Iowa Department of Transportation

MINUTES
OF
IOWA D.O.T. SPECIFICATION COMMITTEE MEETING

April 14, 2011

Members Present:	Jim Berger	Office of Materials
	Donna Buchwald	Office of Local Systems
	Eric Johnsen, Secretary	Specifications Section
	Bruce Kuehl	District 6 - Construction
	Deanna Maifield	Office of Design
	Doug McDonald	District 1 - Marshalltown RCE
	Gary Novey	Office of Bridges & Structures
	Dan Redmond	District 4 - Materials
	Tom Reis, Chair	Specifications Section
	John Selmer	Statewide Operations Bureau
	John Smythe	Office of Construction
	Willy Sorensen	Office of Traffic & Safety
Members Not Present:	Roger Bierbaum	Office of Contracts
Advisory Members Present:	Lisa Rold	FHWA
	Paul Wiegand	SUDAS
Others Present:	Nicole Fox	Office of Local Systems
	Ed Kasper	Office of Contracts
	Phil Pratt	FHWA

Tom Reis, Specifications Engineer, opened the meeting. The following items were discussed in accordance with the agenda dated April 7, 2011:

1. Article 1104.10, Railroad Crossings.

The Office of Design requested changes to incorporate a standard plan note into the Standard Specifications.

2. Article 1104.08, Final Cleaning Up.

The Office of Design requested changes to incorporate a standard plan note into the Standard Specifications.

3. Article 1108.01, Subletting of Contact.

The Office of Contracts requested changes to allow leasing of employees by contractors.

4. Article 2301.02, B, 6, Use of Supplementary Cementitious Materials.

The Office of Materials requested changes to eliminate confusion in the field on use of supplementary cementitious materials.

5. **Section 2416, Rigid Pipe Culverts.**
Section 4145, Concrete Culvert Pipe.

The Office of Materials requested changes to add RCP class designations into the Standard Specifications.

6. **Section 2435, Sanitary and Storm Sewer Structures.**

The Office of Design requested changes to match SUDAS specifications.

7. **Article 2513.03, A, 2, b, 3, Concrete Barrier.**

The Office of Materials requested changes to allow more variation in combined gradations for barrier rail concrete mixes.

8. **Section 2516, Removal and Construction of Retaining Walls and Steps.**

The Office of Design requested changes to assimilate SUDAS specifications.

9. **Voiding Standard Plan Notes.**

The Office of Design requested voiding a standard plan note.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 1**
Submittal Date: 2/25/11	**Proposed Effective Date:** 10/18/11	
Article No.: 1104.10 **Title:** Railroad Crossings	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 4/10/2011	**Effective Date:** 10/18/2011

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

1104.10, RAILROAD CROSSINGS.

REPLACE the Article:

Whenever the work involves construction with which railroad companies are concerned, the performance of the work is contingent upon arrangements with the railroad companies for the proposed construction. The performance of the work shall be in accordance with arrangements established by the Contracting Authority. The Contractor may make additional arrangements, such as establishment of temporary railroad crossings required by the Contractor for construction operations. The cost due the railroad for such arrangements shall be the responsibility of the Contractor. Claims will not be allowed for loss or damage caused by failure of the railroad to comply with provisions of the agreement with the Contracting Authority. The Contracting Authority will institute necessary legal action to enforce the conditions of its agreement with the railroad company.

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

Reason for Revision: The proposed changes consist of language currently contained in Standard Note 262-2 (see below). The Office of Design is proposing this language be added (and updated if needed) to the Standard Specifications.

07-21-87 262-2

The establishment of temporary railroad crossings which are required by the contractor for construction operations shall be the responsibility of the contractor. The cost due the railroad for any such temporary crossing including replacing contaminated ballast shall be borne by the contractor.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 2**
Submittal Date: 2/25/11	**Proposed Effective Date:** 10/18/11	
Article No.: 1104.08 **Title:** Final Cleaning Up	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 4/14/2011	**Effective Date:** 10/18/2011

Specification Committee Approved Text:

1104.08, Final Cleaning Up.

Replace the Article and title:

1104.08 ~~FINAL~~ CLEAN~~ING~~ UP.

A. Holes resulting from operations of the Contractor, including removal of guardrail posts, fence posts, utility poles, or foundation studies, shall be filled and consolidated to finished grade as directed by the Engineer to prevent future settlement. Voids shall be filled as soon as practical, preferably the day created and not later than the following day. Portions of the right-of-way or project limits (including borrow areas and operation sites) disturbed by operations of the Contractor shall be restored to an acceptable condition. This operation shall be considered incidental to other bid items on the contract.

~~A~~ B. ~~Before final acceptance of the work~~ During construction, the Contractor shall remove all unused material and rubbish from the site of the work, remedy any objectionable conditions the Contractor may have created on private property, and leave the right-of-way in a neat and presentable condition. The Contractor shall not make agreements which allow~~s~~ salvaged or unused material to remain on private property within view of a road except when consistent with previous land use.

~~B~~ C. All ground occupied by the Contractor in connection with the work, which is within view of or adjacent to a road, shall be restored. Restoration shall include appropriate smoothing to its original condition and may include making the area suitable for cultivation and, where vegetation has been disturbed, seeding of the area. All material removed from the work site because of the final cleaning operation shall become the property of the Contractor.

~~C~~ D. ~~Final c~~Clean~~ing~~ up shall be subject to approval of the Engineer and in accordance with applicable regulations.

Comments: The Specification Committee decided that “clean up” was a better phrase than “cleaning up”.

The FHWA asked if it was clear that the clean up was continuous throughout the project and not just at the end. The Specification Committee decided that by eliminating “final” and adding “During construction”, we have indicated that the clean up is continuous.

Specification Section Recommended Text:

1104, Final Cleaning Up.

Replace the Article and title:

1104.08 ~~FINAL~~ CLEANING UP.

A. Holes resulting from operations of the Contractor, including removal of guardrail posts, fence posts, utility poles, or foundation studies, shall be filled and consolidated to finished grade as directed by the Engineer to prevent future settlement. Voids shall be filled as soon as practical, preferably the day created and not later than the following day. Portions of the right-of-way or project limits (including borrow areas and operation sites) disturbed by operations of tee Contractor shall be restored to an acceptable condition. This operation shall be considered incidental to other bid items on the contract.

~~A~~ B. ~~Before final acceptance of the work~~ During construction, the Contractor shall remove all unused material and rubbish from the site of the work, remedy any objectionable conditions the

Contractor may have created on private property, and leave the right-of-way in a neat and presentable condition. The Contractor shall not make agreements which allows salvaged or unused material to remain on private property within view of a road except when consistent with previous land use.

~~B~~ **C.** All ground occupied by the Contractor in connection with the work, which is within view of or adjacent to a road, shall be restored. Restoration shall include appropriate smoothing to its original condition and may include making the area suitable for cultivation and, where vegetation has been disturbed, seeding of the area. All material removed from the work site because of the final cleaning operation shall become the property of the Contractor.

~~C~~ **D.** ~~Final c~~Cleaning up shall be subject to approval of the Engineer and in accordance with applicable regulations.

Comments: The Office of Design indicated this note appears on a majority of projects.

The Specifications Section wondered if a new article is necessary or if should be incorporated into Article 1104.08 or 1107.11.

The Office of Construction wondered if this note was necessary. Specifically, filling guardrail post holes is covered in Section 2505.

The Office of Bridges and Structures pointed out that this proposed revision does have a time requirement of the next day for filling holes.

The District 6 Office wondered why Article 1104.08 is only "Final Cleaning Up" and shouldn't we apply it on a continual basis during a project. Then this proposed revision would fit in Article 1104.08.

The Specifications Section will review other sections to see if filling holes is required for removal of fence posts, utility poles, or foundation studies. Article 1104.08 will be revised to apply during the project, not only for final clean up. The requirement to fill holes the following working day will be incorporated into Article 1104.08.

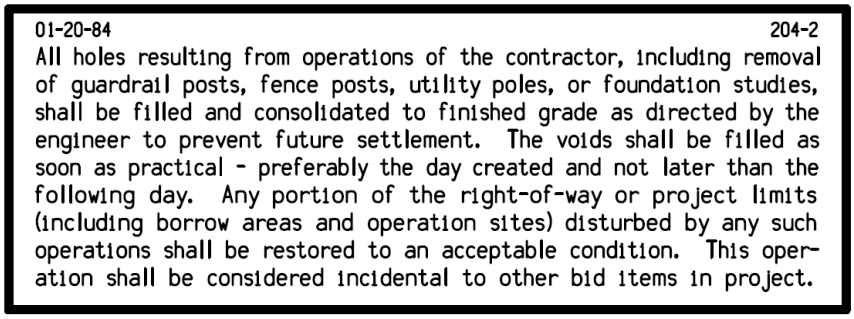
Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

1104.11, Filling Holes Resulting from Contractor Operations.

Add as a new article:

All holes resulting from operations of the Contractor, including removal of guardrail posts, fence posts, utility poles, or foundation studies, shall be filled and consolidated to finished grade as directed by the Engineer to prevent future settlement. The voids shall be filled as soon as practical, preferably the day created and not later than the following day. Any portion of the right-of-way or project limits (including borrow areas and operation sites) disturbed by any such operations shall be restored to an acceptable condition. This operation shall be considered incidental to other bid items on the project.

Reason for Revision: The proposed changes consist of language currently contained in Standard Note 204-2 (see below). The Office of Design is proposing this language be added (and updated if needed) to the Standard Specifications.



01-20-84 204-2

All holes resulting from operations of the contractor, including removal of guardrail posts, fence posts, utility poles, or foundation studies, shall be filled and consolidated to finished grade as directed by the engineer to prevent future settlement. The voids shall be filled as soon as practical - preferably the day created and not later than the following day. Any portion of the right-of-way or project limits (including borrow areas and operation sites) disturbed by any such operations shall be restored to an acceptable condition. This operation shall be considered incidental to other bid items in project.

County or City Input Needed (X one)	**Yes**	**No** X
Comments:		

Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Roger Bierbaum	**Office:** Contracts	**Item 3**
Submittal Date: March 15, 2011	**Proposed Effective Date:** October 2011 GS	
Article No.: 1108.01 **Title:** Subletting of Contact	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 4/14/2011	**Effective Date:** 10/18/2011

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: The Office of Design asked about not including work performed by a DBE firm using leased employees towards meeting the Department's annual DBE goal. The Office of Contracts noted that because of the regulations governing work performed by DBE's, leased employees cannot be used toward meeting the Department's annual DBE goal.

Specification Section Recommended Text:

1108.01, Subletting of Contract.

Add new Article:

E. Either the Contractor or approved subcontracts (e.g. contractors) can use leased employees from a firm that does not perform highway construction with its own organization. Work performed by a DBE firm using leased employees will not count towards meeting the Department's annual DBE goal.

When used, leased employees will be considered part of the Contractor's "own organization" if:

- The use of the employee leasing company is documented with the submittal of a Request to Subcontract.
- The Contractor maintains supervisory control over day-to-day activities of leased employees.
- The Contractor remains responsible for the quality of work of leased employees.
- The leasing company is responsible for customary employer responsibilities including EEO/AA in hiring, training, promotions, and submittal of required employee information to the Department and other governmental agencies.
- The Contractor retains power to accept or exclude individual employees from work on the project.
- The employee leasing company prepares and submits required certified payrolls. The Contractor remains ultimately responsible for payment of predetermined minimum wages and submission of payrolls.
- The Contractor retains responsibility for compliance with contract requirements.

Comments:

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

Add New Subsection E.

E. Either the Prime Contractor or approved subcontracts (e.g. contractors) can use leased employees from a firm that does NOT perform highway construction with its own organization. However work performed by a DBE firm using leased employees will NOT count towards meeting the Department's annual DBE goal.

When used the leased employees will be considered to be part of the highway contractor's "own organization" if:

- The use of the employee leasing company is documented with the submittal of a Request to Subcontract.
- The contractor maintains control over the supervision of the day-to-day activities of the leased employees;
- The contractor remains responsible for the quality of the work of the leased employees;
- The leasing company is responsible for all customary employer responsibilities including EEO/AA in hiring, training and promotions, and the submittal of required employee information to the Department, state and federal agencies.
- The contractor retains all power to accept or exclude individual employees from work on the project
- The employee leasing company prepares and submits the required certified payrolls. However the contractor remains ultimately responsible for the payment of predetermined minimum wages and the submission of payrolls.

• The Prime Contractor retains responsibility for compliance with all contract requirements.					
Reason for Revision: Federal regulations allow contractors to lease employees. This change will add procedures for leased employees to our Standard Specifications.					
County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office:** Materials	**Item 4**
Submittal Date: February 2011	**Proposed Effective Date:** October 2011	
Article No.: 2301.02, B, 6 **Title:** Use of Supplementary Cementitious Materials	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 4/14/2011	**Effective Date:** 10/18/2011

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: None.

Specification Section Recommended Text:

2301.02, B, 6, Use of Supplementary Cementitious Materials.

Replace the Article:

The maximum allowable fly ash substitution rate is 20%. The GGBFS substitution rate shall not be more than 35% by weight (mass). The total mineral admixture substitution rate shall not exceed 40%. When Type IP or IS cement is used in the concrete mixture, only fly ash substitution will be permitted. ~~Substitution of Type I/II cement with both GGBFS and fly ash will be permitted in ready mix concrete mixtures only.~~ Between October 16 and March 15, ~~fly ash~~ substitution of Type I/II cement with fly ash and GGBFS, or Type IP or IS cement with fly ash will be allowed only when maturity method is used to determine time of opening.

Comments:

Member's Requested Change (Redline/Strikeout):

6. Use of Supplementary Cementitious Materials.

The maximum allowable fly ash substitution rate is 20%. The GGBFS substitution rate shall not be more than 35% by weight (mass). The total mineral admixture substitution rate shall not exceed 40%. When Type IP or IS cement is used in the concrete mixture, only fly ash substitution will be permitted. ~~Substitution of Type I/II cement with both GGBFS and fly ash will be permitted in ready mix concrete mixtures only.~~ Between October 16 and March 15, ~~fly ash~~ substitution of Type I/II cement with fly ash and GGBFS and Type IP or IS cement with fly ash will be allowed only when maturity method is used to determine time of opening.

Reason for Revision: To clear up confusion in the field on slag and fly ash substitution. Slag was not listed with fly ash substitution between October 16 to March 15 – for Type I/II cements.

Ternary mixes were originally prohibited in central batch plants due to poor workability on the US 20 Webster county project in the late 1980's. We have not seen workability problems the past 10 years. Although it is highly unlikely anyone will use three cementitious materials in a central batch plant, we should not preclude the use since we get the benefit of better workability and much lower permeability by use of all three materials.

County or City Input Needed (X one)			**Yes**	**No**	
Comments:					
Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes** X	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office:** Materials	**Item 5**
Submittal Date: 2011.03.31	**Proposed Effective Date:** October, 2011	
Section No.: 2416 **Title:** Rigid Pipe Culverts **Section No.:** 4145 **Title:** Concrete Culvert Pipe	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 4/14/2011	**Effective Date:** 10/18/2011

Specification Committee Approved Text:

2416.02, MATERIALS.

Replace the Article:

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

2416.03, A.

Replace the first two sentences of the Article:

~~Class~~ 1500D (75D) (Class II) pipe may be used for entrance culverts only. Use ~~class~~ 2000D (Class III), 3000D (Class IV), or 3750D (Class V) (100D, 150D, or 175D) pipes for roadway culverts, or if conditions require, for entrance culverts.

2416.05, I, 1.

Replace the first sentence of the Article:

Aprons: Per unit for each size and strength (class) of apron removed and reinstalled.

2416.05, I, 2.

Replace the first sentence of the Article:

Pipe culvert: Per linear foot (meter) for each size and strength (class) of pipe removed and reinstalled.

4145.02, A.

Replace the Article:

Furnish concrete pipe ~~in classes~~ according to ~~their~~ strength (class). These will be designated as 1500D (Class II), 2000D (Class III), 3000D (Class IV), and 3750D (Class V) (75D, 100D, 150D, and 175D) pipe. These ~~(classes)~~ designations indicate the D load (test load in pounds per linear foot of length per foot of inside diameter or Newtons per meter of length per millimeter of inside diameter) to produce the ultimate load specified. Table 4145.02-1 shows the D load and the corresponding class.

Table 4145.02-1: D Load and Corresponding Class

D load-ultimate	Class
1500D (75D)	Class II
2000D (100D)	Class III
3000D (150D)	Class IV
3750D (175D)	Class V

4145.04, A.

Replace the second bulleted item:

Diameter 12 inches (300 mm) or larger: AASHTO M 170/M 170M ~~for the modified design shown in the contract documents, except do not use elliptical reinforcement in circular pipe with a diameter less than 36 inches (915 mm)~~.

4145.05, STRENGTH.

Replace Articles A and B:

A. Furnish pipe that has the strength specified for the ~~class and~~ design used, including both ultimate load and load to produce a 0.01 inch (0.3 mm) crack.

B. Meet the requirements of AASHTO M 170/M 170M for pipe ~~of the modified design shown in the contract documents~~, except the load to produce a 0.01 inch (0.3 mm) crack will not be measured for

nonreinforced pipe.

Add new Article:

D. The barrel section of aprons shall be 1500D (75D) (Class II) or better for 1500D (75D) (Class II) pipe installations and 2000D (100D) (Class III) or better for 2000D (100D) (Class III) and greater pipe installations.

4145.06, C, 4.

Replace the first sentence of the Article:

For ~~class~~ 3000D (150D) (Class IV) pipe 54 inches (1350 mm) in diameter and larger ~~manufactured according to the modified design~~, tie inner and outer cages together using clips or other approved methods.

4145.06, F, 2.

Replace the Article:

Cutting of circumferential wire in lift hole locations will be permitted if the pipe satisfies the 0.01 inch (0.3 mm) crack test requirements of AASHTO M 170/M 170M for the specified strength (class) of pipe.

4145.06, K, Special Shapes.

Replace the second sentence of the Article:

The contract documents may require pieces of special design. If not specified, the strength (class) specified will indicate reinforcement requirements.

Comments: The Office of Bridges and Structures pointed out an error in the table number and a reference to class 2000D pipe in Article 2416.03, A.

The Office of Bridges and Structures asked about Article 2416.05, D. The first sentence is somewhat contradicted by the second sentence. The first sentence was deleted to eliminate confusion about aprons for pipe stronger than 2000D (100D) (Class III).

The Office of Contracts asked about specifying strength (class) of aprons and pipe for removal and reinstallation. The reference to size class for apron and pipe removal and reinstallation is a reference to classes of pipes less than or equal to 36 inches (1000 mm) and pipes greater than 36 inches (1000 mm). The revisions to Article 2416.04, I, Removal and Reinstallation, were eliminated.

Following the Specification Committee meeting, the Office of Design pointed out that the reference to modified design in Article 4145.05, B should be deleted as RF-1 will be deleted which modified AASHTO M 170/ M 170M.

Specification Section Recommended Text:

2416.02, MATERIALS.

Replace the Article:

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

2416.03, A.

Replace the first two sentences of the Article:

~~Class~~ 1500D (75D) (Class II) pipe may be used for entrance culverts only. Use class 2000D (Class III), 3000D (Class IV), or 3750D (Class V) (100D, 150D, or 175D) pipes for roadway culverts, or if conditions require, for entrance culverts.

2416.04, I, Removal and Reinstallation.

Replace the Article:

1. Aprons: Each apron removed and reinstalled will be counted for each size and strength (class).

2. Pipe culvert: Measurement of pipe removed and reinstalled for each size and strength (class) specified will be in linear feet (meters) from end to end.

2416.05, I, 1.

Replace the first sentence of the Article:

Aprons: Per unit for each size and strength (class)of apron removed and reinstalled.

2416.05, I, 1.

Replace the first sentence of the Article:

Pipe culvert: Per linear foot (meter) for each size and strength (class)of pipe removed and reinstalled.

4145.02, A.

Replace the Article:

Furnish concrete pipe ~~in classes~~ according to ~~their~~ strength (class). These will be designated as 1500D

(Class II), 2000D (Class III), 3000D (Class IV), and 3750D (Class V) (75D, 100D, 150D, and 175D) pipe. These ~~(classes)~~ designations indicate the D load (test load in pounds per linear foot of length per foot of inside diameter or Newtons per meter of length per millimeter of inside diameter) to produce the ultimate load specified. Table 4145.02-1 shows the D load and the corresponding class.

Table 4145.02: D Load and Corresponding Class

D load-ultimate	Class
1500D (75D)	Class II
2000D (100D)	Class III
3000D (150D)	Class IV
3750D (175D)	Class V

4145.04, A.

Replace the second bulleted item:

Diameter 12 inches (300 mm) or larger: AASHTO M 170/M 170M ~~for the modified design shown in the contract documents, except do not use elliptical reinforcement in circular pipe with a diameter less than 36 inches (915 mm)~~.

4145.05, STRENGTH.

Replace Article A:

Furnish pipe that has the strength specified for the ~~class and~~ design used, including both ultimate load and load to produce a 0.01 inch (0.3 mm) crack.

Add new Article:

D. The barrel section of aprons shall meet or exceed the strength (class) requirements of the adjacent pipe. The barrel section of aprons shall be 1500D (75D) (Class II) or better for 1500D (75D) (Class II) pipe installations and 2000D (100D) (Class III) or better for 2000D (100D) (Class III) and greater pipe installations.

4145.06, C, 4.

Replace the first sentence of the Article:

For ~~class~~ 3000D (Class IV) (150D) pipe 54 inches (1350 mm) in diameter and larger manufactured according to the modified design, tie inner and outer cages together using clips or other approved methods.

4145.06, F, 2.

Replace the Article:

Cutting of circumferential wire in lift hole locations will be permitted if the pipe satisfies the 0.01 inch crack test requirements of AASHTO M 170/M 170M for the specified strength (class) of pipe.

4145.06, K, Special Shapes.

Replace the second sentence of the Article:

The contract documents may require pieces of special design. If not specified, the strength (class) specified will indicate reinforcement requirements.

Comments:

Member's Requested Change: (Do not use **'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.**)

2416.02 MATERIALS.

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

2416.03 CONSTRUCTION.

A. ~~Class~~ 1500D (75D) (class II)pipe may be used for entrance culverts only. Use class 2000D (class III), 3000D (class IV), or 3750D (class V) (100D, 150D, or 175D) pipes for roadway culverts, or if conditions require, for entrance culverts. Table 2416.03-1 provides minimum and maximum allowable pipe sizes.

2416.04 METHOD OF MEASUREMENT.

I. Removal and Reinstallation:

1. Aprons: Each apron removed and reinstalled will be counted for each size ~~class.~~ and strength (class).

2. Pipe culvert: Measurement of pipe removed and reinstalled for each size ~~class~~ and strength (class) specified will be in linear feet (meters) from end to end.

2416.05 BASIS OF PAYMENT.

I. Removal and Reinstallation:

1. Aprons: Per unit for each size ~~class.~~ and strength (class). of apron removed and reinstalled. Payment is full compensation for removal and reinstallation of apron.

2. Pipe culvert: Per linear foot (meter) for each size ~~class.~~ and strength (class). of pipe removed and reinstalled. Payment is full compensation for removal and reinstallation of pipe.

4145.02 Classification

A. Furnish concrete pipe ~~in classes~~ according to ~~their~~ strength (class). These will be designated as 1500D (class II), 2000D (class III), 3000D (class IV), and 3750D (class V) (75D, 100D, 150D, and 175D) pipe. These designations ~~(classes)~~ indicate the D load (test load in pounds per linear foot of length per foot of inside diameter or Newtons per meter of length per millimeter of inside diameter) to produce the ultimate load specified. The following table shows the D load and the corresponding class.

D load-ultimate	Class
1500D (75D)	Class II
2000D (100D)	Class III
3000D (150D)	Class IV
3750D (175D)	Class V

4145.04 DESIGN.

A. For circular pipe, the shell, design, Diameter less than 86M. comply with the following for details of and distribution of reinforcement: 12 inches (300 mm): AASHTO M 86/M

Diameter 12 inches (300 mm) or larger: AASHTO M 170/M 170M ~~for the modified design shown in the contract documents, except do not use elliptical reinforcement in circular pipe with a diameter less than 36 inches (915 mm).~~

4145.05 STRENGTH.

A. Furnish pipe that has the strength specified for the ~~class and~~ design used, including both ultimate load and load to produce a 0.01 inch (0.3 mm) crack.

B. Meet the requirements of AASHTO M 170/M 170M for pipe of the modified design shown in the contract documents, except the load to produce a 0.01 inch (0.3 mm) crack will not be measured for nonreinforced pipe.

C. All strength tests will be conducted according to AASHTO T 33.

D.The barrel section of aprons shall meet or exceed the strength(class) requirements of the adjacent pipe. The barrel section of aprons shall be 1500D (75D) (class II) or better for 1500D (75D) (class II) pipe installations and 2000D (100D) (class III) or better for 2000D (100D) (class III) pipe installations. For 3000 D (150D) (class IV) and greater pipe installations, 2000D (100D) (class III) or better aprons will be required.

4145.06.C. Construction of Reinforcement Cages.

4. For ~~class~~ 3000D (class IV) (150D) pipe 54 inches (1350 mm) in diameter and larger manufactured according to the modified design, tie inner and outer cages together using clips or other approved methods. If using clips, place in no less than one circumferential row per foot (300 mm) of length of cage plus one. Space each row no more than 8 inches (200 mm) along the outer cage within 45 degrees of the top and bottom of the pipe. Use clips fabricated from no smaller than No. 6 (4.877 mm diameter) wire.

4145.06.F. Lift Holes.

2. Cutting of circumferential wire in lift hole locations will be permitted if the pipe satisfies the 0.01 inch crack test requirements of AASHTO M 170/M 170M for the specified strength (class) of pipe.

4145.06.K. Special Shapes

The contract documents may require pieces of special design. If not specified, the strength (class) specified will indicate reinforcement requirements.

Reason for Revision: Standard Road plan RF1 will be discontinued from October 2011and roadway concrete pipe will be fabricated by ASTM and AASHTO standard. ASTM and AASHTO standards designate concrete pipe by class and these changes will reflect the corresponding class for D strength.

County or City Input Needed (X one)			**Yes**	**No** x	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes** X	**No**
Comments: Materials					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 6**
Submittal Date: 2011.01.27	**Proposed Effective Date:** 10/18/2011	
Section No.: 2435 **Title:** Sanitary and Storm Sewer Structures	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 4/14/2011	**Effective Date:** 10/18/2011

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: SUDAS explained the changes to other sections that will be brought to the Specification Committee at the May meeting.

Specification Section Recommended Text:

2435.03, A, 12, Placing and Compacting Backfill Material.

Replace the Article and title:

12. ~~Placing and Compacting~~ Backfill and Compaction ~~Material~~ .

a. Place suitable backfill material according to Article 2552.02 after concrete in structure has reached at least 3000 psi (21 MPa) compressive strength or 550 psi (3850 kPa) flexural strength. If concrete strength is not determined, place backfill material at least 14 calendar days after initial concrete placement.

b. Place backfill material simultaneously on all sides of walls and structures so the fill is kept at approximately the same elevation at all times.

c. Compact the 3 feet (1 m) closest to all walls ~~for wing faces~~ using pneumatic or hand tampers only. Ensure proper and uniform compaction of backfill material around structure.

2435.03, E, Connection to Existing Manhole or Intake.

Replace the Article:

1. General.

a. Remove invert as necessary to install pipe at required elevation and develop hydraulic channel.

b. Insert pipe into structure and trim end flush with inside wall of structure.

c. Place backfill material according to Section 2552.

~~1~~2. Sanitary Sewer.

a. General.

1) ~~Excavate as required.~~ Core openings in existing manholes unless specified otherwise in the contract documents.

2) Divert flow as necessary. Obtain approval of the diversion plan from the Engineer. Maintain sanitary sewer service at all times unless specified otherwise in the contract documents.

~~**3) Remove existing invert as necessary to install pipe at required elevation and develop hydraulic channel.**~~

b. Cored Opening.

1) Insert flexible watertight connector into new opening.

2) Install and tighten internal expansion sleeve to hold flexible connector in place.

3) Insert pipe through flexible connector and tighten external compression ring.

4) Do not grout opening or pour collar for cored opening with flexible connector.

c. Cut and Chipped Opening (Knockout).

1) Saw opening to approximate dimensions with a masonry saw. Saw to depth sufficient to sever reinforcing steel.

2) Remove concrete and expand opening to a diameter at least 6 inches (150 mm) larger than the outside diameter of the new pipe.

3) Cut off reinforcing steel protruding from the structure wall.

~~**4) Remove existing concrete invert as required to accommodate new pipe.**~~

~~**5) Insert pipe into structure and trim end flush with inside wall of structure.**~~

~~6~~4) Install waterstop around new pipe centered within structure wall.

~~7~~5) Fill opening between structure and pipe with non-shrink grout.

~~8~~6) Construct concrete collar around pipe and exterior manhole opening.

a) For new pipes 12 inches (300 mm) or smaller, install two No. 3 steel reinforcing hoops on collar around pipe. Pour concrete collar around pipe/structure junction to a minimum

thickness and width of 6 inches (150 mm).

b) For new pipes larger than 12 inches (300 mm), install two No. 4 steel reinforcing hoops in collar around pipe. Pour concrete collar around pipe/structure junction to a minimum thickness and width of 9 inches (230 mm).

~~**97)**~~ Provide pipe joint, non-shear coupling, or other approved flexible coupling within 2 feet (600 mm) of structure wall to allow for differential settlement between the new sewer and the structure.

~~**10) Reconstruct structure invert to provide a well defined channel between pipes.**~~

~~**23**~~**. Storm Sewer.**

~~**a. Excavate as required.**~~

~~**b**~~**a.** Cut opening to manhole or intake to 3 to 6 inches (75 to 150 mm) beyond the outside of the pipe. ~~Remove existing invert as necessary to install pipe at required elevation and develop hydraulic channel.~~

~~**c. Position end of pipe flush with interior wall of manhole.**~~

~~**d**~~**b.** Fill opening between manhole or intake wall and outside of pipe with non-shrink grout. Construct a concrete collar around the pipe.

~~**e. Reconstruct invert according to Article 4149.04, K**~~

~~**f. Place backfill material according to Section 2533.**~~

2435.05, A, 2.

Replace the Article:

Payment is full compensation for excavation, placing bedding and backfill material, compaction, base, structural concrete, reinforcing steel, precast units (if used), inverts, chimney seals, castings, and adjustment rings.

2435.05, B, 2.

Replace the Article:

Payment is full compensation for excavation, placing bedding and backfill material, compaction, base, structural concrete, reinforcing steel, precast units (if used), inverts, castings, and adjustment rings~~, and all appurtenances necessary for proper installation~~.

2435.05, G, 2.

Replace the Article:

Payment is full compensation for coring into the existing manhole or intake, pipe ~~connectors~~ connections, grout, and waterstop (when required).

Comments: The District 4 Office asked about testing for Atterberg Limits and soil coefficients for Class II through V material. If there is a specification, the materials office will have to write an exception if they don't do testing. The quality requirements shown in the Appendix for Class II through Class V materials will be removed from the specifications. The gradations for Class I and Class II materials will be added to the Aggregate Gradation Table. Also, the bedding, backfill, and topsoil materials will be separated in Article 2552.02, B to eliminate some confusion. These changes will be brought to the May 12, 2011 Specification Committee meeting.

The District 4 Office pointed out that Class V can be a soil designation (Article 2552.02, C) and also an aggregate designation (Section 4117). This could potentially cause confusion. The Class V Material (Topsoil) title will be revised to make it less likely that there will be any confusion.

Member's Requested Change: (Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)

See attached.

Reason for Revision: To match SUDAS.

County or City Input Needed (X one)			**Yes**	**No**	
Comments:					
Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes**	**No**	**Industry Concurrence:**	**Yes**	**No**
Comments:					

Section 2435. Sanitary and Storm Sewer Structures

2435.01 DESCRIPTION.
This section was developed in conjunction with Sections 6010 and 6030 of the SUDAS Standard Specifications, with modifications to suit the needs of the Department.

A. Construct sanitary and storm sewer manholes to provide access to sewer systems for maintenance and cleaning purposes.

B. Construct storm sewer intakes for collection of surface water and conveyance to the storm sewer system.

C. Modify existing manholes and intakes as necessitated by other improvements adjacent to the manholes or intakes.

D. Clean and inspect sanitary and storm sewer manholes, intakes, and other utility structures. Test sanitary sewer manholes.

2435.02 MATERIALS.
Apply Article 4149.04.

2435.03 CONSTRUCTION.

A. General Requirements for Installation of Manholes and Intakes.

1. Excavation.
Excavate according to Section 2552.

2. Subgrade Preparation.
- **a. Cut Sections (Undisturbed Soil):** Prepare subgrade to accurate elevation required to place structure base or subbase.
- **b. Fill Sections:** Compact to 95% of maximum Standard Proctor Density and hand grade to accurate elevation required to place structure base or subbase, or install stabilization material as directed by the Engineer.
- **c. Unstable Soil:** Install stabilization material as directed by the Engineer.

3. Subbase.
- **a. Cast-in-place Structures:** No subbase material is required.
- **b. Precast Structures:** If precast structure is provided, install 8 inch (200 mm) thick pad of Class I bedding material a minimum of 12 inches (300 mm) outside the footprint of the structure.

4. Installation of Manhole or Intake Structure.
Adjust wall height and depth of base, when necessary, to provide a minimum of 48 inches (1200 mm) between form grade elevation and top of base.
- **a. Cast-in-place:** Apply Article 2435.03, B.
- **b. Precast:** Apply Article 2435.03, C.

5. Pipes.
Install and bed pipes and connect to manhole or intake. Install pipe flush with inside wall of structure. Place bedding and pipe embedment material according to Section 2552.
- **a. Cast-in-place Structures.**
  - **1) Storm:** Form structure walls around pipe.
  - **2) Sanitary:** Form or core circular opening and install flexible watertight gasket according to Article 4149.04, G. Keep void between pipe and manhole section free of debris and concrete.
- **b. Precast Storm Sewer Manholes or Intakes.**
  Fill space between pipe and structure with non-shrink grout.
- **c. Precast Sanitary Sewer Manholes.**
  Connect to structure with flexible watertight gasket according to Article 4149.04, G. Keep void between pipe and manhole section free of debris and concrete.
- **d. Sanitary Sewer Manholes on Existing Pipe.**
  Install waterstop according to Article 4149.04, G.

6. Joint Sealant.
- **a. Sanitary Sewer Manholes.**
  - **1)** Install rubber O-ring or profile gasket (precast structures).

2) Apply bituminous jointing material or butyl sealant wrap to exterior of all sanitary sewer manhole joints.

b. Storm Sewer Manholes and Intakes.

1) Apply bituminous jointing material or install rubber rope gasket.

2) If indicated in the contract documents, apply engineering fabric wrap to joints.

7. Invert.

a. Construct manhole invert up to one half of pipe diameter to produce a smooth half pipe shape between pipe inverts.

b. Shape invert to provide a smooth transition between pipe inverts.

c. Slope invert top toward pipe 1/2 inch per foot (40 mm per meter) perpendicular to flow line.

d. For sanitary sewer, keep void between pipe and structure wall free of debris and concrete.

e. For precast inverts, remove projections and repair voids to provide a hydraulically smooth channel between ends of pipes.

8. Top Sections.

Install manhole eccentric cone or flat top section or install intake top.

9. Adjustment Ring(s).

Bed each concrete ring with bituminous jointing material in trowelable or rope form. Bed each polyethylene ring with the manufacturer's approved product. Do not install more than a total ring stack height of 12 inches (300 mm). For greater adjustment, modify lower riser section(s).

10. Casting.

Install the type of casting specified in the contract documents and adjust to proper grade. Where a manhole or intake is to be in a paved area, adjust the casting to match the slope of the finished surface. When specified in the contract documents, attach a casting frame to the structure with four anchor bolts.

11. Chimney Seal.

For sanitary sewer manholes, install an internal or external rubber chimney seal.

a. Do not use external chimney seal if seal will be permanently exposed to sunlight.

b. Extend seal 3 inches (75 mm) below the lowest adjustment ring.

c. Extend seal to 2 inches (50 mm) above the flange of the casting for a standard two piece casting, or 2 inches (50 mm) above the top of the base section of the casting for an adjustable three piece casting.

d. Use multiple seals, if necessary.

e. Install compression bands (external chimney seal) or expansion bands (internal chimney seal) to lock the rubber sleeve or extension into place and to provide a positive watertight seal. Once tightened, lock bands into place. Use only manufacturer recommended installation tools and sealants.

12. ~~Placing and Compacting~~ Backfill and Compaction ~~Material~~ .

a. Place suitable backfill material according to Article 2552.02 after concrete in structure has reached at least 3000 psi (21 MPa) compressive strength or 550 psi (3850 kPa) flexural strength. If concrete strength is not determined, place backfill material at least 14 calendar days after initial concrete placement.

b. Place backfill material simultaneously on all sides of walls and structures so the fill is kept at approximately the same elevation at all times.

c. Compact the 3 feet (1 m) closest to all walls ~~for wing faces~~ using pneumatic or hand tampers only. Ensure proper and uniform compaction of backfill material around structure.

B. Additional Requirements for Cast-In-Place Concrete Structures.

1. Forms.

a. Apply Article 2403.03, B, 5.

b. Form all cast-in-place manholes and intakes on both the inside and the outside face above the base. Do not form against excavated earthen surface.

2. Reinforcing Steel.

a. Apply Section 2404.

b. Lap bars a minimum of 36 diameters, unless specified otherwise in the contract documents.

c. Provide a minimum of 3 inches (75 mm) of clearance for structure bases and 2 inches (50 mm) of clearance for walls and tops.

3. Concrete Mixing.
- **a.** Apply Article 2403.02, D.
- **b.** When using ready-mixed concrete, comply with ASTM C 94/C 94M.

4. Concrete Placing.
- **a.** Apply Article 2403.03, C.
- **b.** Do not place concrete when the air temperature is less than 40°F (5º C) without the approval of the Engineer. When placement below 40ºF (5ºC) is allowed, apply Article 2403.03, F.
- **c.** Place concrete continuously in each section until complete. Do not allow more than 30 minutes to elapse between depositing adjacent layers of concrete within each section.
- **d.** Apply Article 2403.03, D, for concrete vibration.
- **e.** Form 1 1/2 by 3 inch (38 mm by 75 mm) keyed construction joints at locations shown in the contract documents.
- **f.** Provide a broom finish on portions of structure that are to become part of exposed pavement.

5. Stripping and Cleaning.
- **a.** Remove forms for manhole and intake walls and tops according to Article 2403.03, M. References to culverts include all sanitary and storm structures. When allowed by the Engineer, compressive strengths at six times the stated flexural strengths may be used in determining concrete strength of structure tops.
- **b.** Finish surfaces according to Article 2403.03, P. Give exposed surfaces a Class 2 finish.

6. Curing.
- **a.** Apply Article 2403.03, E.
- **b.** For surfaces visible to the public, use only curing compounds complying with ASTM C 309, Type 1-D or Type 2.

7. Exterior Loading.
- **a.** Restrict exterior loads on concrete according to Article 2403.03, N.
- **b.** When allowed by the Engineer, compressive strengths at six times the stated flexural strengths may be used.

8. Repairs.
After visual inspection of the completed manhole or intake, repair honeycomb areas, visible leaks, tie holes, or other damage areas. Remove concrete webs or protrusions.

C. Additional Requirements for Precast Concrete Structures.

1. Substitutions.
Precast structures may be substituted for designated cast-in-place structures so long as structure is constructed as specified in the contract documents and according to Article 2435.03, B.

2. Cast-in-place Base.
- **a.** Apply Article 2435.03, B, for placement of concrete.
- **b.** Ensure proper vertical and horizontal alignment of base riser section.

3. Precast Base or Base with Integral Riser Section.
Place base or base with integral riser section and ensure proper vertical and horizontal alignment.

4. Additional Riser Sections.
Install additional riser sections as required.

5. Lift Holes.
Install rubber plug in lift holes. Cover plug and hole with non-shrink grout.

D. Adjustment of Existing Manhole or Intake.

1. Casting Extension Rings.
- **a.** Only install casting extension rings when allowed by the contract documents, and only in conjunction with pavement overlays.
- **b.** Install according to the manufacturer's recommendation and adjust for proper alignment.

2. Minor Adjustment (Adding or Removing Adjustment Rings).
- **a.** Remove casting.
- **b.** Modify adjustment ring stack height by one of the following methods:

1) Add adjustment rings as necessary to adjust existing manhole or intake to finished pavement grade or finished topsoil grade, to a maximum ring stack height of 16 inches (400 mm). Bed each concrete ring with bituminous jointing material. Bed each polyethylene ring with manufacturer's approved product.

2) Remove one or more adjustment rings, as appropriate, to reduce casting elevation.

c. Install new casting on modified adjustment ring stack. Existing casting may be reinstalled when specified in the contract documents.

d. Replace chimney seal for sanitary sewer manhole using only new materials.

3. Major Adjustment (Adding, Removing, or Modifying Riser or Cone Section).
When adjustment is greater than can be accomplished through adding or removing adjustment rings, a major adjustment will be required.

a. Remove casting.

b. Remove top.

c. Remove and replace or modify existing riser section and/or top section, as appropriate.

d. Install new frame and cover or grate. Existing casting may be reinstalled when allowed by the contract documents.

e. Replace chimney seal for sanitary sewer manhole using only new materials.

E. Connection to Existing Manhole or Intake.

1. General.

a. Remove invert as required to accommodate new pipe and develop hydraulic channel.

b. Insert pipe into structure and trim end flush with inside wall of structure.

c. Reconstruct invert to provide a well defined channel between pipes.

d. Place backfill material according to Section 2552.

~~1~~2. Sanitary Sewer.

a. General.

1) ~~Excavate as required.~~ Core openings in manholes unless specified otherwise in the contract documents.

2) Divert flow as necessary. Obtain approval of the diversion plan from the Engineer. Maintain sanitary sewer service at all times unless specified otherwise in the contract documents.

~~**3)** Remove existing invert as necessary to install pipe at required elevation and develop hydraulic channel.~~

b. Cored Opening.

1) Insert flexible watertight connector into new opening.

2) Install and tighten internal expansion sleeve to hold flexible connector in place.

3) Insert pipe through flexible connector and tighten external compression ring.

4) Do not grout opening or pour collar for cored opening with flexible connector.

c. Cut and Chipped Opening (Knockout).

1) Saw opening to approximate dimensions with a masonry saw. Saw to depth sufficient to sever reinforcing steel.

2) Remove concrete and expand opening to a diameter at least 6 inches (150 mm) larger than the outside diameter of the new pipe.

3) Cut off all reinforcing steel protruding from the structure wall.

~~**4)** Remove existing concrete invert as required to accommodate new pipe.~~

~~**5)** Insert pipe into structure and trim end flush with inside wall of structure.~~

~~6~~4) Install waterstop around new pipe centered within structure wall.

~~7~~5) Fill opening between structure and pipe with non-shrink grout.

~~8~~6) Construct concrete collar around pipe and exterior manhole opening.

a) For new pipes 12 inches (300 mm) or smaller, install two No. 3 steel reinforcing hoops on collar around pipe. Pour concrete collar around pipe/structure junction to a minimum thickness and width of 6 inches (150 mm).

b) For new pipes larger than 12 inches, install two No. 4 steel reinforcing hoops in collar around pipe. Pour concrete collar around pipe/structure junction to a minimum thickness and width of 9 inches (230 mm).

~~9~~7) Provide pipe joint, non-shear coupling, or other approved flexible coupling within 2 feet (600 mm) of structure wall to allow for differential settlement between the new sewer and the structure.

~~**10)** Reconstruct structure invert to provide a well defined channel between pipes.~~

~~2~~3. Storm Sewer.

~~**a.** Excavate as required.~~

~~**b.**~~**a.** Cut opening to manhole or intake to 3 to 6 inches (75 to 150 mm) beyond the outside of the pipe. ~~Remove existing invert as necessary to install pipe at required elevation and develop hydraulic channel.~~

~~**c. Position end of pipe flush with interior wall of manhole.**~~

~~**d.**~~**b.** Fill opening between manhole or intake wall and outside of pipe with non-shrink grout. Construct a concrete collar around the pipe.

~~**e. Reconstruct invert according to Article 4149.04, K**~~

~~**f. Place backfill material according to Section 2533.**~~

F. Cleaning, Inspection, and Testing of Structures.

1. Cleaning.

a. Clean all manholes, intakes, and structures by removing sheeting, bracing, shoring, forms, soil sediment, concrete waste, and other debris.

b. Do not discharge soil sediment or debris to drainage channels, existing storm sewer, or existing sanitary sewer system.

2. Visual Inspection.

a. Examine structure for:

1) Damage.

2) Slipped forms.

3) Indication of displacement of reinforcement.

4) Porous areas or voids.

5) Proper placement of seals, gaskets, and embedments.

b. Verify that the structure is set to true line, grade, and plumb.

c. Verify structure dimensions and thicknesses.

3. Repair.

Apply Article 2435.03, B, 8.

4. Sanitary Sewer Manhole Testing.

a. General.

1) Use vacuum testing for new sanitary sewer manholes unless exfiltration testing is specified in the contract documents.

2) Conduct final test after manhole construction is complete, all repairs and connections have been made, and invert has been installed.

b. Vacuum Test.

1) Applicable only for new manholes isolated from connecting sewer lines.

2) Use manufactured vacuum test equipment meeting the Engineer's approval. Follow the equipment manufacturer's recommended procedures throughout.

3) Use extreme care and follow safety precautions during testing operations. Keep personnel clear of manholes during testing.

4) Seal all openings except manhole top access using pneumatic plugs rated for test pressures. Install plugs according to the test equipment manufacturer's recommendations.

5) Brace pipe inverts if backfill material has not been placed around connecting pipes.

6) Install the vacuum tester head assembly on the manhole top access, and inflate the seal.

7) Evacuate the manhole to 5 psi (35 kPa). Close the isolation valve and start the test. Record the starting time.

8) Maintain vacuum in the manhole for the time indicated in Table 2435.03-1 below for the diameter and depth of manhole being tested.

9) Test failure is indicated by vacuum loss greater than 0.5 psi (4 kPa) within the minimum test time indicated in Table 2435.03-1 below for the depth and diameter of the manhole being tested.

Table 2435.03-1: Minimum Vacuum Test Times for Various Manhole Diameters

Depth feet (m)	**Diameter inches (mm)**				
	48 (1200)	**54 (1350)**	**60 (1500)**	**66 (1650)**	**72 (1825)**
	Time, Seconds				
8 (2.45)	20	23	26	29	33
10 (3.28)	25	29	33	36	41

12 (3.66)	30	35	39	43	49
14 (4.27)	35	41	46	51	57
16 (4.88)	40	46	52	58	67
18 (5.49)	45	52	59	65	73
20 (6.10)	50	53	65	72	81
22 (6.71)	55	64	72	79	89
24 (7.32)	59	64	78	87	97
26 (7.93)	64	75	85	94	105
28 (8.54)	69	81	91	101	113
30 (9.15)	74	87	98	108	121

c. Exfiltration Test.

1) Applicable to new manholes (when specified in the contract documents) or rehabilitated manholes.
2) Testing may be performed in conjunction with sanitary sewer line testing. Apply Section 2504.
3) Do not test by this method if water may potentially freeze during the test.
4) Plug the manhole inlet and outlet.
5) Fill the manhole with water to 2 feet (600 mm) above the outside top of the connecting pipe. If groundwater is present, fill the manhole to no less than 2 feet (600 mm) nor more than 5 feet (1.5 meters) above the groundwater level. Do not fill above the top of the standard barrel sections.
6) Mark the water level.
7) Allow water to stand in the manhole for 1 hour, then refill to the original water level and begin the test.
8) Determine the allowable drop in water level by using the equation given in Article 2504.03, L, 4, b, 3, c. After 1 hour, measure the drop in water level.
9) Test failure is indicated by water loss greater than maximum allowable calculated exfiltration.

5. Test Failure.

If testing fails, reseal the openings, repair the manhole, and retest. An alternate test method complying with these specifications may be used for a retest if desired.

2435.04 METHOD OF MEASUREMENT.

A. Manhole.
Each type and size of manhole will be counted.

B. Intake.
Each type and size of intake will be counted.

C. Drop Connection.
Each drop connection will be counted.

D. Casting Extension Rings.
Each casting extension ring will be counted.

E. Manhole or Intake Adjustment, Minor.
Each existing manhole or intake adjusted to finished grade by addition or removal of adjustment rings or adjustment of adjustable casting will be counted.

F. Manhole or Intake Adjustment, Major.
Each existing manhole or intake adjusted to grade by addition or removal of riser, cone or flat top sections, or the exchange of existing riser sections with sections having different vertical dimensions will be counted.

G. Connection to Existing Manhole or Intake.
Each connection made to an existing manhole or intake will be counted.

H. Cleaning, Inspection, and Testing.
None.

2435.05 BASIS OF PAYMENT.

A. Manhole.

1. Payment will be at the contract unit price for each type and size of manhole.

2. Payment is full compensation for excavation, placing bedding and backfill material, compaction, base, structural concrete, reinforcing steel, precast units (if used), inverts, chimney seals, castings, and adjustment rings.

B. Intake.

1. Payment will be at the contract unit price for each type and size of intake.

2. Payment is full compensation for excavation, placing bedding and backfill material, compaction, base, structural concrete, reinforcing steel, precast units (if used), inverts, castings, and adjustment rings~~, and all appurtenances necessary for proper installation~~.

C. Drop Connection.

1. Payment will be at the contract unit price for each drop connection.

2. Payment is full compensation for the connection to the manhole and all pipe, fittings, concrete encasement, and bedding and backfill material.

D. Casting Extension Rings.
Payment will be at the unit price for each casting extension ring.

E. Manhole or Intake Adjustment, Minor.

1. Payment will be made at the contract unit price for each minor manhole or intake adjustment.

2. Payment is full compensation for:
- Removing existing casting and existing adjustment rings,
- Furnishing and installing adjustment rings,
- Furnishing and installing new casting, and
- Installing new chimney seal (sanitary sewer manholes only).

F. Manhole or Intake Adjustment, Major.

1. Payment will be at the contract unit price for each major adjustment.

2. Payment is full compensation for:
- Removal of existing casting, adjustment rings, top sections and risers,
- Excavation,
- Concrete and reinforcing steel or precast sections,
- Furnishing and installing new casting
- Installing new chimney seal (sanitary sewer manholes only),
- Placing backfill material, and
- Compaction.

G. Connection to Existing Manhole or Intake.

1. Payment will be made at the contract unit price for each sewer connection.

2. Payment is full compensation for coring into the existing manhole or intake, pipe ~~connectors~~ connections, grout, and waterstop (when required).

H. Cleaning, Inspection, and Testing.
Cleaning, inspection, and testing of structures are incidental to construction of structures and will not be paid for separately.

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Jim Berger	**Office:** Materials	**Item 7**
Submittal Date: February 2011	**Proposed Effective Date:** October 2011	
Article No.: 2513.03, A, 2, b, 3 **Title:** Aggregates for Class BR (Concrete Barrier)	**Other:**	

Specification Committee Action: Approved as recommended.

Deferred:	**Not Approved:**	**Approved Date:** 4/14/2011	**Effective Date:** 10/18/2011

Specification Committee Approved Text: See Specification Section Recommended Text.

Comments: The Office of Bridges and Structures asked what gradation will apply to aggregates used for barrier rail. The Office of Materials stated that individual aggregates used, i.e. coarse and fine aggregates, will have specified gradations, but there will not be a requirement for the combined aggregate.

Specification Section Recommended Text:

2513.03, A, 2, b, 3.

Replace the Article:

Aggregates for Class BR. Use a well graded combination of aggregates complying with Materials I.M. 532 in Zone II-A or II-B. ~~Provide a target gradation and apply the limits of Table 2513.03-3. A new target gradation will require the Engineer's approval.~~ Meet requirements in Division 41 for each individual aggregate used.

~~**Table 2513.03-3: Gradation Limits**~~

~~Sieves~~	~~Limits~~
~~No. 4 (4.75 mm) and larger~~	~~± 5%~~
~~No. 8 (2.36 mm) to No. 30 (600 µm)~~	~~± 4%~~
~~No. 50 (300 µm)~~	~~± 3%~~
~~No. 100 (150 µm)~~	~~± 2%~~
~~No. 200 (75 µm)~~	~~Maximum 1.5% Passing~~

Comments:

Member's Requested Change (Redline/Strikeout):

3) Aggregates for Class BR. Use a well graded combination of aggregates complying with Materials I.M. 532 in Zone II-A or II-B. ~~Provide a target gradation and apply the limits of Table 2513.03-3. A new target gradation will require the Engineer's approval.~~ Meet requirements in Division 41 for each individual aggregate used.

~~**Table 2513.03-3: Gradation Limits**~~

~~Sieves~~	~~Limits~~
~~No. 4 (4.75 mm) and larger~~	~~± 5%~~
~~No. 8 (2.36 mm) to No. 30 (600 µm)~~	~~± 4%~~
~~No. 50 (300 µm)~~	~~± 3%~~
~~No. 100 (150 µm)~~	~~± 2%~~
~~No. 200 (75 µm)~~	~~Maximum 1.5% Passing~~

Reason for Revision: Most mix designs seem to keep getting used over again from the producer. Small variations in aggregate gradations cause the combined to be out on a sieve or two, but the overall combined gradation works well for placement. We are price adjusting for one sieve when the overall mix works great. Trying to apply these combined limits on a QMC paving mix works fine when the stockpiles are produced for a large project at one time, but when the mix is only used once every 2-3 years it is not effective. Require combined gradation to fall within Zone II-A or II-B in IM 532. Individual aggregate gradations meet for respective size materials 4110, 4112, 4117, or 4115.

County or City Input Needed (X one)			**Yes**	**No**	
Comments:					
Industry Input Needed (X one)			**Yes**	**No**	
Industry Notified:	**Yes** X	**No**	**Industry Concurrence:**	**Yes** X	**No**
Comments:					

SPECIFICATION REVISION SUBMITTAL FORM

Submitted by: Deanna Maifield	**Office:** Design	**Item 8**
Submittal Date: 2011.01.27	**Proposed Effective Date:** 10/18/2011	
Section No.: 2516 **Title:** Removal and Construction of Retaining Walls and Steps	**Other:**	

Specification Committee Action: Approved with changes.

Deferred:	**Not Approved:**	**Approved Date:** 4/14/2011	**Effective Date:** 10/18/2011

Specification Committee Approved Text:

2516, Removal and Construction of Retaining Walls and Steps.

Replace title and entire section:

~~**Section 2516. Removal and Construction of Retaining Walls and Steps**~~

~~**2516.01 DESCRIPTION.**~~

~~Remove retaining walls and steps as designated, and construct new PCC retaining walls and steps according to the contract documents and the following provisions.~~

~~**2516.02 MATERIALS.**~~

~~For construction of retaining walls and steps, meet the requirements of Division 41 for the respective materials.~~

~~**2516.03 CONSTRUCTION.**~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~When the contract documents indicate that retaining walls and steps are to be removed, break and remove the walls and steps designated by the Engineer according to Article 2510.03, A.~~

~~**B. Construction of Retaining Walls and Steps.**~~

~~Construct walls and steps to the dimensions shown in the contract documents and according to Section 2403. Unless designated otherwise, use Class C concrete as specified in Section 2403. Give exposed vertical surfaces a Class 2, strip down surface finish.~~

~~**2516.04 METHOD OF MEASUREMENT.**~~

~~Measurement for walls and steps removed and replaced will be as follows:~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~Cubic yards (cubic meters) shown in the contract documents, without remeasurement.~~

~~**B. Construction of Walls and Steps.**~~

~~Cubic yards (cubic meters) shown in the contract documents. When the quantities of concrete have been modified by direction of the Engineer, the Engineer will compute the cubic yards (cubic meters) of concrete involved in the modification and adjust the quantity accordingly.~~

~~**2516.05 BASIS OF PAYMENT.**~~

~~Payment for retaining walls and steps removed and constructed will be the contract unit price as follows:~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~**1.** Per cubic yard (cubic meters).~~

~~**2.** Payment is full compensation for the cost of all labor and equipment necessary to remove and haul the material according to Article 1104.08.~~

~~**B. Construction of Retaining Walls and Steps.**~~

~~**1.** Per cubic yard (cubic meter). Includes modifications ordered by the Engineer.~~

~~**2.** Payment is full compensation for furnishing all materials required, including all steel reinforcement~~

~~specified, and all equipment and labor necessary to construct the walls and steps as specified.~~

Section 2516. Combined Concrete Sidewalk and Retaining Wall

2516.01 DESCRIPTION.

A. This section was developed in conjunction with Section 9072 of the SUDAS Standard Specifications, with modifications to suit the needs of the Department.

B. Construct combined concrete sidewalk and retaining wall.

2516.02 MATERIALS.

A. Combined Concrete Sidewalk and Retaining Wall.

1. Portland Cement Concrete.
Comply with Article 2511.02, A.

2. Reinforcing Steel.
Comply with Section 4151.

3. Expansion Joint.
Comply with Article 4136.02. Use resilient filler when type is not specified.

B. Subdrain.
Use minimum 4 inch (100 mm) diameter pipe.

1. Polyvinyl Chloride Pipe and Fittings (Solid Wall PVC):
- **a.** Comply with ASTM D 3034, minimum thickness SDR 35, 46 psi (320 kPa) minimum pipe stiffness.
- **b.** Use PVC plastic conforming to ASTM D 1784, Cell Classification 12454.
- **c.** Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.
- **d.** Slot subdrain pipe according to ASTM F 949 or perforate with four rows of 1/4 to 3/8 inch (6 to 9 mm) diameter holes along the bottom of pipe.

2. Corrugated Polyvinyl Chloride Pipe and Fittings (Corrugated PVC):
- **a.** Use corrugated exterior, smooth interior, PVC.
- **b.** Comply with ASTM F 949, minimum pipe stiffness, 46 psi (320 kPa).
- **c.** Use PVC plastic complying with ASTM D 1784, Cell Classification 12454.
- **d.** Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.
- **e.** Slot subdrain pipe according to ASTM F 949.

3. Corrugated Polyethylene Tubing and Fittings (Corrugated PE):
- **a.** Comply with Article 4143.01, B, 1.
- **b.** Use only fittings supplied or recommended by pipe manufacturer for soil tight service.

C. Porous Backfill Material for Subdrain:

1. Crushed Stone or Processed Gravel.
Comply with Section 4131.

2. Pea Gravel.
Comply with Gradation No. 20 or 21 of Section 4109 and the quality requirements of Section 4131.

D. Suitable Backfill Material.
Comply with Article 2102.02, D, 2.

E. Rodent-Proof Hardware Cloth.
Comply with Materials I.M. 443.01.

2516.03 CONSTRUCTION.

A. Excavation and Embankment.

1. At locations where the wall will be constructed against embankment, compact to a minimum of 90% of maximum Standard Proctor Density prior to beginning wall construction.

2. Excavate to the line and grade specified in the contract documents. Minimize over-excavation. Install sheeting, shoring, or other retention systems as required to ensure the stability of the excavation.

B. Installation.

1. General.
- **a.** Forming the back of the wall is not required. Where the back of the wall is not formed and sloughing occurs, remove loose material, and replace with concrete at no additional cost to the Contracting Authority.
- **b.** Install 3 inch (75 mm) diameter weep holes at 8 foot (2.5 m) intervals. Form weep holes with an approved rustproof device backed with rodent-proof hardware cloth.
- **c.** Install 8 inch (200 mm) wide trench of porous backfill behind the wall. Install subdrain within porous backfill trench. Ensure positive drainage on subdrain.

2. Backfill Material Placement.
- **a.** Place suitable backfill material with adequate moisture content for compaction in maximum 8 inch (200 mm) lifts, spread, and compact.
- **b.** Use hand-operated compaction equipment within 3 feet (10 m) of the front of the wall face.

C. Joints.

1. Form ED joints in wall at no more than 60 foot (18 m) spacing. Affix expansion material to retaining wall.

2. Form C joints in the wall at no more than 20 foot (6 m) spacing.

3. Form E joints in sidewalk to coincide with ED joints in wall. Form C joints in sidewalk at spacing equal to sidewalk width.

4. Form longitudinal joint in sidewalk when sidewalk width is greater than 8 feet (2.4 m).

D. Rustication.

Decorative form liners or inserts may be used when forming the face of the wall with the approval of the Engineer. Form rustications as specified in the contract documents.

2516.04 METHOD OF MEASUREMENT.

Measurement for Combined Concrete Sidewalk and Retaining Wall will be cubic yards (cubic meters) shown in the contract documents.

2516.05 BASIS OF PAYMENT.

Payment for Combined Concrete Sidewalk and Retaining Wall will be the contract unit price per cubic yard (cubic meter). Payment is full compensation for:

- Excavation and foundation preparation,
- Furnishing and placing concrete and reinforcing steel,
- Joint material,
- Subdrain,
- Porous backfill material,
- Suitable backfill material,
- Finishing disturbed areas, and
- Shoring as necessary.

Comments: The District 6 Office asked for clarification of Article 2516.03, B, 2. After the Specification Committee meeting, SUDAS clarified that Articles a and b both apply to the suitable backfill. These articles were combined to reflect this.

The Office of Construction asked how the porous backfill will be tested for optimum moisture content. With the revision after the meeting, this concern applies to suitable backfill. The note was revised to indicate adequate moisture content instead of a specific value.

Specification Section Recommended Text:

2516, Removal and Construction of Retaining Walls and Steps.

Replace title and entire section:

~~**Section 2516. Removal and Construction of Retaining Walls and Steps**~~

~~**2516.01 DESCRIPTION.**~~

~~Remove retaining walls and steps as designated, and construct new PCC retaining walls and steps according to the contract documents and the following provisions.~~

~~**2516.02 MATERIALS.**~~

~~For construction of retaining walls and steps, meet the requirements of Division 41 for the respective materials.~~

~~**2516.03 CONSTRUCTION.**~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~When the contract documents indicate that retaining walls and steps are to be removed, break and remove the walls and steps designated by the Engineer according to Article 2510.03, A.~~

~~**B. Construction of Retaining Walls and Steps.**~~

~~Construct walls and steps to the dimensions shown in the contract documents and according to Section 2403. Unless designated otherwise, use Class C concrete as specified in Section 2403. Give exposed vertical surfaces a Class 2, strip down surface finish.~~

~~**2516.04 METHOD OF MEASUREMENT.**~~

~~Measurement for walls and steps removed and replaced will be as follows:~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~Cubic yards (cubic meters) shown in the contract documents, without remeasurement.~~

~~**B. Construction of Walls and Steps.**~~

~~Cubic yards (cubic meters) shown in the contract documents. When the quantities of concrete have been modified by direction of the Engineer, the Engineer will compute the cubic yards (cubic meters) of concrete involved in the modification and adjust the quantity accordingly.~~

~~**2516.05 BASIS OF PAYMENT.**~~

~~Payment for retaining walls and steps removed and constructed will be the contract unit price as follows:~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~**1.** Per cubic yard (cubic meters).~~

~~**2.** Payment is full compensation for the cost of all labor and equipment necessary to remove and haul the material according to Article 1104.08.~~

~~**B. Construction of Retaining Walls and Steps.**~~

~~**1.** Per cubic yard (cubic meter). Includes modifications ordered by the Engineer.~~

~~**2.** Payment is full compensation for furnishing all materials required, including all steel reinforcement specified, and all equipment and labor necessary to construct the walls and steps as specified.~~

Section 2516. Combined Concrete Sidewalk and Retaining Wall

2516.01 DESCRIPTION.

A. This section was developed in conjunction with Section 9072 of the SUDAS Standard Specifications, with modifications to suit the needs of the Department.

B. Construct combined concrete sidewalk and retaining wall.

2516.02 MATERIALS.

A. Combined Concrete Sidewalk and Retaining Wall.

1. Portland Cement Concrete.
Comply with Article 2511.02, A.

2. Reinforcing Steel.
Comply with Section 4151.

3. Expansion Joint.
Comply with Article 4136.02. Use resilient filler when type is not specified.

B. Subdrain.
Use minimum 4 inch (100 mm) diameter pipe.

1. Polyvinyl Chloride Pipe and Fittings (Solid Wall PVC):
- **a.** Comply with ASTM D 3034, minimum thickness SDR 35, 46 psi (320 kPa) minimum pipe stiffness.
- **b.** Use PVC plastic conforming to ASTM D 1784, Cell Classification 12454.
- **c.** Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.
- **d.** Slot subdrain pipe according to ASTM F 949 or perforate with four rows of 1/4 to 3/8 inch (6 to 9 mm) diameter holes along the bottom of pipe.

2. Corrugated Polyvinyl Chloride Pipe and Fittings (Corrugated PVC):
- **a.** Use corrugated exterior, smooth interior, PVC.
- **b.** Comply with ASTM F 949, minimum pipe stiffness, 46 psi (320 kPa).
- **c.** Use PVC plastic complying with ASTM D 1784, Cell Classification 12454.
- **d.** Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.
- **e.** Slot subdrain pipe according to ASTM F 949.

3. Corrugated Polyethylene Tubing and Fittings (Corrugated PE):
- **a.** Comply with Article 4143.01, B, 1.
- **b.** Use only fittings supplied or recommended by pipe manufacturer for soil tight service.

C. Porous Backfill Material for Subdrain:

1. Crushed Stone or Processed Gravel.
Comply with Section 4131.

2. Pea Gravel.
Comply with Gradation No. 20 or 21 of Section 4109 and the quality requirements of Section 4131.

D. Suitable Backfill Material.
Comply with Article 2102.02, D, 2.

E. Rodent-Proof Hardware Cloth.
Comply with Materials I.M. 443.01.

2516.03 CONSTRUCTION.

A. Excavation and Embankment.

1. At locations where the wall will be constructed against embankment, compact to a minimum of 90% of maximum Standard Proctor Density prior to beginning wall construction.

2. Excavate to the line and grade specified in the contract documents. Minimize over-excavation. Install sheeting, shoring, or other retention systems as required to ensure the stability of the excavation.

B. Installation.

1. General.
- **a.** Forming the back of the wall is not required. Where the back of the wall is not formed and sloughing occurs, remove loose material, and replace with concrete at no additional cost to the Contracting Authority.
- **b.** Install 3 inch (75 mm) diameter weep holes at 8 foot (2.5 m) intervals. Form weep holes with an approved rustproof device backed with rodent-proof hardware cloth.

c. Install 8 inch (200 mm) wide trench of porous backfill behind the wall. Install subdrain within porous backfill trench ~~when specified in the contract documents~~. Ensure positive drainage on subdrain. ~~Outlet subdrain to weep holes.~~

2. Backfill Material Placement.

a. Place backfill in maximum 8 inch (200 mm) lifts, spread, and compact ~~in such a manner that eliminates the development of wrinkles and/or movement of the geogrid reinforcement~~.

b. Ensure moisture content of granular backfill material falls within a range from 3% under optimum moisture to no more than optimum moisture content.

c. Use only hand-operated compaction equipment within 3 feet (10 m) of the front of the wall face.

C. Joints.

1. Form ED joints in wall at no more than 60 foot (18 m) spacing. Affix expansion material to retaining wall.

2. Form C joints in the wall at no more than 20 foot (6 m) spacing.

3. Form E joints in sidewalk to coincide with ED joints in wall. Form C joints in sidewalk at spacing equal to sidewalk width.

4. Form longitudinal joint in sidewalk when sidewalk width is greater than 8 feet (2.4 m).

D. Rustication.

Decorative form liners or inserts may be used when forming the face of the wall with the approval of the Engineer. Form rustications as specified in the contract documents.

2516.04 METHOD OF MEASUREMENT.

Measurement for Combined Concrete Sidewalk and Retaining Wall will be cubic yards (cubic meters) shown in the contract documents.

2516.05 BASIS OF PAYMENT.

Payment for Combined Concrete Sidewalk and Retaining Wall will be the contract unit price per cubic yard (cubic meter). Payment is full compensation for:

- Excavation and foundation preparation,
- Furnishing and placing concrete and reinforcing steel,
- Joint material,
- Subdrain,
- Porous backfill material,
- Suitable backfill material,
- Finishing disturbed areas, and
- Shoring as necessary.

Comments: Minor revisions highlighted in yellow will more closely align with approved SUDAS specifications. Subdrain will be required for all combined concrete sidewalk and retaining wall installations. Subdrain will not be connected to weep holes. Specifications for backfill placement were added.

Member's Requested Change: **(Do not use 'Track Changes', or 'Mark-Up'. Use ~~Strikeout~~ and Highlight.)**

2516, Removal and Construction of Retaining Walls and Steps.

Replace the title and the entire section:

~~**Section 2516. Removal and Construction of Retaining Walls and Steps**~~

~~**2516.01 DESCRIPTION.**~~

~~Remove retaining walls and steps as designated, and construct new PCC retaining walls and steps according to the contract documents and the following provisions.~~

~~**2516.02 MATERIALS.**~~

~~For construction of retaining walls and steps, meet the requirements of Division 41 for the respective materials.~~

~~**2516.03 CONSTRUCTION.**~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~When the contract documents indicate that retaining walls and steps are to be removed, break and remove the walls and steps designated by the Engineer according to Article 2510.03, A.~~

~~**B. Construction of Retaining Walls and Steps.**~~

~~Construct walls and steps to the dimensions shown in the contract documents and according to Section 2403. Unless designated otherwise, use Class C concrete as specified in Section 2403. Give exposed vertical surfaces a Class 2, strip down surface finish.~~

~~**2516.04 METHOD OF MEASUREMENT.**~~

~~Measurement for walls and steps removed and replaced will be as follows:~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~Cubic yards (cubic meters) shown in the contract documents, without remeasurement.~~

~~**B. Construction of Walls and Steps.**~~

~~Cubic yards (cubic meters) shown in the contract documents. When the quantities of concrete have been modified by direction of the Engineer, the Engineer will compute the cubic yards (cubic meters) of concrete involved in the modification and adjust the quantity accordingly.~~

~~**2516.05 BASIS OF PAYMENT.**~~

~~Payment for retaining walls and steps removed and constructed will be the contract unit price as follows:~~

~~**A. Removal of Retaining Walls and Steps.**~~

~~**1.** Per cubic yard (cubic meters).~~

~~**2.** Payment is full compensation for the cost of all labor and equipment necessary to remove and haul the material according to Article 1104.08.~~

~~**B. Construction of Retaining Walls and Steps.**~~

~~**1.** Per cubic yard (cubic meter). Includes modifications ordered by the Engineer.~~

~~**2.** Payment is full compensation for furnishing all materials required, including all steel reinforcement specified, and all equipment and labor necessary to construct the walls and steps as specified.~~

Section 2516. Combined Concrete Sidewalk and Retaining Wall

2516.01 DESCRIPTION.

A. This section was developed in conjunction with Section 9072 of the SUDAS Standard Specifications, with modifications to suit the needs of the Department.

B. Construct combined concrete sidewalk and retaining wall.

2516.02 MATERIALS.

Upon request, submit certification that products supplied comply with identified specifications.

A. Combined Concrete Sidewalk and Retaining Wall.

1. Portland Cement Concrete.
Comply with Article 2511.02, A.

2. Reinforcing Steel.
Comply with Section 4151.

3. Expansion Joint.
Comply with Article 4136.02. Use resilient filler when the type is not specified.

B. Subdrain.
Use minimum 4 inch (100 mm) diameter pipe.

1. Polyvinyl Chloride Pipe and Fittings (Solid Wall PVC):

a. Comply with ASTM D 3034, minimum thickness SDR 35, 46 psi (320 kPa) minimum pipe stiffness.

b. Use PVC plastic conforming to ASTM D 1784, Cell Classification 12454.

c. Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.

d. Slot subdrain pipe according to ASTM F 949 or perforate with four rows of 1/4 to 3/8 inch (6 to 9 mm) diameter holes along the bottom of pipe.

2. Corrugated Polyvinyl Chloride Pipe and Fittings (Corrugated PVC):

a. Use corrugated exterior, smooth interior, PVC.

b. Comply with ASTM F 949, minimum pipe stiffness, 46 psi (320 kPa).

c. Use PVC plastic complying with ASTM D 1784, Cell Classification 12454.

d. Integral bell and spigot type rubber gasket joint complying with ASTM D 3212 and ASTM F 477.

e. Slot subdrain pipe according to ASTM F 949.

3. Corrugated Polyethylene Tubing and Fittings (Corrugated PE):

a. Comply with Article 4143.01, B, 1. Slot or perforate according to AASHTO M 252, Type CP or Type SP.

b. Use only fittings supplied or recommended by pipe manufacturer for soil tight service.

C. Porous Backfill Material for Subdrain:

1. Crushed Stone or Processed Gravel.
Comply with Gradation No. 29 of Section 4109.

2. Pea Gravel.
Comply with Gradation No. 20 or No. 21 of Section 4109.

D. Suitable Backfill Material.
Comply with Article 2102.02, D, 2.

E. Rodent-Proof Hardware Cloth.
Comply with I.M. 443.01.

2516.03 CONSTRUCTION.

A. Excavation and Embankment.

1. At locations where the wall is to be constructed against embankment, compact to a minimum of 90% of maximum Standard Proctor Density prior to beginning wall construction.

2. Excavate to the line and grade specified in the contract documents. Minimize over-excavation. Install sheeting, shoring, or other retention systems as required to ensure the stability of the excavation.

B. Installation.

1. Forming the back of the wall is not required unless otherwise specified in the contract documents. Where the back of the walls is not formed and sloughing occurs, remove the loose material, and replace with concrete at no additional cost to the Contracting Authority.

2. Install 3 inch (75 mm) diameter weep holes at 8 foot (2.5 m) intervals. Form weep holes with an approved rustproof device backed with rodent-proof hardware cloth.

3. Install 8 inch (200 mm) wide trench of porous backfill behind the wall. Install subdrain within porous backfill trench when specified in the contract documents. Ensure positive drainage on subdrain. Outlet subdrain to weep holes.

C. Joints.

1. Form ED joints in wall at no more than 60 foot (18 m) spacing. Affix expansion material to retaining wall.

2. Form C joints in wall at no more than 20 foot (6 m) spacing.

3. Form E joints in sidewalk to coincide with ED joints in wall. Form C joints in sidewalk at spacing equal to sidewalk width.

4. Form longitudinal joint in sidewalk when sidewalk width is greater than 8 feet (2.4 m).

D. Rustication.
Decorative form liners or inserts may be used when forming the face of the wall with the approval of the Engineer. Form rustications as specified in the contract documents.

2516.04 METHOD OF MEASUREMENT.
Measurement for Combined Concrete and Retaining Wall will be cubic yards (cubic meters) shown in the contract documents.

2516.05 BASIS OF PAYMENT.
Payment for Combined Concrete and Retaining Wall will be the contract unit price per cubic yard (cubic meter). Payment is full compensation for:

- Excavation and foundation preparation,
- Furnishing and placing concrete and reinforcing steel,
- Joint material,
- Subdrain,
- Porous backfill material,
- Suitable backfill material,
- Finishing disturbed areas, and
- Shoring as necessary.

Reason for Revision: The Department worked with SUDAS to develop joint standards and specifications for combined sidewalk with retaining wall. SUDAS is proposing to include these specifications in their 2012 manual (to be released in October 2011).

This change will remove construction of steps from the specifications. If it is necessary to construct steps for a private property, designers will include SUDAS specifications as Special Provisions and would include the SUDAS standard as a detail sheet. The Office of Design will provide instructions to designers.

County or City Input Needed (X one)			**Yes**	**No** X	
Comments:					
Industry Input Needed (X one)			**Yes**	**No** X	
Industry Notified:	**Yes**	**No** X	**Industry Concurrence:**	**Yes**	**No**
Comments:					

Item 9

01-20-84 261-2

Before performing earthwork, tiling, or excavation within three hundred feet of an existing pipeline, the contractor shall notify the pipeline company and the pipeline company shall mark the location of the pipeline as required by Section 479.47 of the Code of Iowa.

The contractor shall exercise all due caution when working in the vicinity of pipelines carrying combustible or toxic materials which are present on this project. Pipeline location shown on the plans represents the best information available at the time of plan preparation.

Is this covered by Article 1107.15? If not, could it go there? At the very least, the Code of Iowa reference needs to be corrected.

yes

- The Office of Traffic and Safety believes this note was written before One Call was required. Contractors are required to issue a dig ticket whenever they are going to dig, pipeline or not. No one could verify why the limitation of within 300 feet of an existing pipeline. The Office of Traffic and Safety agrees with eliminating this standard note.

- The Office of Traffic and Safety indicated that this note was in response to a pipeline explosion in the early 1980's. One call has eliminated the need for this note. The Specification Committee approved eliminating this standard note.