OHIO DEPARTMENT OF TRANSPORTATION

CENTRAL OFFICE, 1980 W. BROAD ST., COLUMBUS, OHIO 43216-0899

January 20, 2017

To: Users of the Bridge Design Manual

From: Tim Keller, Administrator, Office of Structural Engineering

By: Sean Meddles, Assistant Administrator, Office of Structural Engineering

Re: 2017 First Quarter Revisions

Revisions have been made to the ODOT Bridge Design Manual, January 2004. These revisions shall be implemented on all Department projects that begin Stage 2 plan development date after January 20, 2017. Implementation of some or all of these revisions for projects further along the development process should be considered on a project-by-project basis.

This package contains the revised pages. The revised pages have been designed to replace the corresponding pages in the book and are numbered accordingly. Revisions, additions, and deletions are marked in the revised pages by the use of one vertical line in the right margin. The header of the revised pages is dated accordingly.

To keep your Manual correct and up-to-date, please replace the appropriate pages in the book with the pages in this package.

To ensure proper printing, make sure your printer is set to print in the 2-sided mode.

The January 2004 edition of the Bridge Design Manual may be downloaded at no cost using the following link:

http://www.dot.state.oh.us/Divisions/Engineering/Structures/Pages/default.aspx

Attached is a brief description of each revision.

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Summary of Revisions to the January 2004 ODOT BDM

BDM Section	Affected Pages	Revision Description
201.2.2	2-3	The latitude and longitude coordinates provided in the proposed structure block shall be measured to 0.01 seconds. The precision of measuring to the nearest second or the nearest hundredth of a second results in about 50-ft as opposed to about 1-ft.
204.6	2-23	The retaining wall justification study still exists, but the Preferred Alternative Verification Review does not. This section was revised to eliminate the stage review in which the submittal is made. That information is provided in other Department publications.
208.1	2-35.1 through 2-36	This revision corresponds with recent C&MS 501.05 revisions for the design of temporary excavation support. These revisions address when the contract plans will provide designs and pay items for temporary excavation support.
302.1.1	3-9	This revision corrects the concrete class for drilled shafts. Drilled shaft concrete was previously specified as Class QC2. However, C&MS 524.02 specifies concrete as Class QC4 or QC5.
302.1.4.3	3-13	The sacrificial graffiti coatings have been removed from the BDM. The sacrificial coatings have not performed well due to their short service life.
302.4.2	3-28	This section of the BDM listed the section properties for W36x16 rolled beams. This list was provided because in January 2006, Nucor implemented changes to the physical dimensions of the W36x16 group of shapes. Since then, Nucor has continued to tweak the section properties such that the sections provided in the BDM are no longer accurate. This list was eliminated.
303.1.1	3-52	The sacrificial graffiti coatings have been removed from the BDM. The sacrificial coatings have not performed well due to their short service life.
303.4.3	3-75 through 3-75.1	This revision was provided to clarify the concrete strength used for determining the structural capacity of a drilled shaft.
304.2	3-83 through 3-84	The table showing standard railing types still referenced BR-2-98 which was replaced with BR-2-15 in Jul 2015. This has been corrected.

BDM Section	Affected Pages	Revision Description
304.3.6	3-87	The section heading for 304.3.5 was revised from BR-2-98 to BR-2-15 to reflect the release of the new standard drawing.
306.1.2	3-93	This revision reflects the release of the new EXJ-6-17 drawing.
306.2.4	3-94	This revision reflects the release of the new EXJ-6-17 drawing.
306.3.4	3-97	The table in this section was revised to reflect the release of the new EXJ-6-17 drawing.
602.6	6-9	Note **[13a]** specifying the use of sacrificial graffiti coatings has been retired.
702.6.2	7-6	Notes **[71a]** & **[71c]** previously referred to PSID-1-13 for the location of a construction joint for the top of the diaphragm. This location was accurate for prestressed I-beam superstructures, but for steel superstructures, the diaphragm construction joint shall be located at the approach slab seat elevation as shown in SICD-1-96. This revision corrects the notes for steel superstructures.
AN-1	Appendix - 2	The accreditation procedure for MSE Walls has been revised.
ARN-39	Appendix - 8	Retired Note **[13b]** was placed in the appendix.

E. In the existing structure block, provide a brief description of existing bridge. This should include type, length of spans and how measured (c/c of bearings, f/f of abutments), roadway width (t/t of barrier, t/t of curb, or f/f of railing), skew angle, original design loading or upgraded loading, type of deck and type of substructure, date when built, Structure File Number (SFN), approach slabs and wearing surface.

F. In the proposed structure block provide a brief description of proposed bridge. This should include type, length of spans and how measured (c/c of bearings), roadway width (t/t of barrier, t/t of curb, or f/f of railing), width of sidewalks, design loading, future wearing surface loading, skew angle, wearing surface, approach slabs, alignment, superelevation or crown and latitude and longitude bridge coordinates measured to the nearest 0.01 seconds.

G. A cross section of the proposed superstructure, including an elevation of the proposed pier type(s) if applicable.

H. The design and current average daily traffic (ADT) and the design average daily truck traffic (ADTT).

I. For each substructure unit where a bearing is to be used, the bearing condition (fixed or expansion) shall be designated in the profile view (FIX or EXP). Semi-integral substructures shall be designated as expansion (EXP) and integral shall be designated as integral (INT).

J. Horizontal and vertical clearances and their locations shall be provided for navigable waterway crossings.

K. A cross section sketch at the abutments shall be submitted to provide information to help verify bridge limits.

201.2.3 HYDROLOGY AND HYDRAULICS (H&H) REPORT

The Structure Type Study shall include a Hydrology and Hydraulics (H&H) Report. Refer to the ODOT Location and Design Manual, Volume 2, Section 1118.2 for more information.

the use of spread footing supported abutments on MSE walls because of their susceptibility to loss of bearing caused by erosion during the service life of the structure. Piles require a minimum 15-foot embedment below the MSE wall. If rock exists within the minimum embedment depth, the piles shall be placed in pre-bored holes that extend a minimum of 5-ft into bedrock. The pre-bored holes shall be backfilled with Class QC Misc. concrete up to the top of the leveling pad elevation after pile installation.

Refer to Sections 201.2.6, 202.2.3 and 204.6.2 for the staged review requirements for MSE walls. Consult the Office of Structural Engineering for additional design recommendations.

204.5 PIER TYPES

For highway grade separations, the pier type should generally be cap-and-column piers supported on a minimum of 3 columns. (This requirement may be waived for temporary conditions that require caps supported on less than 3 columns.) Typically the pier cap ends should be cantilevered and have squared ends.

For bridges over railroads generally the pier type should be T-type, wall type or cap and column piers. Preference should be given to T-type piers. Where a cap and column pier is located within 25 feet [7.6 meters] from the centerline of tracks, crash walls will be required.

For waterway bridges the following pier type should be used:

A. Capped pile type piers; generally limited to a maximum height of 20 feet [6 meters]. For heights greater than 15 feet [4.5 meters], the designer should analyze the piles as columns above ground. Scour depths shall be considered.

B. Cap-and-column type piers.

C. Solid wall or T-type piers.

Note that the use of T-type piers, or other pier types with large overhangs, makes the removal of debris at the pier face difficult to perform from the bridge deck. For low stream crossings with debris flow problems and where access to the piers from the stream is limited, T-type piers, or other similar pier types, should not be used.

For unusual conditions, other types may be acceptable. In the design of piers which are readily visible to the public, appearance should be given consideration if it does not add appreciably to the cost of the pier.

204.6 RETAINING WALLS

Perform a wall justification in accordance with Section 1404 of the ODOT Location and Design Manual, Volume Three. Generally, the justification compares the

practicality, constructability and economics of the various types of retailing walls listed below:

A. Cast-in-place reinforced concrete
B. Precast concrete
C. Tied-back
D. Adjacent drilled shafts
E. Sheet piling
F. H-piling with lagging
G. Cellular (Block, Bin or Crib)
H. Soil nail
I. Mechanically Stabilized Earth (MSE)

Refer to SS840 for accredited MSE wall systems. Contact the Office of Structural Engineering for modular block wall systems. For wall systems that utilize geogrid reinforcements, the wall height shall be limited to 30 ft.

204.6.1 DESIGN CONSTRAINTS

Below are some design constraints to consider in the wall justification study to establish acceptable wall types:

A. Future use of the site (future excavations cannot be made in Mechanically Stabilized Embankments)
B. Deflection and/or differential settlements
C. Accessibility to the construction site
D. Aesthetics, including wall textures
E. Right-of-way (or other physical constraints)
F. Cost (approximate cost analysis)
G. Stage construction
H. Stability (long-term and during construction)
I. Railroad policies

204.6.2 STAGE 1 DETAIL DESIGN SUBMISSION FOR RETAINING WALLS

When a justification study has determined that a retaining wall is required, generally the wall will be a cast-in-place reinforced concrete wall or some type of proprietary wall system. The use of proprietary wall systems should be considered when the wall quantity for the project exceeds 5000 ft^2 [450 m^2].

For the purposes of determining vertical clearances, "Reconstructed" shall refer to an improvement of an existing structure involving the replacement of the entire superstructure.

207.2 BRIDGE SUPERSTRUCTURE

Bridge superstructure widths shall be established in accordance with ODOT↘s Location and Design Manual, Section 302, unless specified in the scope of services or other contract criteria.

207.3 LATERAL CLEARANCE

Divided highways having four or more lanes crossing under an intersecting highway shall be provided with a minimum lateral clearance of 30 feet [9000 mm] from the edge of traveled lane to the point where the 2:1 back slope intersects the radius at the toe of the 2:1 slope. Refer to ODOT↘s Location and Design Manual, Figure 307-2. To satisfy cost considerations or in order to maintain the typical roadway section (including roadway ditch) of the underpass through the structure, for four or more lane highways, wall abutments or the 2:1 slope of typical two-span grade separation structures may be located farther than 30 feet [9000 mm] from the near edge of traveled lane.

Lateral clearances for other roadway classifications shall be established in accordance with ODOT↘s Location and Design Manual, Section 302, unless specified in the scope of services or other contract criteria.

207.4 INTERFERENCE DUE TO EXISTING SUBSTRUCTURE

Where a new pier or abutment is placed at the location of an existing pier or abutment the usual "Removal" note (and also the text of CMS 202.03) calls for sufficient removal of the old pier or abutment to permit construction of the new. However, a new pier or abutment preferably should not be located at an existing pier or abutment where the existing masonry may extend appreciably below the bottom of the proposed footing, or appreciably below the ground in case of capped-pile construction. This applies particularly where piles are to be driven. It is desirable to avoid the difficulty and expense of removing deep underground portions of the existing substructure and to avoid the resultant disturbance of the ground.

Where existing substructure units are shown on the Site Plan, the accuracy of the locations and extent should be carefully drawn. The existing substructure configuration should be shown based on existing plans or field verified dimensions, otherwise just a vertical line showing the approximate face of the abutment or pier widths should be shown. Misrepresentation of the location of the existing substructure units has resulted in expensive change orders during construction. Existing dimensions should be labeled as (+/-) plus or minus.

207.5 BRIDGE STRUCTURE, SKEW, CURVATURE AND SUPERELEVATION

During the Assessment of Feasible Alternatives, the location of the proposed structure should be studied to attempt to eliminate the presence of excessive skew, curves or extreme superelevation transitions within the actual bridge limits.

208 TEMPORARY SHORING

208.1 SUPPORT OF EXCAVATIONS

208.1.1 ESTIMATED QUANTITIES

Provide a pay item for Cofferdams and Excavation Bracing when either of the following conditions exist:

A. Excavation that extends below the ground water table or below an elevation defined as 3-ft above the Ordinary High Water Mark (see BDM Section 203.4 for more information).

B. Excavation of earth supporting:

   1. Structures/utilities when the structure/utility is located within a distance of 1½ times the depth of excavation. Designers shall consider the location of bridge substructures supported on shallow foundations but not substructures supported on deep foundations unless the excavation will expose the deep foundation members.

   2. Railroads when the excavation encroaches on foundation material defined by each railroad.

   3. Roadways used to maintain traffic when the edge line is located within a distance of one-half times the depth of excavation.

When a pay item for Cofferdams and Excavation Bracing is required for (B) above, show the approximate locations of the Excavation Bracing in the Plans.

208.1.2 EXCAVATION BRACING PLAN WARRANTS

Provide a complete design for Excavation Bracing in the Plans for each of the following conditions:

A. BDM Section 208.1.1.B.1

B. BDM Section 208.1.1.B.2

C. BDM Section 208.1.1.B.3 and the depth of any side of the excavation exceeds 8-ft

The designer shall consider the feasibility of this Excavation Bracing during the Structure Type

Study.

208.1.3 DESIGN REQUIREMENTS

When warranted according to BDM Section 208.1.2, the design for Excavation Bracing shall be in accordance with the latest AASHTO Guide Design Specifications for Bridge Temporary Works and the latest edition of either the AASHTO LRFD Bridge Design Specifications or the AASHTO Standard Specifications for Highway Bridges. The design methodology may be in accordance with either Load and Resistance Factor Design or Allowable Stress Design.

As a minimum, provide the following information in the Plans:

A. Design methodology & governing specifications
B. Minimum section modulus (for sheet pile walls)
C. Top elevation and minimum bottom elevation
D. Limits of bracing
E. Sequence of installation and/or operations.
F. If bracing or tiebacks are required, provide all details, connections and member sizes

For projects involving railroads, the requirements will be different as each railroad company has their own specific requirements. The designer is responsible for contacting the responsible railroad and obtaining the specific requirements for design and construction.

208.1.4 DESIGN CONSIDERATIONS

Following are some conceptual ideas for the design of Excavation Bracing:

A. A cantilever sheet pile wall should generally be used for excavation up to approximately 12-ft in height.
B. For cuts greater than 12-ft in height, anchored or braced walls will generally be required.
C. Braced walls using waler and struts can sometimes be braced against another rigid element on the excavated side.
D. The use of steel “H” piles with lagging is also a practical solution for some sites. Please note that some railroad companies allow only interlocking steel sheet piling adjacent to their tracks.
E. Where sufficient embedment cannot be attained by driving sheet piling because of the location of shallow bedrock, predrilled holes into the bedrock with soldier “H” piles and lagging should be considered.

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208.2 SUPPORT OF EXISTING STRUCTURE

Whenever temporary support is required for a portion of an existing structure used to maintain traffic, the Design Agency shall provide sufficient information in the plans to allow contractors to prepare bids and construct the project. The feasibility of temporary support of an existing structure should be considered and discussed during the Structure Type Study.

The design shown in the plans should include: permissible locations of temporary support; temporary support loads; construction sequences; construction limitations not otherwise provided in C&MS 501.05; and any remaining plan notes. As a minimum, the plan notes should address method of measurement and basis of payment for temporary support.

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properly performed and are at locations of minimum stress. Construction joints shall be designed to transfer all loads.

302 SUPERSTRUCTURE

302.1 GENERAL CONCRETE REQUIREMENTS

302.1.1 CONCRETE DESIGN ALLOWABLES

The following concrete strengths (f'c) shall be assumed for design purposes:

A. Substructure Concrete (Class QC1)

1. Load Factor Design ..... 4.0 ksi
2. Service Load Design ..... Unit stress = 0.33 x 4.0 ksi = 1.3 ksi

B. Superstructure Concrete (Class QC2)

1. Load Factor Design ..... 4.5 ksi
2. Service Load Design ..... Unit stress = 0.33 x 4.5 ksi = 1.5 ksi

C. Drilled Shaft Concrete (Class QC4 or QC5)

1. Load Factor Design ..... 4.0 ksi
2. Service Load Design ..... Unit stress = 0.33 x 4.0 ksi = 1.3 ksi

302.1.2 SELECTION OF CONCRETE FOR BRIDGE STRUCTURES

The following concrete types may be specified for substructure concrete:

A. Class QC1 Concrete
B. Class QC1 Concrete with QC/QA
C. Class QC3 Special Concrete
D. Class QC4 Mass Concrete

The following concrete types may be specified for superstructure concrete:

A. Class QC2 Concrete
B. Class QC2 Concrete with QC/QA
C. Class QC3 Special Concrete
D. Class QC4 Mass Concrete

Concrete with QC/QA shall be specified for the class of concrete when the total concrete quantity for that class exceeds 150 yd^3.

Class QC3 Special Concrete shall be specified when concrete strengths and/or permeability other than the QC1 or QC2 are necessary.

Class QC4 Mass Concrete shall be specified when the minimum dimension for a concrete component is 5-ft or greater or the diameter of a drilled shaft is 7-ft or greater.

302.1.3 WEARING SURFACE

302.1.3.1 TYPES

A. 1 inch [25 mm] monolithic concrete - defined as the top one inch [25 mm] of a concrete deck slab. This one inch [25 mm] thickness shall not be considered in the structural design of the deck slab or as part of the composite section.

B. 3 inches [75 mm] asphalt concrete - defined as the minimum asphaltic concrete wearing surface to be used on only non-composite prestressed box beams. The asphalt concrete

be sealed with an epoxy-urethane sealer.

F. Concrete decks on prestressed I-beam superstructures with sidewalks:

The vertical face of curb; the top of the curb/sidewalk; the inside face, top and outside face of the parapet; the deck fascia; the underside of the deck to the edge of the top flange; the exterior fascia of the beam; the underside of the bottom flange; and the inside face of the bottom flange shall be sealed with an epoxy-urethane sealer.

G. Concrete decks on prestressed I-beam superstructures with deflector parapets:

The inside face, top and outside face of parapet; the deck fascia; the underside of the deck to the edge of the top flange; the exterior fascia of the beam; the underside of the bottom flange; and the inside face of the bottom flange shall be sealed with either an epoxy-urethane sealer.

Concrete surfaces that include patches should be sealed with an epoxy-urethane sealer so the concrete color will remain uniform.

The designer should include in the plans actual details showing the position, location and area required to be sealed. A plan note should not be used to describe the location as there can be both description and interpretation problems.

The designer has the option to select a specific type of sealer, epoxy-urethane or non-epoxy. The designer may also use a bid item for sealer, with no preference, and allow the contractor to choose based on cost.

Due to poor performance, epoxy-only sealers shall not be used.

In areas where concrete surfaces have a history of graffiti vandalism, the designer may add a permanent graffiti coating meeting the requirements of Supplement 1083 on top of the epoxy-urethane or non-epoxy sealer. A plan note is available in BDM Section 600. The designer should limit the concrete surfaces that are treated with permanent graffiti coatings to those reachable by easy climbing and visible to the traveling public.

302.2 REINFORCED CONCRETE DECK ON STRINGERS

302.2.1 DECK THICKNESS

Bridge deck concrete thickness shall meet the requirements of AASHTO, this Manual and Standards.

For reinforced concrete decks on steel or concrete stringers the deck thickness shall be computed by the following formula:

Tmin (inches) = (S + 17)(12) ÷ 36 ≥ 8½″

Tmin (mm) = (S + 5200) ÷ 36 ≥ 215 mm

302.4.1.14.a BOLTS

Field splices in beams and girders shall be bolted connections using high strength bolts, ASTM A325[M].

The designer shall specify the diameter of the bolts and check that the type (Type I for Galvanized or Type III for Weathering) of A325[M] bolts is described in the coating notes or bolt material specifications.

Coating systems that are zinc based, such as OZEU, IZEU, Galvanizing or Metallizing require galvanized Type I bolts.

Un-coated weathering steel structures shall have A325[M], Type III bolts. If the faying surfaces under both the head and nut of every bolt of a weathering steel member are coated, specify galvanized A325[M] Type I bolts. Otherwise, specify A325[M], Type III bolts.

Generally, bolted splices should be designed using 1 inch [25 mm] or 1⅛ inch [29 mm] diameter bolts. No metric bolts or studs are available in the small quantities required for bridges.

The use of A490[M] bolts is not permitted.

302.4.1.14.b EDGE DISTANCES

1" [25 mm] diameter bolts used in splice plates should be detailed to allow for 2" [50 mm] edge distances in lieu of the AASHTO requirements. 1⅛ inch [29 mm] diameter bolts used in splice plates should be detailed to allow for 2¼ inch [60 mm] edge distances in lieu of the AASHTO requirements.

This increase to AASHTO's edge distances is to help alleviate the problem fabricators have of drilling bolt holes in flange splice plates and maintaining required minimum edge distances, especially on the inside splice plates.

If larger diameter bolts are specified the designer shall add ¼ inch [6 mm] to the AASHTO minimum edge distance.

302.4.1.14.c LOCATION OF FIELD SPLICES

Generally bolted splices should be located at points of dead load contraflecture on a continuous structure. Splices may also be supplied to help meet shipping and handling limitations. Plans should show optional field splice locations.

302.4.1.15 SHEAR CONNECTORS

AASHTO Sections 10.38.2.3 and 10.38.2.4 on studs shall be followed.

Shear studs shall be automatic welded studs. The use of channel sections is not allowed. 7/8 inch [22 mm] diameter studs are recommended as a standard diameter. The length of stud specified should be checked with manufacturers as to availability.

The Department's policy of using a 2 inch [50 mm] deep haunch over the top flange will have an effect on the length of shear studs.

Shear studs shall be field installed. In the case of galvanized structures, the design plans shall allow shop installation of studs prior to galvanizing or field installation after removing the coating by grinding at each stud location. If the studs are shop installed, the Contractor will be responsible for meeting all applicable OSHA requirements. A Detail note is available in Section 700.

302.4.2 ROLLED BEAMS

302.4.2.1 GALVANIZED BEAM STRUCTURES

If a galvanized bridge structure is the selected structure type, the following problems should be recognized and dealt with by the designer.

Galvanizing tanks are shallow and normally not longer than 45 feet [13.7 meters] in length.

303 SUBSTRUCTURE

303.1 GENERAL

If a pier column, wall or other structural member is located in the sloped portion of an embankment, the design active earth pressure shall be applied to an effective width (S) of the member as defined in the following table. The effective width accounts for the earth pressure due to the embankment directly in back of the member and the earth pressure due to the adjacent embankment on each side.

Type of Member		S
Single Column or Wall		a + H
Interior Columns	$c \geq H$	a + H
	$c < H$	$a+H-(H-c)^2/H$
Exterior Columns	$c \geq H$	a + H
	$c < H$	$a+H-(H-c)^2/2H$

Where: c = One-half of the distance between adjacent members measured face to face.
H = Height of the active earth fill measured at the face of the footing.
a = Width of the member.

The minimum design earth pressure shall be 40 psf [2.0 kPa] unless granular backfill is provided.

303.1.1 SEALING OF CONCRETE SURFACES, SUBSTRUCTURE

Specifications for the sealer are defined in CMS 512. Concrete surfaces shall be sealed with a concrete sealer as follows:

A. The front face of abutment backwalls, from top to bridge seat, the bridge seat and the breastwall down to the groundline shall be sealed with an epoxy-urethane or non-epoxy sealer. (Note: Sealing of the backwall shall not be required on prestressed box beam bridges because the beams are installed before the backwall is placed.)

B. The exposed surfaces of all wingwalls and retaining walls, exclusive of abutment type, that are within 30 feet [10 000 mm] of any pavement edge shall be sealed with an epoxy-urethane sealer.

C. Ends and sides of piers exposed to traffic-induced deicer spray, from any direction, shall be sealed with either an epoxy-urethane or non-epoxy sealer. Top of pier caps need only be sealed if there is an expansion joint or the tops are subject to exposure to deicer-laden water.

D. The total vertical surface of piers which are adjacent to traffic lanes shall be sealed with either an epoxy-urethane or non-epoxy sealer. Structures with A588[M] weathering steel superstructures shall also have their piers sealed as stated above with either an epoxy-urethane or non-epoxy sealer.

The designer should include in the plans actual details showing the position, location and area required to be sealed. A plan note to describe the position should not be used as there can be both description and interpretation problems.

The designer has the option to select a specific type of sealer, epoxy-urethane or non-epoxy. The designer also has the alternative to just use a bid item for sealer, with no preference, and allows the contractor to choose based on cost.

See Figures 321, 322 & 323.

In areas where concrete surfaces have a history of graffiti vandalism, the designer may add a permanent graffiti coating meeting the requirements of Supplement 1083 on top of the epoxy-urethane or non-epoxy sealer. A plan note is available in BDM Section 600. The designer should limit the concrete surfaces that are treated with permanent graffiti coatings to those reachable by easy climbing and visible to the traveling public.

303.2 ABUTMENTS

303.2.1 GENERAL

Abutments should be provided with backwalls to protect the superstructure from contact with the approach fill and to assist in preventing water from reaching the bridge seat.

For members designed to retain earth embankments and restrained from deflecting freely at their tops, the computed backfill pressure shall be determined by using at-rest pressure. Examples include: rigid frame bridges, abutment walls keyed to the superstructure, and some types of U-abutments.

For abutment walls of structures designed without provision for expansion between superstructure and substructure and where an appreciable amount of superstructure expansion is anticipated, passive earth pressure should be considered in the design.

To allow for slight tilting of wall type abutments after the backfill has been placed, batter the front face 1/16" for each foot [5 mm for each 1000 mm] of abutment height. Height is measured from bottom of footing to the roadway surface.

Pier 5 Piles:
52 piles 90 ft long, order length
1 dynamic load testing item

The Designer should provide the following items in the Estimated Quantities:

Item	Extension	Total	Unit	Description
506	11100	Lump	Sum	Static Load Test
506	12200	1	Each	Subsequent Static Load Test
507	00500	4200	ft	12" Cast-In-Place Reinforced Concrete Piles, Driven
507	00550	4500	ft	12" Cast-In-Place Reinforced Concrete Piles, Furnished
507	00600	26,820	ft	14" Cast-In-Place Reinforced Concrete Piles, Driven
507	00650	28,680	ft	14" Cast-In-Place Reinforced Concrete Piles, Furnished
523	20000	6	Each	Dynamic Load Testing
523	20500	4	Each	Restriking

303.4.3 DRILLED SHAFTS

When determining the structural capacity of drilled shafts, multiply the compressive strength provided by the concrete mix design by a factor of 0.9 [e.g. f'_c = 0.9 (4.5 ksi) = 4.0 ksi for Class QC5] for all limit states.

3'-6" [1065 mm] diameter drilled shafts for piers and 3'-0" [915 mm] diameter shafts for abutments are normally used.

The diameter of bedrock sockets of a drilled shaft are generally 6 inches [150 mm] less in diameter than the diameter of the drilled shaft above the bedrock elevation. The 6 inch [150 mm] downsize can be eliminated for abutment shafts. Reinforcing steel cages should be based on the bedrock socket diameter.

The drilled shaft diameter for the abutment shafts can be shown as one constant diameter for the full length of the drilled shaft (through bedrock and through soil).

Spiral reinforcement used in the drilled shaft is normally a #4 [#13M] bar at a 4½ inch [115 mm] pitch with a spiral diameter of 6 inches [150 mm] less, out to out of spiral cage than the drilled shaft diameter. (Note AASHTO specifications do not recognize a 4½ inch [115 mm] pitch as meeting spiral requirements definition 8.18.2.2.3) When steel casing is left in place, a pitch of 12 inches [300 mm] should be used for the spiral reinforcing.

The minimum clear distance between longitudinal and lateral reinforcement shall not be less than 5 times the maximum aggregate size. Where heavy reinforcement is required, consideration may be given to an inner and outer reinforcing cage.

Drilled shafts with diameters of less than 3'-0" [915 mm] are not recommended.

The diameter of the drilled shafts should be 6 inches [150 mm] larger than the pier column diameter so that if the drilled shaft is slightly misaligned, the pier column can still be placed at plan location, although the pier column would not be exactly centered on a misaligned-drilled shaft.

For record and project use, each drilled shaft for a structure shall be individually identified by a unique number. The designer may choose to number the drilled shafts on the individual

Modifications to the ODOT standard railing types or other NCHRP 350 or MASH approved railing system should be avoided. Additional structural steel tubing added to satisfy pedestrian concerns does not require additional crash testing provided these elements do not protrude nearer to the roadway than the rail elements on the tested design and they do not present any type of snagging potential to an impacting vehicle. If an accepted crash tested railing system is modified, the face geometry (i.e. offset, rail height, spacing, etc.) shall match the tested design and the static strength and deflections shall remain at least equal to the tested design. Include with the preliminary design submission to the Office of Structural Engineering, strength and deflection calculations to support these modifications. The calculations shall follow the procedure defined in the AASHTO LRFD Bridge Design Specifications, 2nd Edition, Sections A13.1-3. The intent of any modification shall be to maintain the original NCHRP 350 or MASH acceptability level.

All railing elements fabricated with ASTM A500 steel tubing shall specify a drop-weight tear test per CMS 707.10. Provisions shall be made at tube splices for expansion and contraction. Steel railing systems shall also allow for structural movement at expansion joints without adversely affecting the system's level of acceptability.

Aesthetically pleasing railing systems have been successfully crash tested but are for use only where TL-2 acceptability requirements are allowed. These systems include the Texas Classic Traffic Railing, Type T411 with open windows, a smooth stone masonry barrier with reinforced concrete core wall and an artificial stone precast concrete barrier. Detailed information regarding the latter two systems may be found in FHWA Report No. FHWA-RD-90-087 "Guardrail Testing Program: Final Report", June 1990 and FHWA Report No. FHWA-SA-91-051 "Summary Report on Selected Aesthetic Bridge Rails and Guardrails", June 1992.

The recommended railing design for bridges with combination vehicular and pedestrian traffic is detailed in Standard Bridge Drawing BR-2-15. Other designs are allowed as previously mentioned above, provided the following requirements are met:

A. The curb height shall be 8".
B. The sidewalk width shall be 5'-0" or greater.

A pedestrian railing may be used in lieu of a crash tested barrier at the deck edge provided a crash tested barrier system meeting the minimum requirements for the specific location is used to separate the vehicular and pedestrian traffic. Pedestrian railing shall be designed in accordance with AASHTO.

304.2 STANDARD RAILING TYPES

Drawing No.	Description	NCHRP Level
BR-1-13	36" New Jersey Shape Concrete Bridge Railing	TL-4
	42" New Jersey Shape Concrete Bridge Railing	TL-5
BR-2-15	Bridge Sidewalk Railing with Concrete Parapet	TL-4
DBR-2-73	Deep Beam Bridge Guardrail	TL-2
DBR-3-11	Deep Beam Bridge Retrofit Railing	TL-3
PCB-91	Portable Concrete Barrier (Fully Anchored)	TL-4
	Portable Concrete Barrier (Unanchored)	TL-3
SBR-1-13	42" Single Slope Concrete Bridge Railing	TL-5
SBR-2-13	57” Single Slope Concrete Median	TL-5
TBR-91	Thrie Beam Bridge Railing (Retrofit)	TL-4
TST-1-99	Twin Steel Tube Bridge Railing	TL-4

304.3 WHEN TO USE

304.3.1 PARAPET TYPE (BR-1-13, SBR-1-13 & SBR-2-13)

The department currently has three (3) standard concrete parapet type bridge railing systems for use at deck edges: a 36" New Jersey shape, a 42" New Jersey shape and a 42" single slope shape. These systems are for use on roadway and railroad overpass structures with no sidewalks and structures where the finished deck surface is 25-ft or more above the ground line or water surface. Details for these parapet types, including end transitions to terminal assemblies, are provided in the Standard Bridge Drawings. The transition section may be placed on a structure’s turned back wingwalls, widened approach slab or directly on the actual structure.

The 36" barrier section is for use on structures located on two (2) lane routes with an ADTT in one direction less than 2500.

The 42" barrier sections are for use on structures located on interstates, divided highways of four

temporary barrier system when a permanent bridge railing system does not exist. Application guidelines for PCB-91 are provided in Design Data Sheet, PCB-DD, available at the Office of Structural Engineering web site.

The designer is required to detail the installation requirements, including the number of anchor bolts per barrier, in the bridge plans. The pay item for this barrier system is Item 622 - Portable Concrete Barrier, 32 inch, Bridge Mounted. Although temporary railing is to be specified and completely described in the bridge plans, temporary railing is a roadway item and shall be included in the roadway quantities.

On projects where maintaining minimum lane widths during a construction phase is not possible due to limited bridge width, the use of a top mounted steel post and tubular steel rail system, similar to the Twin Steel Tube bridge guardrail, may be justified. The railing, post and anchorage designs of these systems are to be in accordance with the AASHTO LRFD Bridge Design Specifications, 2nd Edition, Sections A13.1-3.

304.3.6 BRIDGE SIDEWALK RAILING WITH CONCRETE PARAPETS (BR-2-15)

This railing system is for use on bridges with sidewalks at least 5'-0" wide and a curb height of 8 inches. Although this system is essentially a combination railing system, it may also be used without a sidewalk in applications where pedestrian traffic is not a concern.

Where Vandal Protection Fencing is required, the fencing shall be installed behind the steel tubing as shown in Figure 327. However, the steel tubing may be omitted if the concrete parapet height is 32" or greater. See Figure 326. If the tubing is omitted, the fencing should extend the full length of the concrete parapet and the additional 18" parapet height at each end, as detailed in the standard, is not required.

The concrete parapet shall be designed and detailed as follows:

A. All horizontal reinforcing steel shall be detailed as continuous for the total length of the structure.

B. Crack control joints shall be sawed into the concrete parapets. The distance between the saw-cut joints on the structure shall be between 6'-0" and 10'-0". The detailed locations of the crack control joints and vertical reinforcing bars shall be shown in the contract plans.

C. The saw-cut crack control joint shall be detailed as 1 ¼ inch deep and shall be filled with a polyurethane or polymeric material conforming to ASTM C920, Type S. The bottom one-half inch of both the inside and outside face shall be left unsealed to allow any water that enters the joint to escape. This requirement is established in the Standard Bridge Drawing; however, a plan note is required for special designs. See Section 600.

304.3.7 DEEP BEAM BRIDGE RETROFIT RAILING (DBR-3-11)

This system has been accepted by FHWA as a TL-3 compliant railing. The DBR-3-11 railing system is intended solely as an upgrade for existing Deep Beam Bridge Guardrail (DBR-2-73) installations and shall be specified on all bridge projects with existing DBR-2-73 railing that require at least TL-3 acceptance level according to BDM Section 304.1. The use of the AASHTO "Guide Specifications for Bridge Railing" will not be permitted.

Sidewalk details for standard expansion devices (strip seals) are shown on the standards. For non-standard devices, a curb plate and sidewalk cover plate will be required. The Curb and sidewalk plates should be separated at the interface of the sidewalk and curb. See details on Standard Bride Drawings: EXJ-2-81, EXJ-3-82, EXJ-4-87, EXJ-5-93 and EXJ-6-17 for sidewalk plates.

306.1.3 EXPANSION DEVICES WITH STAGE CONSTRUCTION

On projects involving stage construction, joints in the seal armor must be located and shown in the plans. At the stage construction lines, expansion devices should require complete penetration welded butt joints. If butt welds will be in contact with a sealing gland the butt-welded joint shall be ground flush at the contact area.

306.2 EXPANSION DEVICE TYPES

306.2.1 ABUTMENT JOINTS IN BITUMINOUS CONCRETE, BOX BEAM BRIDGES

This poured joint seal system is capable of small expansion movements, up to 3/16". Refer to AS-1-15 Sheet 2, Detail A. This system requires including the following bid item in the structure estimated quantities: Item 409 - Sawing and Sealing Bituminous Concrete Joints.

306.2.2 ABUTMENT JOINTS AS PER AS-1-15

A group of no or small movement joints used for sealing and rotational purposes are detailed on Standard Bridge Drawing, AS-1-15.

306.2.3 EXPANSION JOINTS USING POLYMER MODIFIED ASPHALT BINDER

This device is for use on structures with concrete or asphalt overlays and where total expected movement is 0 to 1½". The Department has a Supplemental Specification for the Polymer Modified Asphalt Expansion Joint System.

Thickness of the polymer-modified joint shall be between 2" and 5". The design plans shall show a plan view and cross-section of each polymer modified asphalt expansion joint location on the bridge. The plan view shall provide the station of the joint centerline at the centerline of construction, skew angle and dimension its length as measured along the centerline of the joint. The cross-section shall dimension the width and thickness of the joint, width of the expansion gap and other significant joint details.

306.2.4 STRIP SEAL EXPANSION DEVICES

The seal size is limited to a 5" [125 mm] maximum. Unpainted A588[M] weathering steel should not be used in the manufacture of this type expansion device as A588[M] does not perform well in the atmospheric conditions an expansion device is subjected to. Standard Bridge Drawings, EXJ-4-87, EXJ-5-93 and EXJ-6-17, are available. The designer must ensure that all details are covered in the plans because the standard drawing is not inclusive for all structure types.

The strip seal shall be of one piece across the total width of the structure. No splices will be acceptable.

306.2.5 COMPRESSION SEAL EXPANSION DEVICES

Maximum allowable seal size is 4" [100 mm]. A 5" [125 mm] wide seal shall not be used since installation problems have been encountered. Compression seal expansion devices are limited to structures with a maximum skew of 15 degrees. Movement should be limited so that the seal is not compressed greater than 60 percent or less than 20 percent.

The compression seal shall be of one piece across the total width of the structure. No splices will be acceptable. Standard Bridge Drawings EXJ-2-81 & EXJ-3-82 give generally used details.

306.2.6 STEEL SLIDING PLATE ENDDAMS, RETIRED STANDARD DRAWING SD-1-69

In general steel sliding plate enddams are not recommended for new structures. This expansion device is limited to total movement of 4" [100 mm], including movement in both directions.

Sliding plates should be configured to prevent binding and bearing when the superstructure is supported on elastomeric bearings.

Unpainted A588[M]/A709[M] Grade 50W materials are not recommended for construction of this type of joint.

306.2.7 MODULAR EXPANSION DEVICES

Modular expansion devices may be required for structures when total required movements exceed movement capacity of a strip or compression seal. Consult the Office of Structural Engineering for recommendations prior to completion of the project plans.

Modular devices main load bearing beams, support beams and welds shall be designed for fatigue.

Expansion Length (ft)	Expansion Length (m)	Joint Required	Approach Slab Joint
0 - 30	0 - 10	None	AS-1-15 detail B or C
30 - 125	10 - 38	PM (1) or EXJ-4-87	AS-1-15 detail B or C
125 - 400	38 - 125	EXJ-4-87	AS-1-15 detail B or C
400 +	125 +	TTED or MED	AS-1-15 detail B or C

PM = Polymer Modified Asphalt Joint
TTED = Tooth Type expansion device
MED = Modular Expansion Device
(1) = Stringer bridges with sidewalks should not use polymer modified expansion joint systems.

306.3.4 PRESTRESSED CONCRETE I-BEAM BRIDGES

The following table specifies joint requirements based on expansion length defined as the total length of structure, if no fixed bearing exists, or length from fixed bearing to proposed expansion device location if one exists.

Expansion Length (ft)	Expansion Length (m)	Joint Required	Approach Slab Joint
0 - 40	0 - 12	None	AS-1-15 detail B or C
40 - 225	12 - 65	PM (1) or EXJ-6-17	AS-1-15 detail B or C
225 - 500	65 - 150	EXJ-6-17	AS-1-15 detail B or C
500 +	150 +	TTED or MED	AS-1-15 detail B or C

PM = Polymer Modified Asphalt Joint
TTED = Tooth Type expansion device
MED = Modular Expansion Device
(1) = Stringer bridges with sidewalks should not use polymer modified expansion joint systems

306.3.5 NON-COMPOSITE PRESTRESSED BOX BEAM BRIDGES

The following table specifies joint requirements based on expansion length defined as the total length of structure, if no fixed bearing exists, or length from fixed bearing to proposed expansion

device location if one exists.

Expansion Length (ft)	Expansion Length (m)	Joint Required (2)	Approach Slab Joint
0 - 40	0 - 12		AS-1-15 detail A
40 - 225	12 - 65	PM (1) or EXJ-5-93	AS-1-15 detail E AS-1-15 detail B or C
225 - 500	65 - 150	EXJ-5-93	AS-1-15 detail B or C

PM = Polymer Modified Asphalt Joint
(1) = Bridges with sidewalks should not use polymer modified expansion joint systems
(2) = Joint requirements are for rigid or fixed abutments. For flexible abutments requiring no expansion movement a PM joint is recommended except for (1).

306.3.6 COMPOSITE PRESTRESSED CONCRETE BOX BEAM BRIDGES

The following table specifies joint requirements based on expansion length defined as the total length of structure, if no fixed bearing exists, or length from fixed bearing to proposed expansion device location if one exists.

Expansion Length (ft)	Expansion Length (m)	Joint Required (2)	Approach Slab Joint
0 - 40	0 - 12	PM	AS-1-15 detail D or F
40 - 225	12 - 65	PM (1) or EXJ-5-93	AS-1-15 detail D or F AS-1-15 detail B or C
225 - 500	65 - 150	EXJ-5-93	AS-1-15 detail B or C

PM = Polymer Modified Asphalt Joint
(1) = Bridges with sidewalks should not use polymer modified expansion joint systems
(2) = Joint requirements are for rigid or fixed abutments. For flexible abutments requiring no expansion movement a PM joint is recommended except for (1).

306.3.7 ALL TIMBER STRUCTURES

No allowance for temperature need be made.

2½" [65 mm] concrete cover

Superplasticized dense, Micro-silica, Epoxy, or Latex modified concrete overlay (Only applicable for existing decks)

Waterproofing and asphalt concrete overlay

Steel drip strip

Other (Specify)

602.5 MONOLITHIC WEARING SURFACE

Furnish the following note for concrete bridge decks.

[12] MONOLITHIC WEARING SURFACE is assumed, for design purposes, to be 1 inch [25 mm] thick.

602.6 SEALING OF CONCRETE SURFACES

Use the following note when permanent anti-graffiti coatings are required:

[13a] ITEM 512 SEALING OF CONCRETE SURFACES, AS PER PLAN, (PERMANENT GRAFFITI PROTECTION):
Apply a permanent graffiti coating qualified according to Supplement 1083 that is compatible with the concrete sealer over which it is applied. Apply the graffiti coating in accordance with the manufacturer's printed instructions.

603 EXISTING STRUCTURE REMOVAL NOTES

The following sample notes will serve as a guide in composing the note(s) for the removal of the existing structure. Modify the notes as required to fit the conditions. Use the following note if it is the desire of the owner to salvage any portion of the bridge.

[14] REMOVAL OF EXISTING STRUCTURE: Carefully dismantle the _____ and

store along the right-of-way for disposal by the State's forces.

Describe the degree of care to be exercised in the removal in sufficient detail to allow accurate bidding. For example, for a truss bridge where the stringers and floor beams are to be salvaged for reuse but it is permissible to flame cut the truss members, state that clearly along with any other restrictions or allowances. If this option is used, the pay item shall be "as per plan".

Use the following note when removal of structure to 1 foot [300 mm] below ground line as specified in CMS 202 will not fill the specific requirements of the project.

[15] ITEM 202, PORTIONS OF STRUCTURE REMOVED, AS PER PLAN: Remove abutments to Elev.____. Remove piers to Elev.____.

Use the following note when special protection of an existing structure to be incorporated into a

[71] INTERMEDIATE DIAPHRAGMS: Do not place the deck concrete until all intermediate diaphragms have been properly installed. If concrete diaphragms are used, complete the installation of the intermediate diaphragms at least 48 hours before deck placement begins. Concrete shall conform to C&MS 511 with a design strength of 4.5 ksi.

702.7.2 SEMI-INTEGRAL OR INTEGRAL ABUTMENT CONCRETE PLACEMENT FOR DIAPHRAGMS

Hardened concrete end diaphragms restrain the movement and rotation of beam/girder ends that occur during deck placement. This restraint will increase stress in both the beam/girder and diaphragm. Factors that can contribute to detrimental stress increases include large structure skew and phased construction. When these factors exist, hardened diaphragms should be avoided during the deck placement. The following table provides guidelines for concrete diaphragm placement options.

Description of Superstructure	Note
No phased construction, and Steel superstructures with skew < 30º, or I-beam superstructure with skew < 10º	[71a]
No phased construction, and Steel superstructures with skew ≥ 30º, or I-beam superstructure with skew ≥ 10º	[71b]
Phased construction with closure pour, and Steel superstructures with skew < 30º, or I-beam superstructure with skew < 10º	[71c]
Phased construction with closure pour, and Steel superstructures with skew ≥ 30º, or I-beam superstructure with skew ≥ 10º	[71d]
Phased construction without closure pour, and Steel superstructures with skew < 30º, or I-beam superstructure with skew < 10º	[71e]
Phased construction without closure pour, and Steel superstructures with skew ≥ 30º, or I-beam superstructure with skew ≥ 10º	[71f]

Designers should consider the absence of restraint at the diaphragm location and when calculating the unbraced length of beam/girder flanges. If necessary, temporary bracing details should be included in the plans. Temporary end bracing should be oriented perpendicular to beam/girder webs.

Use the following notes as prescribed in the table above:

[71a] ABUTMENT DIAPHRAGM CONCRETE: Place the diaphragm concrete encasing the structural member ends with the deck concrete or at least 48 hours before placement of the deck concrete. If placed separately, locate a horizontal construction joint in the diaphragm as shown on PSID-1-13, sheet 7 of 10 for prestressed I-beam superstructures or as shown on SICD-1-96 for steel superstructures and place remaining diaphragm concrete with the deck.

[71b] ABUTMENT DIAPHRAGM CONCRETE: Place the diaphragm concrete encasing the structural member ends after the deck placement in the adjacent span is complete. Procedures that place the abutment diaphragm with the deck concrete may be approved by the Engineer if the placement submittal can assure that the deck concrete in the adjacent span will be placed before concrete in the diaphragm has reached its initial set.

NOTE TO DESIGNER: (Applies only to [71b])

Locate the deck construction joint parallel to the centerline of the abutment offset 1-ft from the face of the diaphragm toward the span.

[71c] ABUTMENT DIAPHRAGM CONCRETE, PHASED CONSTRUCTION: Place the diaphragm concrete encasing the structural member ends of an individual phase with the deck concrete or at least 48 hours before placement of the deck concrete. If placed separately, locate a horizontal construction joint in the diaphragm as shown on PSID-1-13, sheet 7 of 10 for prestressed I-beam superstructures or as shown on SICD-1-96 for steel superstructures and place remaining diaphragm concrete with the deck. Place closure pour concrete in the diaphragm and deck concurrently.

NOTE TO DESIGNER: (Applies only to [71c])

If a closure pour is required in the deck per BDM Section 302.2.9, provide a closure pour in the diaphragm as well. Locate the closure pour in the diaphragm, as near as practical, to mid-bay and orient the vertical construction joints parallel to the centerline of the adjacent beam/girders. Provide 3-in chamfers at the acute corners.

[71d] ABUTMENT DIAPHRAGM CONCRETE, PHASED CONSTRUCTION: Place the diaphragm concrete encasing the structural member ends of an individual phase after the deck placement in the adjacent span is complete. Procedures that place the abutment diaphragm with the deck concrete may be approved by the Engineer if the placement submittal can assure that the deck concrete in the adjacent span will be placed before concrete in the diaphragm has reached its initial set. Place closure pour concrete in the diaphragm and deck concurrently.

NOTE TO DESIGNER: (Applies only to [71d])

If a closure pour is required in the deck per BDM Section 302.2.9, provide a closure pour in the diaphragm as well. Locate the closure pour in the diaphragm, as near as practical, to mid-bay and orient the vertical construction joints parallel to the centerline of the adjacent beam/girders. Locate the deck construction joint parallel to the centerline of the abutment offset 1-ft from the face of the diaphragm toward the span. Provide 3-in chamfers at the acute corners.

APPENDIX – MISC. BRIDGE INFORMATION

APPENDIX PURPOSE

The Bridge Design Manual's appendix serves three purposes.

A. One is to serve as a repository for special plan notes that are infrequently used or subject to frequent revision. These notes are generally large and detailed documents. When a bridge design requires the use of appendix notes one of two methods should be used to incorporate the notes into the project plans. One, the designer transfers the notes to plan sheets for inclusion into the bridge plans. The second method is to treat the note as un-numbered proposal note. This method requires the designer to include with the bid item(s) a reference to the proposal and supply electronic versions, or typed hard copies, of the note with the final plan submission. If the proposal note method is used, the designer shall ensure the notes are presentable, that it is clear what notes are to be used as proposal notes, and that the agency receiving the completed plans understands the notes must be included in the project's actual proposal. The choice of methods is the option of the owner.

B. The second purpose is to serve as a historical archive for old plan notes, old general notes or old proposal notes which are no longer active or not recommended for use.

C. The third purpose is to serve a repository for special bridge policy criteria and other items of similar concept.

AN-1 ACCREDITATION PROCEDURE FOR MSE AND OTHER PREFABRICATED RETAINING WALL SYSTEMS

1.0 DESCRIPTION

This document describes the process by which the Department will review and approve prefabricated Retaining Wall Systems (PRWS). PRWS include the following:

A. Precast Gravity, Semi-gravity, Bin, and Crib Retaining Wall Systems
B. Gravity Modular Block and Large Block Retaining Wall Systems
C. Mechanically Stabilized Earth (MSE) Retaining Wall Systems, which are listed as "Accredited MSE Wall Systems" in Supplemental Specification 840.

2.0 ACCREDITATION

Documents describing the PRWS approval process can be found on the Department's Approved List at:

http://www.dot.state.oh.us/Divisions/ConstructionMgt/Materials/Approved-List/Pages/default.aspx

Additional information can be found at:

http://www.dot.state.oh.us/Divisions/Engineering/Geotechnical/Pages/Announce.aspx

Submit the required documents to the Office of Geotechnical Engineering.

PAGES APPENDIX – 3 THROUGH APPENDIX – 37
HAVE BEEN INTENTIONALLY DELETED

AN-5 3 COAT SHOP PAINT SYSTEM IZEU

Un-numbered plan note to define specification requirements for shop application of the 3 coat IZEU paint system. To use this note The 863 item shall be AS PER PLAN.

As example:
Item 863 Lump Sum STRUCTURAL STEEL MEMBERS, LEVEL ?, AS PER PLAN

The note AN-4 follows as the AS PER PLAN specifications to have a a three (3) coat shop paint system applied.

1.0 DESCRIPTION

In addition to the requirements of Supplemental Specification 863, this item shall consist of furnishing all necessary labor, materials and equipment to clean, apply a three(3) coat shop applied IZEU system for Item 863 Structural Steel, including requirements for field cleaning and coating of surfaces only prime coated at the shop, and methods of repair for surfaces damaged in shipping, handling and erecting the structural steel and any other damages during construction. Section 863.29 and 863.30 shall not apply.

This specification shall also include galvanizing, CMS 711.02, of all nuts, washers, bolts, anchor bolts, and any other structural steel items requiring galvanizing as part of item 863.

All shop painting shall be applied in a structural steel fabrication shop having permanent buildings per SS863.07 and pre qualified at the same SS863 level as the structural steel fabricator. The painter is under the supervision of a QCPS and is the SS863 Fabricator, the field painting sub-contractor performing touch up work in the field and or shop coating at the 863 Fabricator's facility or an independent painter meeting the qualifications of SSPC QP3 with facilities evaluation and acceptance by the Department.

2.0 MATERIAL

A. A three coat paint system consisting of an:

1. Inorganic Zinc Prime Coat meeting the requirements of CMS 708.17

2. Epoxy Intermediate Coat meeting the requirements of Supplemental Specification 910 entitled "OZEU Structural Steel Paint".

3. Urethane Finish Coat meeting the requirements of Supplemental Specification 910 entitled "OZEU Structural Steel Paint".

B. A tie coat consisting of an Epoxy Intermediate Coat, meeting the requirements of Supplemental Specification 910, "Epoxy Intermediate Coat" and thinned 50%, by volume,

ARN-38 RETIRED NOTE 54

Include the following note in the Structural General Notes when a concrete parapet or railing is used and standard drawings do not cover the below requirements.

[54] CONCRETE PARAPETS: As soon as a concrete saw can be operated without damaging the freshly placed concrete, sawcut 1 1/4" [32 mm] deep control joints into the perimeter of the concrete parapet starting and ending at the elevation of the concrete deck. Place the sawcuts at a minimum of 6 feet [2 meter] and a maximum of 10 feet [3 meter] centers. Use an edge guide, fence, or jig to ensure that the cut joint is straight, true, and aligned on all faces of the parapet. The joint width shall be the width of the saw blade, a nominal width of 1/4 inch [32 mm]. Seal the perimeter of the deflection control joint to a minimum depth of 1 inch [25 mm] with a polyurethane or polymeric material conforming to ASTM C920, Type S. Leave the bottom ½ inch [13 mm] of the inside and outside face unsealed to allow water to escape.

HISTORY: Note **[54]** was retired with the release of BR-1-13, SBR-1-13 and SBR-2-13.

ARN-39 RETIRED NOTE 13b

Use the following notes when sacrificial anti-graffiti coatings are required:

[13b] ITEM 512 SEALING OF CONCRETE SURFACES, AS PER PLAN, (SACRIFICIAL GRAFFITI PROTECTION):
Apply a permanent graffiti coating qualified according to Supplement 1083 that is compatible with the concrete sealer over which it is applied. Apply the graffiti coating in accordance with the manufacturer's printed instructions.

HISTORY: Note **[13b]** was retired when the use of sacrificial graffiti coatings were discontinued due to ineffectiveness.