

January 5, 2010

SUBJECT: FAI Route 290 (I-290/Eisenhower Expressway) Project: ACIM-290-4 (113) 091 Section: (2828 [B, D], ETC., 3031.1)RS-6 Cook County Contract No. 60G53 Item No. 195, January 15, 2010 Letting Addendum A

# NOTICE TO PROSPECTIVE BIDDERS:

Attached is an addendum to the plans or proposal. This addendum involves revised and/or added material.

- 1. Replaced the Schedule of Prices.
- 2. Revised page iv of the Table of Contents to the Special Provisions.
- 3. Added pages 218 232 to the Special Provisions.
- 4. Revised Sheets 1, 2, 3, 5, 15, 49 & 94 of the Plans.
- 5. Added sheet 15A, 15B & 124A 124D to the Plans.

Prime contractors must utilize the enclosed material when preparing their bid and must include any Schedule of Prices changes in their bidding proposal.

Bidders using computer-generated bids are cautioned to reflect any and all Schedule of Prices changes, if involved, into their computer programs.

Very truly yours,

Charles Ingersoll, Chief Bureau of Design and Environment

Tet Dalacheyon DE.

By: Ted B. Walschleger, P. E. Engineer of Project Management

cc: Diane O'Keefe, Region 1, District 1 Mike Renner R.E. Anderson Estimates

TBW:MS:vp

\* REVISED : JANUARY 4, 2010

C-91-494-09 State Job # -1-77631-0100 PPS NBR -County Name -COOK--Code -31 - -1 - -District -

**Project Number** ACIM-2904/113/091 Route

FAI 290

Section Number -(2828[B,D],ETC., 3031.1) RS-6

ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
A2002614	T-CARYA CORD 1-3/4	EACH	20.000				
A2002914	T-CELTIS OCCID 1-3/4	EACH	25.000				
A2005014	T-GYMNOCLA DIO 1-3/4	EACH	45.000				
A2006514	T-QUERCUS BICOL 1-3/4	EACH	30.000				
A2012122	T-AESCUL ASP 1-3/4 BB	EACH	25.000				
B2001664	T-CRATAE CRU-I SF 5'	EACH	30.000				
B2006116		EACH	25.000				
K0036120	MULCH PLACEMENT 4	SQ YD	5,882.000				
K1003660		EACH	2.000				
* XX005656		EACH	680.000				
XZ186500		SQ YD	38,150.000				
X0322256		SQ FT	94.000				
		TON					
X0322729			73,294.000				
X0322856		GALLON	5.000				
X0322859	WEED CONTR PRE-EM GRN	POUND	300.000			<u> </u>	

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ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
X0324685		EACH	2.000				
* X0325095	MAIN DRAIN CLEANING	FOOT	27,391.000				
X0325222	WEED CONT BASAL TRTMT	GALLON	15.000				
X0325223	FIBER ASPHALT	POUND	1,272.000				
* X0325303	STR REP CON DP OVER 5	SQ FT	256.000				
* X0325305	STR REP CON DP $= < 5$	SQ FT	120.000				
X0325702	NIGHT WORK ZONE LIGHT	L SUM	1.000				
X0325775	WET RF TEM TAPE T3 4	FOOT	71,013.000				
X0325840	WET RF TEM TAPE T3 12	FOOT	3,406.000				
X0325842	WET RF TEM TAPE T3 LS	SQ FT	145.000				
X0325864	BR APPROACH PVT REM	SQ YD	187.000				
X0325876	WET RF TEM TAPE T3 8	FOOT	33,727.000				
X0325921	PLANT CARE	SQ YD	7,495.000				
X0326107	WET RF TEM TAPE T3 5	FOOT	21,777.000				
X0326701	WEED CONT BROADLF TRF	POUND	1.000				

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ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
X0326765	CLN & PT EXP REBAR SP	SQ FT	192.000				
X0326766	CLEAN RESEAL RLF JNT	FOOT	168.000				
X0326767	PROF DMD GRND CON PVT	SQ YD	69,625.000				
X0326768	CON T HD POLY COILBLE	FOOT	100.000				
X0326818	CONC BAR REM REPL SF	FOOT	235.000				
X0326819	CONC BAR REM REPL DF	FOOT	60.000				
X0326838	REMOV SIGN PANL T1 SP	SQ FT	54.000				
X0326839	REMOV SIGN PANL T2 SP	SQ FT	1,212.000				
X0326840	REMOV SIGN PANL T3 SP	SQ FT	12,673.000				
X0326841	REM SIN PAN ASY TB SP	EACH	64.000				
X0326842	MILE POST MKR ASSY SP	EACH	26.000				
X0326843	STAIN EX COL CONC SUR	SQ FT	2,600.000				
* X0326849	CLEAN WET PIT	TON	1,090.000				
* X0326850	MAIN DRAIN JOINT REP	FOOT	225.000				
X2010300	TREE REMOV UNDER 6	UNIT	108.000				

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Section Number -(2828[B,D],ETC., 3031.1) RS-6

ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
X4066580	POL HMA SC SMA N80	TON	40,059.000				
X4066685	POL HMA BC SMA N80	TON	33,234.000				
X7011015	TR C-PROT EXPRESSWAYS	L SUM	1.000				
X7013820	TR CONT SURVEIL EXPWY	CAL DA	65.000				
X8730312	EC C LEAD 18 4C TW SH	FOOT	12,962.000				
X8850102	INDUCTION LOOP	FOOT	5,795.000				
Z0001800	APPROACH SL REP (PD)	SQ YD	33.900				***************************************
Z0013798		L SUM	1.000				
Z0016001		SQ YD	10.000				
Z0016002		SQ YD	28.300				
Z0016200		SQ YD	145.000				
* Z0018500		EACH	680.000				
Z0018600		EACH	20.000				
Z0030250 Z0030350	IMP ATTN TEMP NRD TL3 IMP ATTN REL NRD TL3	EACH	2.000 2.000				

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Section Number -(2828[B,D],ETC., 3031.1) RS-6

ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
Z0048665	RR PROT LIABILITY INS	L SUM	1.000				
Z0064800	SELECTIVE CLEARING	UNIT	1,200.000				
Z0075310	TIE BARS 3/4	EACH	195.000				
Z0076600	TRAINEES	HOUR	1,000.000		0.800		800.000
20100110	TREE REMOV 6-15	UNIT	1,240.000				
20100210	TREE REMOV OVER 15	UNIT	371.000				
20101300	TREE PRUN 1-10	EACH	9.000				
20101350	TREE PRUN OVER 10	EACH	6.000				
* 28000510	INLET FILTERS	EACH	680.000				
* DELETED							
40600100	BIT MATLS PR CT	GALLON	2,489.000				
40600200	BIT MATLS PR CT	TON	369.000				
40600300	AGG PR CT	TON	1,847.000				
40600400	MIX CR JTS FLANGEWYS	TON	692.000				
40600895	CONSTRUC TEST STRIP	EACH	2.000				

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Section Number -(2828[B,D],ETC., 3031.1) RS-6

ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
40600982	HMA SURF REM BUTT JT	SQ YD	3,500.000				
40601005	HMA REPL OVER PATCH	TON	10,690.000				
40603085	HMA BC IL-19.0 N70	TON	20,777.000				
40603340	HMA SC "D" N70	TON	13,851.000				
* 40800052	INCIDENTL HMA SURF SP	TON	857.000				
42001300	PROTECTIVE COAT	SQ YD	1,018.000				
42001420	BR APPR PVT CON (PCC)	SQ YD	187.000				
42100925	PAVT REINF 11 1/4	SQ YD	187.000				
44000162	HMA SURF REM 3 1/4	SQ YD	39,000.000				
44000164	HMA SURF REM 3 3/4	SQ YD	125,896.000				
44000165	HMA SURF REM 4	SQ YD	296,736.000				
44000500	COMB CURB GUTTER REM	FOOT	4,189.000				
44001700	COMB C C&G REM & REPL	FOOT	143.000				
44002213	HMA RM OV PATCH 3 1/4	SQ YD	4,064.000				
44002222	HMA RM OV PATCH 5 1/2	SQ YD	31,053.000				

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Section Number -(2828[B,D],ETC., 3031.1) RS-6

ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
44002223	HMA RM OV PATCH 5 3/4	SQ YD	1,198.000				
* 44004250	PAVED SHLD REMOVAL	SQ YD	100.000				
* 44004260	PAVED SHLD REMOVAL SP	SQ YD	3,825.000				
44200561	CL A PATCH T1 11	SQ YD	352.000				
44200565	CL A PATCH T2 11	SQ YD	278.000				
44200569	CL A PATCH T3 11	SQ YD	44.000				
44200571	CL A PATCH T4 11	SQ YD	696.000				
44201761	CL D PATCH T1 10	SQ YD	458.000				
44201765	CL D PATCH T2 10	SQ YD	17,703.000				
44201769	CL D PATCH T3 10	SQ YD	4,176.000				
44201771	CL D PATCH T4 10	SQ YD	12,106.000				
44213000	PATCH REINFORCEMENT	SQ YD	1,528.000				
44213200	SAW CUTS	FOOT	1,099.000				
* 48300100	PCC SHOULDERS 6	SQ YD	100.000				
50102400	CONC REM	CU YD	47.000				

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ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
50157300	PROTECTIVE SHIELD	SQ YD	191.000				
50300255	CONC SUP-STR	CU YD	47.000				
50800205	REINF BARS, EPOXY CTD	POUND	4,860.000				
50800515	BAR SPLICERS	EACH	44.000				
52000110	PREF JT STRIP SEAL	FOOT	288.000				
55039700	SS CLEANED	FOOT	1,560.000				
58700300	CONCRETE SEALER	SQ FT	50,652.000				
60300205	FR & GRATES ADJUST SP	EACH	323.000				
60300310	FR & LIDS ADJUST SPL	EACH	323.000				
60603800	COMB CC&G TB6.12	FOOT	3,746.000				
60605000	COMB CC&G TB6.24	FOOT	443.000				
63000001	SPBGR TY A 6FT POSTS	FOOT	250.000				
63000005	SPBGR TY B	FOOT	50.000				
63100041	TRAF BAR TERM T1B	EACH	1.000				
63100070	TRAF BAR TERM T5	EACH	1.000				

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ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
63200305	SPBGR REM	FOOT	50.000				
64200105	SHOULDER RUMBLE STRIP	FOOT	112,609.000				
67100100	MOBILIZATION	L SUM	1.000				
70106800	CHANGEABLE MESSAGE SN	CAL MO	31.000				
70300240	TEMP PVT MK LINE 6	FOOT	3,867.000				
70400100	TEMP CONC BARRIER	FOOT	2,400.000				
70400200	REL TEMP CONC BARRIER	FOOT	2,749.000				
72000105	SIGN PANEL T1 SPL	SQ FT	118.000				
72000205	SIGN PANEL T2 SPL	SQ FT	2,088.000				
72000305	SIGN PANEL T3 SPL	SQ FT	13,447.000				
72400100	REMOV SIN PAN ASSY TA	EACH	11.000				
72800100	TELES STL SIN SUPPORT	FOOT	540.000				
73000105	WOOD SIN SUPPORT SPL	FOOT	1,062.000				
78000100	THPL PVT MK LTR & SYM	SQ FT	518.000				
78000200	THPL PVT MK LINE 4	FOOT	73,842.000				

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ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
78000400	THPL PVT MK LINE 6	FOOT	744.000				
78000500	THPL PVT MK LINE 8	FOOT	50,577.000				
78000600	THPL PVT MK LINE 12	FOOT	17,337.000				
78000650	THPL PVT MK LINE 24	FOOT	220.000				
78004210	PREF PL PM TB INL L4	FOOT	2,033.000				
78004220	PREF PL PM TB INL L5	FOOT	40,167.000				
78004240	PREF PL PM TB INL L8	FOOT	470.000				
78005100	EPOXY PVT MK LTR-SYM	SQ FT	654.000				
78005110	EPOXY PVT MK LINE 4	FOOT	299,013.000				
78005120	EPOXY PVT MK LINE 5	FOOT	154,361.000				
78005140	EPOXY PVT MK LINE 8	FOOT	86,047.000				
78008200	POLYUREA PM T1 LTR-SY	SQ FT	37.000				
78008210	POLYUREA PM T1 LN 4	FOOT	56,243.000				
78008220	POLYUREA PM T1 LN 5	FOOT	3,001.000				
78008240	POLYUREA PM T1 LN 8	FOOT	1,622.000				

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ltem Number	Pay Item Description	Unit of Measure	Quantity	x	Unit Price	=	Total Price
78008250	POLYUREA PM T1 LN 12	FOOT	747.000				
78100100	RAISED REFL PAVT MKR	EACH	5,472.000				
78100105	RAISED REF PVT MKR BR	EACH	73.000				
78200410	GUARDRAIL MKR TYPE A	EACH	12.000				
78200450	MONODIR GDRL REFL	EACH	300.000				
78200530	BAR WALL MKR TYPE C	EACH	192.000				
78300100	PAVT MARKING REMOVAL	SQ FT	17,545.000				
78300200	RAISED REF PVT MK REM	EACH	5,472.000				
81900200	TR & BKFIL F ELECT WK	FOOT	100.000				
84200600	REM LT U NO SALV	EACH	65.000		<u> </u>		

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	FAI 290 (I-290/Eisenhower Expressway) Project ACIM-290-4 (113) 091
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Revised 1/5/2010

FAI 290 (I-290/Eisenhower Expressway) Project ACIM-290-4 (113) 091 Section (2828 [B, D], ETC., 3031.1)RS-6 Cook County Contract 60G53

### STRUCTURAL REPAIR OF CONCRETE

Effective: March 15, 2006 Revised: May 11, 2009

Description. This work shall consist of structurally repairing concrete.

Materials. Materials shall be according to the following.

Item	Article/Section
(a) Portland Cement Concrete (Note 1)	
(b) R1 or R2 Mortar (Note2)	
(c) Normal Weight Concrete (Note 3)	
(d) Shotcrete (High Performance) (Note 4)	
(e) Reinforcement Bars	
(f) Anchor Bolts	
(g) Water	
(h) Curing Compound (Type I)	
(i) Cotton Mats	
(j) Protective Coat	
(k) Epoxy (Note 5)	
(I) Mechanical Bar Splicers (Note 6)	

- Note 1. The concrete shall be Class SI, except the cement factor shall be a minimum 6.65 cwt/cu. yd. (395 kg/cu. m), the coarse aggregate shall be a CA 16, and the strength shall be a minimum 4000 psi (27,500 kPa) compressive or 675 psi (4650 kPa) flexural at 14 days. A high range water-reducing admixture shall be used to obtain a 5-7 in. (125-175 mm) slump, but the cement factor shall not be reduced. This cement factor restriction shall also apply if a water-reducing admixture is used.
- Note 2. The R1 or R2 mortar shall be from the Department's approved list of Packaged, Dry, Rapid Hardening, Cementitious Materials for Concrete Repairs with coarse aggregate added. The amount of coarse aggregate added to the R1 or R2 Mortar shall be per the manufacturer's recommendations. The coarse aggregate gradation shall be CA 16 from an Aggregate Gradation Control System source or a packaged aggregate meeting Article 1004.02 with a maximum size of 1/2 in. (12.5 mm). The R1 or R2 Mortar and coarse aggregate mixture shall comply with the air content and strength requirements for Class SI concrete as indicated in Note 1. Mixing shall be per the manufacturer's recommendations, except the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated in Note 1. A high range water-reducing admixture shall be used to obtain a 5-7 in. (125-175 mm) slump.

- Note 3. The packaged concrete mixture shall be from the Department's approved list of Packaged, Dry, Formed, Concrete Repair Mixtures. The materials and preparation of aggregate shall be according to ASTM C 387. Proportioning shall be according to ASTM C 387, except the minimum cement factor shall be 6.65 cwt/cu. yd. (395 kg/cu. m). Cement replacement with fly ash or ground granulated blast-furnace slag shall be according to Section 1020. The coarse aggregate shall be a maximum size of 1/2 in. (12.5 mm). The packaged concrete mixture shall comply with the air content and strength requirements for Class SI concrete as indicated in Note 1. Mixing shall be per the manufacturer's recommendations, except the water/cement ratio shall not exceed the value specified for Class SI concrete as indicated in Note 1. A high range water-reducing admixture shall be used to obtain a 5-7 in. (125-175 mm) slump.
- Note 4. A packaged, pre-blended, and dry combination of materials, for the wet-mix shotcrete method shall be provided according to ASTM C 1480. An accelerator is prohibited, except the shotcrete may be modified at the nozzle with a non-chloride accelerator for overhead applications. The shotcrete shall be Type FA, Grade FR, and Class I. The fibers shall be Type III synthetic according to ASTM C 1116.

The 7 and 28 day compressive strength requirements in ASTM C 1480 shall not apply. Instead the shotcrete shall obtain a minimum compressive strength of 4000 psi (27,500 kPa) at 14 days.

The packaged shotcrete shall be limited to the following proportions:

The cement and finely divided minerals shall be 6.05 cwt/cu. yd. (360 kg/cu. m) to 7.50 cwt/cu. yd. (445 kg/cu. m), and the cement shall not be below 4.70 cwt/cu. yd. (279 kg/cu. m).

Class F fly ash is optional and the maximum shall be 15 percent by weight (mass) of cement.

Class C fly ash is optional and the maximum shall be 20 percent by weight (mass) of cement.

Ground granulated blast-furnace slag is optional and the maximum shall be 25 percent by weight (mass) of cement.

Microsilica is required and shall be a minimum of 5 percent by weight (mass) of cement, and a maximum of 10 percent. As an alternative to microsilica, high-reactivity metakaolin may be used at a minimum of 5 percent by weight (mass) of cement, and a maximum of 10 percent.

Fly ash shall not be used in combination with ground granulated blast-furnace slag. Class F fly ash shall not be used in combination with Class C fly ash. Microsilica shall not be used in combination with high-reactivity metakaolin. A finely divided mineral shall not be used in combination with a blended hydraulic cement, except for microsilica or high-reactivity metakaolin. The water/cement ratio shall be a maximum of 0.42.

The air content as shot shall be 4.0 - 8.0 percent.

- Note 5. In addition ASTM C 881, Type IV, Grade 2 or 3, Class A, B, or C may be used.
- Note 6. Mechanical bar splicers shall be from the approved list of Mechanical Reinforcing Bar Splicers / Coupler Systems, and shall be capable of developing in tension at least 125 percent of the yield strength of the existing reinforcement bar.

Equipment. Equipment shall be according to Article 503.03 and the following.

Chipping Hammer – The chipping hammer for removing concrete shall be a light-duty pneumatic or electric tool with a 15 lb. (7 kg) maximum class or less.

Blast Cleaning Equipment – Blast cleaning equipment for concrete surface preparation shall be the abrasive type, and the equipment shall have oil traps.

Hydrodemolition Equipment – Hydrodemolition equipment for removing concrete shall be calibrated, and shall use water according to Section 1002.

High Performance Shotcrete Equipment – The batching, mixing, pumping, hose, nozzle, and auxiliary equipment shall be for the wet-mix shotcrete method, and shall meet the requirements of ACI 506R.

# Construction Requirements

<u>General</u>. The repair methods shall be either formed concrete repair or shotcrete. The repair method shall be selected by the Contractor with the following rules.

- (a) Rule 1. For formed concrete repair, a subsequent patch to repair the placement point after initial concrete placement will not be allowed. As an example, this may occur in a vertical location located at the top of the repair.
- (b) Rule 2. Formed concrete repair shall not be used for overhead applications.
- (c) Rule 3. Shotcrete shall not be used for column repairs greater than 4 in. (100 mm) in depth, or any repair location greater than 8 in. (205 mm) in depth. The only exception to this rule would be for a horizontal application, where the shotcrete may be placed from above in one lift.
- (d) Rule 4. If formed concrete repair is used for locations that have reinforcement with less than 0.75 in. (19 mm) of concrete cover, the concrete mixture shall contain fly ash or ground granulated blast-furnace slag at the maximum cement replacement allowed.

<u>Temporary Shoring or Cribbing</u>. When a temporary shoring or cribbing support system is required, the Contractor shall provide details and computations, prepared and sealed by an Illinois licensed Structural Engineer, to the Department for review and approval. When ever possible the support system shall be installed prior to starting the associated concrete removal. If no system is specified, but during the course of removal the need for temporary shoring or cribbing becomes apparent or is directed by the Engineer due to a structural concern, the Contractor shall not proceed with any further removal work until an appropriate and approved support system is installed.

<u>Concrete Removal</u>. The Contractor shall provide ladders or other appropriate equipment for the Engineer to mark the removal areas. Repair configurations will be kept simple, and squared corners will be preferred. The repair perimeter shall be sawed a depth of 1/2 in. (13 mm) or less, as required to avoid cutting the reinforcement. Any cut reinforcement shall be repaired or replaced at the expense of the Contractor. If the concrete is broken or removed beyond the limits of the initial saw cut, the new repair perimeter shall be recut. The areas to be repaired shall have all loose, unsound concrete removed completely by the use of chipping hammers, hydrodemolition equipment, or other methods approved by the Engineer. The concrete removal shall extend along the reinforcement bar until the reinforcement is free of bond inhibiting corrosion. The outermost layer of reinforcement bar within the repair area shall be undercut to a depth of 3/4 in. (19 mm) or the diameter of the reinforcement bar, whichever value is larger. The underlying transverse reinforcement bar shall also be undercut as previously described, unless the reinforcement is not corroded, and the reinforcement bar is encased and well bonded to the surrounding concrete.

If sound concrete is encountered before existing reinforcement bars are exposed, further removal of concrete shall not be performed unless the minimum repair depth is not met.

The repair depth shall be a minimum of 1 in. (25 mm). The substrate profile shall be  $\pm 1/16$  in. ( $\pm 1.5$  mm). The perimeter of the repair area shall have a vertical face.

If a repair is located at the ground line, any excavation required below the ground line to complete the repair shall be included in this work.

The Contractor shall have a maximum of 14 calendar days to complete each repair location with concrete or shotcrete, once concrete removal has started for the repair.

The Engineer shall be notified of concrete removal that exceeds 6 in. (150 mm) in depth, one fourth the cross section of a structural member, more than half the vertical column reinforcement is exposed in a cross section, more than 6 consecutive reinforcement bars are exposed in any direction, within 1.5 in. (38 mm) of a bearing area, or other structural concern. Excessive deterioration or removal may require further evaluation of the structure or installation of temporary shoring and cribbing support system.

<u>Surface Preparation</u>. Prior to placing the concrete or shotcrete, the Contractor shall prepare the repair area and exposed reinforcement by blast cleaning. The blast cleaning shall provide a surface that is free of oil, dirt, and loose material.

If a succeeding layer of shotcrete is to be applied, the initial shotcrete surface and remaining exposed reinforcement shall be free of curing compound, oil, dirt, loose material, rebound (i.e. shotcrete material leaner than the original mixture which ricochets off the receiving surface), and overspray. Preparation may be by lightly brushing or blast cleaning if the previous shotcrete surface is less than 36 hours old. If more than 36 hours old, the surface shall be prepared by blast cleaning.

The repair area and perimeter vertical face shall have a rough surface. Care shall be taken to ensure the perimeter sawcut is roughened. Just prior to concrete or shotcrete placement, saturate the repair area with water to a saturated surface-dry condition. Any standing water shall be removed.

Concrete or shotcrete placement shall be done within 3 calendar days of the surface preparation or the repair area shall be prepared again.

<u>Reinforcement.</u> Exposed reinforcement bars shall be cleaned of concrete and corrosion by blast cleaning. After cleaning, all exposed reinforcement shall be carefully evaluated to determine if replacement or additional reinforcement bars are required.

Reinforcing bars that have been cut or have lost 25 percent or more of their original cross sectional area shall be supplemented by new in kind reinforcement bars. New bars shall be lapped a minimum of 32 bar diameters to existing bars. A mechanical bar splicer shall be used when it is not feasible to provide the minimum bar lap. No welding of bars shall be performed.

Intersecting reinforcement bars shall be tightly secured to each other using 0.006 in. (1.6 mm) or heavier gauge tie wire, and shall be adequately supported to minimize movement during concrete placement or application of shotcrete.

For reinforcement bar locations with less than 0.75 in. (19 mm) of cover, protective coat shall be applied to the completed repair. The application of the protective coat shall be according to Article 503.19, 2nd paragraph, except blast cleaning shall be performed to remove curing compound.

The Contractor shall anchor the new concrete to the existing concrete with 3/4 in. (19 mm) diameter hook bolts for all repair areas where the depth of concrete removal is greater than 8 in. (205 mm) and there is no existing reinforcement extending into the repair area. The hook bolts shall be spaced at 15 in. (380 mm) maximum centers both vertically and horizontally, and shall be a minimum of 12 in. (305 mm) away from the perimeter of the repair. The hook bolts shall be installed according to Section 584.

<u>Repair Methods</u>. All repair areas shall be inspected and approved by the Engineer prior to placement of the concrete or application of the shotcrete.

(a) Formed Concrete Repair. Falsework shall be according to Article 503.05. Forms shall be according to Article 503.06. Formwork shall provide a smooth and uniform concrete finish, and shall approximately match the existing concrete structure. Formwork shall be mortar tight and closely fitted where they adjoin the existing concrete surface to prevent leakage. Air vents may be provided to reduce voids and improve surface appearance. The Contractor may use exterior mechanical vibration, as approved by the Engineer, to release air pockets that may be entrapped.

The concrete for formed concrete repair shall be a Class SI Concrete, or a packaged R1 or R2 Mortar with coarse aggregate added, or a packaged Normal Weight Concrete at the Contractor's option. The concrete shall be placed and consolidated according to Article 503.07. The concrete shall not be placed when frost is present on the surface of the repair area, or the surface temperature of the repair area is less than 40 °F (4 °C). All repaired members shall be restored as close as practicable to their original dimensions.

Curing shall be done according to Article 1020.13.

If temperatures below  $45^{\circ}F$  (7°C) are forecast during the curing period, protection methods shall be used. Protection Method I according to Article 1020.13(d)(1), or Protection Method II according to Article 1020.13(d)(2) shall be used during the curing period.

The surfaces of the completed repair shall be finished according to Article 503.15.

(b) Shotcrete. Shotcrete shall be tested by the Engineer for air content according to Illinois Modified AASHTO T 152. Obtain the sample in a damp, non-absorbent container from the discharge end of the nozzle.

For compressive strength of shotcrete, a 18 x 18 x 3.5 in. (457 x 457 x 89 mm) test panel shall be shot by the Contractor for testing by the Engineer. A steel form test panel shall have a minimum thickness of 3/16 in. (5 mm) for the bottom and sides. A wood form test panel shall have a minimum 3/4 in. (19 mm) thick bottom, and a minimum 1.5 in. (38 mm) thickness for the sides. The test panel shall be cured according to Article 1020.13 (a) (3) or (5) while stored at the jobsite and during delivery to the laboratory. After delivery to the laboratory for testing, curing and testing shall be according to ASTM C 1140.

The method of alignment control (i.e. ground wires, guide strips, depth gages, depth probes, and formwork) to ensure the specified shotcrete thickness and reinforcing bar cover is obtained shall be according to ACI 506R. Ground wires shall be removed after completion of cutting operations. Guide strips and formwork shall be of dimensions and a configuration that do not prevent proper application of shotcrete. Metal depth gauges shall be cut 1/4 in. (6 mm) below the finished surface. All repaired members shall be restored as close as practicable to their original dimensions.

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For air temperature limits when applying shotcrete in cold weather, the first paragraph of Article 1020.14(b) shall apply. For hot weather, shotcrete shall not be applied when the air temperature is greater than  $90^{\circ}F$  ( $32^{\circ}C$ ). The applied shotcrete shall have a minimum temperature of  $50^{\circ}F$  ( $10^{\circ}C$ ) and a maximum temperature of  $90^{\circ}F$  ( $32^{\circ}C$ ). The shotcrete shall not be applied during periods of rain unless protective covers or enclosures are installed. The shotcrete shall not be applied when frost is present on the surface of the repair area, or the surface temperature of the repair area is less than  $40^{\circ}F$  ( $4^{\circ}C$ ). If necessary, lighting shall be provided to provide a clear view of the shooting area.

The shotcrete shall be applied according to ACI 506R, and shall be done in a manner that does not result in cold joints, laminations, sandy areas, voids, sags, or separations. In addition, the shotcrete shall be applied in a manner that results in maximum densification of the shotcrete. Shotcrete which is identified as being unacceptable while still plastic shall be removed and re-applied.

The nozzle shall normally be at a distance of 2 to 5 ft. (0.6 to 1.5 m) from the receiving surface, and shall be oriented at right angles to the receiving surface. Exceptions to this requirement will be permitted to fill corners, encase large diameter reinforcing bars, or as approved by the Engineer. For any exception, the nozzle shall never be oriented more than 45 degrees from the surface. Care shall be taken to keep the front face of the reinforcement bar clean during shooting operations. Shotcrete shall be built up from behind the reinforcement bar. Accumulations of rebound and overspray shall be continuously removed prior to application of new shotcrete. Rebound material shall not be incorporated in the work.

Whenever possible, shotcrete shall be applied to the full thickness in a single layer. The maximum thickness shall be 4 in. (100 mm) unless the shotcrete is applied from above on a horizontal surface, or a thicker application is approved by the Engineer. When two or more layers are required, the minimum number shall be used and shall be done in a manner without sagging or separation. A flash coat (i.e. a thin layer of up to 1/4 in. (6 mm) applied shotcrete) may be used as the final lift for overhead applications.

Prior to application of a succeeding layer of shotcrete, the initial layer of shotcrete shall be prepared according to the surface preparation and reinforcement bar cleaning requirements. Upon completion of the surface preparation and reinforcement bar treatment, water shall be applied according to the surface preparation requirements unless the surface is moist. The second layer of shotcrete shall then be applied within 30 minutes.

Shotcrete shall be cut back to line and grade using trowels, cutting rods, screeds or other suitable devices. The shotcrete shall be allowed to stiffen sufficiently before cutting. Cutting shall not cause cracks or delaminations in the shotcrete. For depressions, cut material may be used for small areas. Rebound material shall not be incorporated in the work. For the final finish, a wood float shall be used to approximately match the existing concrete texture. All repaired members shall be restored as close as practicable to their original dimensions.

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Contractor operations for curing shall be continuous with shotcrete placement and finishing operations. The Engineer may require modification of operations to ensure satisfactory results are obtained. Cotton mats shall be applied according to Article 1020.13(a)(5) except the exposed layer of shotcrete shall be covered within 10 minutes after finishing, and wet curing shall begin immediately. As an alternative to this method, Type I curing compound shall be applied according to Article 1020.13(a)(4) within 10 minutes and moist curing with cotton mats shall begin within 3 hours. For overhead applications where the final shotcrete layer has been applied, the Contractor has the option to use Type I curing compound in lieu of the cotton mats. Note 5 of the Index Table in Article 1020.13 shall apply to the membrane curing method. The curing compound shall be applied according to Article 1020.13(a)(4).

When a shotcrete layer is to be covered by a succeeding shotcrete layer within 36 hours, the repair area shall be protected with intermittent hand fogging, or wet curing with either burlap or cotton mats shall begin within 10 minutes. Intermittent hand fogging may be used only for the first hour. Thereafter, wet curing with burlap or cotton mats shall be used until the succeeding shotcrete layer is applied. Intermittent hand fogging may be extended to the first hour and a half if the succeeding shotcrete layer is applied by the end of this time.

The curing period shall be for 7 days, except when there is a succeeding layer of shotcrete. In this instance, the initial shotcrete layer shall be cured until the surface preparation and reinforcement bar treatment is started.

If temperatures below  $45^{\circ}F$  (7°C) are forecast during the curing period, protection methods shall be used. Protection Method I according to Article 1020.13(d)(1), or Protection Method II according to Article 1020.13(d)(2) shall be used during the curing period

<u>Inspection of Completed Work</u>. The Contractor shall provide ladders or other appropriate equipment for the Engineer to inspect the repaired areas. After curing but no sooner than 28 days after placement of concrete or shooting of shotcrete, the repair shall be examined for conformance with original dimensions, cracks, voids, and delaminations. Sounding for delaminations will be done with a hammer or by other methods determined by the Engineer.

The repaired area shall be removed and replaced, as determined by the Engineer, for nonconformance with original dimensions, surface cracks greater than 0.01 in. (0.25 mm) in width, map cracking with a crack spacing in any direction of 18 in. (0.45 m) or less, voids, or delaminations.

If a nonconforming repair is allowed to remain in place, cracks 0.01 in. (0.25 mm) or less shall be repaired with epoxy according to Section 590. For cracks less than 0.007 in. (2 mm), the epoxy may be applied to the surface of the crack. Voids shall be repaired according to Article 503.15.

<u>Publications and Personnel Requirements</u>. The Contractor shall provide a current copy of ACI 506R to the Engineer a minimum of one week prior to start of construction.

The shotcrete personnel who perform the work shall have current American Concrete Institute (ACI) nozzlemen certification for vertical wet and overhead wet applications, except one individual may be in training. This individual shall be adequately supervised by a certified ACI nozzlemen as determined by the Engineer. A copy of the nozzlemen certificate(s) shall be given to the Engineer.

<u>Method of Measurement</u>. This work will be measured for payment in place and the area computed in square feet (square meters). For a repair at a corner, both sides will be measured.

Basis of Payment. This work will be paid for at the contract unit price per square foot (square meter) for STRUCTURAL REPAIR OF CONCRETE (DEPTH GREATER THAN 5 IN. (125 MM), STRUCTURAL REPAIR OF CONCRETE (DEPTH EQUAL TO OR LESS THAN 5 IN. (125 MM).

When not specified to be paid for elsewhere, the work to design, install, and remove the temporary shoring and cribbing will be paid for according to Article 109.04.

With the exception of reinforcement damaged by the Contractor during removal, the furnishing and installation of supplemental reinforcement bars, mechanical bar splicers, hook bolts, and protective coat will be paid according to Article 109.04.

## INLET FILTER CLEANING

Effective: February 7, 2007

<u>Description.</u> This work shall consist of cleaning sediment from each assembled inlet filter. The Engineer will designate the need for cleaning based on the rate of debris and silt collected at each inlet filter location.

Cleaning of the inlet filter shall consist of inspecting and cleaning (includes removal and proper disposal of debris and silt that has accumulated in the filter fabric bag) by vactoring, removing and dumping or any other method approved by the Engineer.

<u>Method of Measurement.</u> Cleaning of the inlet filter shall be measured for payment each time that the cleaning work is performed at each of the inlet filter locations.

Basis of Payment. The work will be paid for at the contract unit price per each for INLET FILTER CLEANING.

### MAIN DRAIN CLEANING

<u>Description</u>. This work shall consist of cleaning the existing main drain storm sewer and main drain manholes as shown in the plans, as described herein and as directed by the Engineer.

<u>Construction Requirements.</u> The types of debris or other foreign matter which may be encountered include, but are not limited to, silt, gravel, broken concrete or rocks, root growth, and other deposits or accumulation which shall be completely removed at the time of final inspection. The equipment selected for cleaning shall be capable of removing all debris and other deleterious material from the main sewer and manholes.

When a sewer is found to be more than one-half full with debris, bucket machines, rodding machines, and/or vacuum equipment shall be used to remove the major portion of material before hydraulic equipment is employed.

All debris removed during the cleaning operations shall be disposed of outside the State rightof-way in accordance with the local EPA rules and regulations and Section 202.03 of the Standard Specifications. Disposal costs shall not be paid for separately, but shall be included in the unit price for MAIN DRAIN CLEANING.

The method by which the debris is removed from the main drain sewer and main drain manholes shall include safety, transportation, equipment and traffic control described herein, and shall require the approval of the Engineer.

The Contractor is expected to complete this work using the permanent lane closures shown in the maintenance of traffic plans when possible. Any work not able to be completed using these permanent lane closures shall be coordinated with the Department and the City of Chicago and any required traffic control shall be included in TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS).

The Contractor shall CCTV the sewer segments after cleaning and shall provide Digital Video Disc (DVD) recordings to the Engineer for verification of cleaning.

<u>Method of Measurement.</u> This work will be measured for payment per foot of debris removed and disposed of from the main drain storm sewer and main drain manholes. The measured length shall be confirmed by the Engineer prior to removal and disposal of the debris.

Basis of Payment. This work will be paid for at the contract unit price per foot for MAIN DRAIN CLEANING.

# MAIN DRAIN JOINT REPAIR

<u>Description.</u> This work shall consist of repairing designated joints, cracks, lift holes and other defects by sealing from the inside surface of the pipe using materials, application techniques and methods stated in these specifications, as shown in the plans and as directed by the Engineer. The techniques shall include providing a water-tight seal by injecting chemical into the soil surrounding the joint or by forming a flexible gasket within the joint annulus as the joint spacing/gap permits.

Application. The following is a summary of work to be performed:

- I. Cleaning and preparation of the pipe defect to be repaired
- II. Injection sealing of pipe joint or defect using one of the following:
  - Acrylamide gel
  - Acrylic gel
  - Urethane gel
  - Polyurethane Resin (foam)

In addition, these specifications allow the application of an elastomeric polyurethane resin in combination with other materials to create a satisfactory flexible gasket in the joint annulus.

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III. Expanding Gasket Placement Techinque (EGP) method of impregnating oil-free jute fiber or open cell backer rod with elastomeric polyurethane.

## I. Pipe Joint/Crack Preparation

Each joint/crack designated by the Engineer to be sealed shall be properly prepared to ensure the effectiveness of the work. Preparation shall include the removal of all previous joint sealing materials. Such removal shall be accomplished using chipping hammers, chisels and water pressure cleaning in any combination to achieve satisfactory results. Any remaining sand, silt, etc. which may accumulate on the bottom (invert) of the joint shall be removed prior to chemical sealing.

If voids are suspected in the sands/soil around the pipe joint to be sealed, then it shall be necessary to fill that void with soil cement or other expansive materials prior to injecting chemical grout. If it is impractical to fill the void, then an internal elastomeric polyurethane gasket shall be applied.

# II. Injection Sealing (Pipe Joint/Crack)

After the joint/crack has been properly prepared, injection ports will be drilled into the pipe joint area where infiltration is or has been active. After the injection ports have been drilled, a chemical injection device shall be placed into the ports and chemical grout shall in injected into the soil surrounding the pipe joint/crack. Injection ports shall be placed around the joint circumference to create a satisfactory seal. "Open" injection ports provide a visual travel route for the placement of the chemical grout by allowing the injected grout to be seen by the operator as it flows around the circumference of the pipe. Once injection has been completed, the injection device shall be removed and the injection ports shall be cleaned and then filled with rapid setting patching material.

# III. Expanding Gasket Placement Technique (EGP) Joint Crack Seal

When joint openings exceed 1 inch, it shall be necessary to use an elastomeric polyurethane resin in conjunction with filler materials to form a gasket seal. This shall be accomplished by impregnating oil-free jute fiber or open cell backer rod with elastomeric polyurethane resin. This is followed by packing the combined materials between the opening in the joint bell and spigot or the crack in the following manner:

- 1. Cut the oil-free jute fiber or open cell backer rod in various sizes to meet the dimension requirements of the open joint or crack.
- 2. Place the oil-free jute fiber or open cell backer rod in a heavy-duty plastic bag or pail.
- 3. Pour the elastomeric polyurethane resin into the plastic container covering the oil-free jute fiber or open cell backer rod. Allow sufficient time for the oil-free jute fiber or open cell backer rod to be thoroughly saturated with the resin.
- 4. Wet the surfaces of the joint/crack with water using a hand-spray operation.
- 5. Place the pre-saturated oil-free jute fiber or open cell backer rod in the joint/crack then lightly tamped into place using wooden dowels, putty knives or other suitable tools.
- 6. Apply water using a hand sprayer during the tamping process.
- 7. Apply additional layers of saturated oil-free jute fiber or open cell backer rod in the same fashion as described above until the joint/crack opening is adequately filled. Note: DO NOT apply layers of the saturated oil-free fiber or open cell backer rod in excess of one inch from the interior joint surface.
- 8. Once the new gasket has been put into place, the entire joint/crack surface shall be finished using a rapid setting patching material. The patching material shall be hand-applied and finished with a trowel to existing surface configurations. When completed, the joint/crack surface shall be smooth and flush with adjacent surfaces.

<u>Materials.</u> The contractor shall submit for review and approval of the Engineer material specifications for each of the following items:

## Acrylamide-Base Chemical Sealant

Formed by the bringing together of three primary chemical constituents:

- 1. Acrylamide
- 2. Triethanolamine/CAT-T
- 3. Ammonium Persulfate

Gel times shall be controlled from ten seconds to as long as one hour by adjusting the percentage of catalysts used.

The group material shall have the following basic properties:

- 1. Viscosity of approximately one (1) centipoise (cps).
- 2. The viscosity to remain constant through the induction period.
- 3. The ability to tolerate dilution and react in moving water.
- 4. The final reaction shall produce a continuous irreversible impermeable stiff gel.

# Acrylic-Base Chemical Sealant

Shall be formed by the bringing together of three primary chemical constituents:

- 1. Acrylic
- 2. Triethanolamine/CAT-T
- 3. Sodium Persulfate

The chemical constituents shall be mixed with water prior to placement.

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Gel times shall be controlled from ten seconds to as long as one hour by adjusting the percentage of catalysts used.

The group material shall have the following basic properties:

- 1. Viscosity of approximately one (1) centipoise.
- 2. The viscosity to remain constant through the induction period.
- 3. The ability to tolerate dilution and react in moving water.
- 4. The final reaction shall produce a continuous irreversible impermeable stiff gel.

### Polyurethane Gel Chemical Sealant

A moisture curing, hydrophilic urethane liquid that is designed to be mixed with water as applied through pumping equipment.

### Elastomeric Polyurethane Resin (Foam)

Designed to control water and seal cracks in concrete. Elastomeric Polyurethane Resin expands when it comes in contact with water and quickly forms a flexible closed cell polyurethane foam seal.

### **Oil-Free Jute Fiber**

### Open Cell Round Backer Rod

### Rapid Setting High Early Strength Patching Material

<u>Method of Measurement.</u> This work will be measured for payment per foot of joint repair as approved by the Engineer. The Contractor shall CCTV the sewer segments after cleaning and shall provide Digital Video Disc (DVD) recordings to the Engineer for verification of repairs.

<u>Basis of Payment.</u> This work will be paid for at the contract unit price per foot for MAIN DRAIN JOINT REPAIR. The Contractor is expected to complete this work using the permanent lane closures shown in the maintenance of traffic plans when possible. Any work not able to be completed using these permanent lane closures shall be coordinated with the Department and any required traffic control shall be included in TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS).

# PAVED SHOULDER REMOVAL (SPECIAL)

<u>Description.</u> This work shall consist of complete removal of existing hot-mix asphalt (HMA) surfaces in preparation for subsequent resurfacing according to Section 440 of the Standard Specifications, as shown on the plans, as described herein and as directed by the Engineer.

<u>Construction Requirements.</u> Typical applications of this work include, but are not limited to, all HMA pads at fencing along frontage roads, all HMA side slopes at exit and entrance ramps and bridge approaches, and all HMA pads at ends of barrier terminal walls.

For locations and extent of work, the Contractor shall coordinate with the Engineer and contact Rick Wanner, Roadside Development Architect, IDOT Roadside Development Unit, at (847) 705-4172 at least 72 hours prior to starting work.

# CLEANING OF WET PIT

<u>Description.</u> This work shall consist of the removal and disposal of all debris from the designated pump station wet pit as shown in the plans, as described herein and as directed by the Engineer.

Pump Station No. 5 is located at the southwest corner of Des Plaines Street and Van Buren Street.

Pump Station No. 26 is located at the northeast quadrant of Union Avenue and Roosevelt Road.

<u>Construction Requirements.</u> The method by which the debris is removed from the wet pit shall include safety, transportation, equipment and traffic control described herein, and shall require the approval of the Engineer.

The wet pit shall be cleaned once prior to commencement of all other construction operations and once at the completion of construction.

The Contractor shall coordinate with the Department and City of Chicago for any traffic control required to perform this work. The cost for any traffic control shall be included in TRAFFIC CONTROL AND PROTECTION (EXPRESSWAYS).

All removed material shall be disposed of outside the State right-of-way and in accordance with the local EPA rules and regulations and Section 202.03 of the Standard Specifications. Disposal costs shall not be paid for separately, but shall be included in the unit price for CLEANING OF WET PIT.

Areas outside the bar screen(s)/trash rack(s) up to the inlet sewer shall be cleaned.

The Contractor shall contact Mr. Naser Gholeh, IDOT Engineer, at (847) 221-3089 at least 72 hours prior to beginning work and to obtain access to the pump stations.

<u>Method of Measurement.</u> Each ton of wet pit debris that is removed and disposed of in accordance with the above specifications and approved by the Engineer shall be counted as a unit for payment.

<u>Basis of Payment.</u> This work will be paid for at the contract unit price per ton for CLEANING OF WET PIT.

## INCIDENTAL HOT-MIX ASPHALT SURFACING (SPECIAL)

<u>Description.</u> This work shall consist of constructing a hot-mix asphalt (HMA) surface on a prepared base according to Section 408 of the Standard Specifications, as shown on the plans, as described herein and as directed by the Engineer.

<u>Construction Requirements.</u> Typical applications of this work include, but are not limited to, all HMA pads at fencing along frontage roads, all HMA side slopes at exit and entrance ramps and bridge approaches, and all HMA pads at ends of barrier terminal walls.

For locations and extent of work, the Contractor shall coordinate with the Engineer and contact Rick Wanner, Roadside Development Architect, IDOT Roadside Development Unit, at (847) 705-4172 at least 72 hours prior to starting work.