materials according to Supplement 1047. Use materials certified according to Supplement 1089.”

740.02

On page 848, **Add** the following to the end of the section:

“Furnish materials according to the Department’s Approved List.”

740.03

On page 850, **Add** the following to the end of the section:

“Furnish materials according to the Department’s Approved List.”

740.04

On page 850, **Replace** the first paragraph with the following:

Furnish thermoplastic pavement marking material formulated expressly for use as retroreflective pavement markings on asphalt concrete or Portland cement concrete pavement. Furnish material that includes a mixture of Alkyd resins-19% minimum by weight at least one of which is solid at room temperature, and contains premixed glass beads 740.09 Type C, 30% minimum by weight, with a 1.50 minimum index of refraction. Ensure that the ingredients are well mixed so that all parts are evenly dispersed throughout. Ensure that there are no foreign objects, skins, dirt, or such ingredients that would cause staining, discoloration, or bleeding. Furnish suitable materials for application in molten form by extrusion method. Ensure that the material is capable of retaining reflective glass beads, 740.09 Type C, after application.

740.04 G

On page 850, **Replace** the section with the following:

G. Pigment Content. Furnish yellow material containing a minimum of 5 percent by weight of primary yellow (lead chromate) pigment (or a lead free pigment) (measured as per ASTM D 126 or Department approved lab method). Furnish white material containing a minimum of 10 percent Titanium Dioxide-Rutile Type -2 by weight of white pigment..

740.09 C

On page 854, **Replace** the section with the following:

C. Type C. Furnish Type C glass beads for thermoplastic material meeting the following specification.

Sieve Size	Percent Retained
No. 16 (1.18 mm)	3 max
No. 20 (850 mm)	5 to 20
No. 40 (425 mm)	65 to 95
No. 50 (300 mm)	0 to 5
Refractive Index	1.50 to 1.60
Roundness	80 min
Coating	Moisture Resistant (For Drop-on Beads only)

Ensure the glass bead packaging is clearly marked “THERMO”
Use materials certified according to Supplement 1089.

748.01

On page 855, **Replace** the second paragraph of 748.01 with the following:

Furnish push-on joints, mechanical joints, and boltless restrained joints conforming to ANSI/AWWA C111/A21.11. For restrained joints, ensure that the restraint is a design approved by the owner of the utility and provides a positive lock designed to prevent joint separation. Steel locking segments molded into a gasket to grip the pipe do not meet the requirements for this joint.