ENVIRONMENTAL (CONTINUED)

ITEM 208 - VIBRATION CONTROL AND MONITORING, AS PER PLAN

THE CONTRACTOR SHALL CONTROL AND MONITOR VIBRATIONS WHEN PERFORMING DEMOLITION AND CONSTRUCTION ACTIVITIES NEAR BUILDINGS, STRUCTURES, OR UTILITIES THAT MAY BE SUBJECT TO DAMAGE FROM CONSTRUCTION INDUCED GROUND VIBRATIONS. DEMOLITION ACTIVITIES INCLUDE REMOVAL OF EXISTING BRIDGES, RETAINING WALLS, PAVEMENTS, AND FOUNDATIONS. CONSTRUCTION ACTIVITIES INCLUDE INSTALLATION OF DRILLED SHAFTS, PILE DRIVING, USE OF VIBRATORY ROLLERS, OR ANY OTHER OPERATION THAT CAUSES VIBRATION. VIBRATION CONTROL AND MONITORING SHALL CONFORM TO THE CONSTRUCTION AND MATERIALS SPECIFICATION (CMS) ITEM 208.15, EXCEPT AS MODIFIED BELOW:

1. ALL REFERENCES TO BLASTING SHALL INSTEAD APPLY TO DEMOLITION AND CONSTRUCTION ACTIVITIES.

2. THE VIBRATION SPECIALIST'S EXPERIENCE REQUIREMENT SHALL APPLY FOR VIBRATION MONITORING AND NEED NOT BE SPECIFIC TO ROCK BLASTING PROJECTS.

THE CONTRACTOR SHALL CONDUCT A PRE-CONSTRUCTION SURVEY OF ANY BUILDINGS, STRUCTURES, AND UTILITIES LOCATED WITHIN LIMITS DETERMINED BY THE VIBRATION SPECIALIST AND PROVIDE THE ENGINEER WITH PRE-CONSTRUCTION AUDIO-VIDEO COLOR RECORDING AS FOLLOWS.

A.RECORDING. CONSTRUCTION IN AN AREA SHALL NOT START UNTIL THE AREA HAS BEEN RECORDED AND THE DVDS SUBMITTED TO THE ENGINEER.

B.VISUAL INSPECTION. PRIOR TO RECORDING, ALL AREAS TO BE RECORDED SHALL BE INVESTIGATED VISUALLY WITH NOTATION MADE OF FEATURES NOT READILY VISIBLE BY RECORDING METHODS. THIS WOULD INCLUDE, BUT ARE NOT LIMITED TO, CULVERTS (SIZE, TYPE, AND CONDITION) AND MANHOLES THAT MAY BE PARTIALLY BURIED. RECORD ALL MEASUREMENTS.

C.APPROVALS. ALL RECORDING SHALL BE CONDUCTED IN THE PRESENCE OF THE DEPARTMENT UNLESS WAIVED BY THE ENGINEERS. AT THE START OF RECORDING, THE CONTRACTOR SHALL SUBMIT A SAMPLE RECORDING OF A PORTION OF THIS PROJECT FOR THE ENGINEER TO REVIEW. THE SAMPLE RECORDING SHALL BE APPROVED BEFORE ANY OTHER RECORDING IS ALLOWED.

D.CERTIFICATION. UPON COMPLETION OF THE WORK, THE CONTRACTOR SHALL PROVIDE CERTIFICATION IN WRITING TO THE ENGINEER THAT ALL REQUIREMENTS OF THE AUDIO-VIDEO COLOR RECORDING FOR THIS PROJECT WERE ACCOMPLISHED IN ACCORDANCE WITH THESE SPECIFICATIONS:

1.IDENTIFICATION. ALL RECORDINGS (DVDS AND CASES) SHALL BE PROPERLY IDENTIFIED BY RECORDING NUMBER, LOCATION, AND PROJECT NAME IN A MANNER ACCEPTABLE TO THE ENGINEER.

2.RECORD. A RECORD OF THE CONTENTS OF EACH RECORDING SHALL BE SUPPLIED ON A RUN SHEET IDENTIFYING EACH SEGMENT IN THE RECORDING NUMBER, LOCATION, AND PROJECT NAME IN A MANNER ACCEPTABLE TO THE ENGINEER.

3.INVENTORY. A BRIEF REPORT AND INVENTORY OF ALL RECORDINGS COMPLETE, REFERENCED BY LOCATION AND RECORDING NUMBER SHALL BE FURNISHED TO THE DEPARTMENT UPON COMPLETION OF THE WORK AND DELIVERY OF THE RECORDINGS. ALL RECORDINGS AND WRITTEN RECORDS SHALL BECOME THE PROPERTY OF THE DEPARTMENT.

THE CONTRACTOR SHALL USE A SURVEY METHOD ACCEPTABLE TO ITS INSURANCE COMPANY. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE RESULTING FROM DEMOLITION AND CONSTRUCTION ACTIVITIES. IF OWNERS OR OCCUPANTS FAIL TO ALLOW ACCESS TO A PROPERTY FOR THE PRE-CONSTRUCTION SURVEY, SEND A CERTIFIED LETTER TO THE OWNER OR OCCUPANT. MAKE THE NOTIFICATION EFFORT AND THE CERTIFIED LETTER PART OF THE PRE-CONSTRUCTION SURVEY RECORDS. DELIVER A COPY OF THE PRE-CONSTRUCTION SURVEY TO THE ENGINEER BEFORE BEGINNING CONSTRUCTION OPERATIONS AT CRITICAL LOCATIONS. CRITICAL LOCATIONS SHALL INCLUDE, BUT ARE NOT LIMITED TO EXISTING BRIDGES, RETAINING WALLS, AND UTILITIES. SUBMIT DELIVERABLES IN ACCORDANCE WITH CMS ITEM 208.

ITEM 208, VIBRATION CONTROL AND MONITORING,
AS PER PLAN LUMP SUM

QUANTITIES CARRIED TO GENERAL NOTES SUBSUMMARY ON SHEET 51

REGULATED WASTE AND WATER PLAN NOTE

SUBGRADE EXCAVATIONS ALONG I-70 EB FROM THE FORWARD ABUTMENT OF FRA-70-1321R ALONG THE SOUTHERN SIDE OF I-70 EB BERM TO THE REAR ABUTMENT OF FRA-70-1358R MAY CONTAIN REGULATED MATERIALS. REFER TO SOIL BORING PROFILES AND ENVIRONMENTAL STUDIES ENTITLED "PHASE II ENVIRONMENTAL SITE ASSESSMENTS", PREPARED BY DLZ, OHIO, INC. DATED MAY 2009 AND "ADDENDUM REPORT FOR PHASE II ENVIRONMENTAL SITE ASSESSMENTS" PREPARED BY DLZ, OHIO, INC. DATED SEPTEMBER 2009. ALL EXCAVATED MATERIAL FROM THE AREAS IDENTIFIED BY THIS NOTE SHALL BE MANAGED AS REGULATED MATERIALS UNTIL APPROPRIATELY REUSED AS A CONSTRUCTION MATERIAL OR DISPOSED OF IN LICENSED DISPOSAL FACILITY. EXCAVATED MATERIALS GENERATED WITHIN THE CROSS-HATCHING LIMITS, MEETING THE REQUIREMENTS OF ITEM 203, SHALL BE REUSED AS EMBANKMENT WITHIN THE CROSS-HATCHING LIMITS IDENTIFIED BY THIS NOTE. EXCAVATED MATERIALS NOT SUITABLE FOR USE IN ITEM 203 EMBANKMENT SHALL BE TESTED FOR CHARACTERIZATION AND DISPOSED OF IN A LICENSED DISPOSAL FACILITY. EXCAVATED MATERIALS NOT BEING REUSED FOR EMBANKMENT ARE REFERRED TO AS "WASTE MATERIALS" FOR THE REMAINDER OF THIS NOTE.

PROVIDE AN EXCAVATION AND EMBANKMENT PLAN TO THE ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO PERFORMING EXCAVATION WITHIN THE ABOVE LIMITS. THE EXCAVATION AND EMBANKMENT PLAN WILL INCLUDE A SCHEDULE OF EXCAVATION/EMBANKMENT ACTIVITIES, A SCHEDULE FOR TESTING AND DISPOSAL OF WASTE MATERIALS, AND IDENTIFY ALL TEMPORARY STOCKPILE LOCATIONS FOR THE EXCAVATED MATERIALS WITHIN THE LIMITS. PROVIDE A SAMPLING AND TESTING PLAN TO THE ENGINEER FOR THE PURPOSES OF CHARACTERIZING THE WASTE MATERIALS FOR PROPER DISPOSAL. PROVIDE THE SAMPLING AND TESTING PLAN TO THE ENGINEER AT THE SAME TIME AS THE EXCAVATION AND EMBANKMENT PLAN.

THE CONTRACTOR SHALL SEGREGATE WASTE MATERIALS INTO INDIVIDUAL STOCKPILES BY THE PARCEL OF GENERATION. EACH STOCKPILE OF WASTE MATERIAL WILL BE SAMPLED AND TESTED FOR PROPER DISPOSAL. PROVIDE THE ENGINEER WITH ALL WASTE MATERIAL SAMPLING RESULTS WITHIN FORTY-EIGHT (48) HOURS OF RECEIVING THE RESULTS. DO NOT MIX WASTE MATERIALS WITH MATERIALS FROM ANY OTHER SOURCE OF GENERATION UNTIL THE WASTE MATERIALS HAVE BEEN CHARACTERIZED.

WASTE MATERIAL NOT CHARACTERIZED AS HAZARDOUS WASTE SHALL BE MANAGED AS SOLID WASTE. TEMPORARY STORAGE OF SOLID WASTE SHALL BE IN COVERED, PORTABLE CONTAINERS FREE FROM HOLES OR DAMAGES. THE CONTRACTOR MAY ALSO UTILIZE TEMPORARY STOCKPILES OF THE SOLID WASTE WITH A SYNTHETIC COVER THAT PREVENTS INFILTRATION FROM RAINWATER AND SURROUNDED BY BERMS THAT PREVENTS CONTACT WITH STORMWATER RUN-ON. PROVIDE PROPER TRANSPORTATION AND DISPOSAL IN A LICENSED SOLID WASTE DISPOSAL FACILITY. THE CONTRACTOR SHALL FILL OUT AND SIGN ALL WASTE DISPOSAL FACILITY FORMS REQUIRED BY THE DISPOSAL FACILITY INCLUDING, BUT NOT LIMITED TO MATERIAL PROFILES, DATA SHEETS AND MATERIAL CERTIFICATIONS. PROVIDE A COPY OF ALL COMPLETED DISPOSAL FACILITY FORMS TO THE ENGINEER.

WASTE MATERIALS CHARACTERIZED AS HAZARDOUS WASTE SHALL IMMEDIATELY BE PLACED IN AN APPROPRIATE LINED, COVERED CONTAINERS, LABELED AS HAZARDOUS WASTE AND SECURED FOR TEMPORARY STORAGE. NOTIFY THE ENGINEER IMMEDIATELY IF SAMPLING RESULTS INDICATE THAT ANY WASTE MATERIALS ARE CHARACTERIZED AS HAZARDOUS. THE DEPARTMENT WILL SUBMIT A REQUEST FOR A RCRA SUBTITLE C SITE GENERATOR ID FROM OHIO EPA. UTILIZE PROPER HANDLED, STORAGE AND TRANSPORTATION METHODS UNTIL PROPERLY DISPOSED OF IN A LICENSE HAZARDOUS WASTE FACILITY. THE CONTRACTOR SHALL COMPLETE ALL MANIFEST AND PROVIDE THE COMPLETED MANIFESTS TO THE ENGINEER FOR SIGNATURE AS THE GENERATOR. PROVIDE THE ENGINEER WITH A COPY OF THE MANIFEST SIGNED BY THE DESIGNATED HAZARDOUS WASTE DISPOSAL FACILITY. THE CONTRACTOR SHALL FILL OUT AND SIGN ALL WASTE DISPOSAL FACILITY FORMS REQUIRED BY THE DISPOSAL FACILITY INCLUDING, BUT NOT LIMITED TO MATERIAL PROFILES, DATA SHEETS AND MATERIAL CERTIFICATIONS. PROVIDE A COPY OF ALL COMPLETED DISPOSAL FACILITY FORMS TO THE ENGINEER.

IF THE EXCAVATIONS WITHIN THE ABOVE LIMITS REQUIRE DEWATERING FOR CONSTRUCTION PURPOSES, THE CONTRACTOR SHALL DEWATER, CONTAINERIZE AND DISPOSE OF THE LIQUID WASTE IN A LICENSED DISPOSAL FACILITY. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND CONDUCTING ALL TESTING NEEDED TO STORE, TRANSPORT, AND DISPOSE OF THE LIQUID WASTE IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS. INCLUDE DETAILS OF THE WASTE WATER SAMPLING AND TESTING AS PART OF THE WASTE MATERIAL SAMPLING AND TESTING PLAN. THE CONTRACTOR SHALL FILL OUT AND SIGN ALL LIQUID WASTE DISPOSAL FACILITY FORMS REQUIRED BY THE DISPOSAL FACILITY INCLUDING, BUT NOT LIMITED TO MATERIAL PROFILES, DATA SHEETS AND MATERIAL CERTIFICATIONS. PROVIDE A COPY OF ALL COMPLETED DISPOSAL FACILITY FORMS TO THE ENGINEER.

THE CONTRACTOR SHALL DEVELOP A HEALTH AND SAFETY PLAN PER OSHA REGULATION 1910.120 COVERING THE WORK FOR THIS NOTE.

THE CONTRACTOR SHALL PROVIDE ALL THE LABOR, EQUIPMENT, AND MATERIALS NECESSARY TO PROPERLY HANDLE, TEMPORARILY STORE, TEST FOR CHARACTERIZATION, HEALTH AND SAFETY PLAN, TRANSPORT, AND DISPOSE OF THE REGULATED MATERIALS, INCLUDING ANY REQUIRED PERMITS OR FEES. PAYMENT FOR THIS WORK SHALL BE MADE AT THE CONTRACT PRICES BID PER TON AND PER GALLON. THE BASIS FOR CONVERSION OF CUBIC YARDS TO TONS IS 1.5 TON/CUBIC YARD. THE FOLLOWING ESTIMATED QUANTITIES HAVE BEEN INCLUDED IN THE SUBSUMMARY.

THE FOLLOWING ESTIMATED QUANTITIES ARE INCLUDED FOR THE WORK NOTED ABOVE:

690E65002 - ITEM SPECIAL - WORK INVOLVING HAZARDOUS WASTE 10 TON

690E65010 - ITEM SPECIAL - WORK INVOLVING SOLID WASTE 50 TON

690E65022 - ITEM SPECIAL - WORK INVOLVING NON-REGULATED WATER 1,000 GAL

690E65024 - ITEM SPECIAL - WORK INVOLVING REGULATED WATER 1,000 GAL

CONSTRUCTION NOISE

THE CONTRACTOR SHALL ENSURE THAT ALL CONSTRUCTION EQUIPMENT SHALL BE OPERATED IN COMPLIANCE WITH ALL APPLICABLE CITY OF COLUMBUS ORDINANCES AND REGULATIONS PERTAINING TO CONSTRUCTION NOISE, INCLUDING SECTION 2329.11 OF THE COLUMBUS CITY CODE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL FINES ASSESSED DUE TO NON-COMPLIANCE WITH THE CITY NOISE ORDINANCE.

THE CONSTRUCTION NOISE MITIGATION IDENTIFIED AND LISTED BELOW SHALL BE USED TO MINIMIZE CONSTRUCTION ACTIVITY DURING NIGHTTIME AND WEEKEND OPERATIONS:

A. DIESEL POWERED VEHICLES SHALL NOT IDLE LONGER THAN 3 MINUTES. IDLING TIMES FOR OTHER VEHICLES AND INTERNAL COMBUSTION ENGINE POWERED EQUIPMENT SHALL ALSO BE MINIMIZED.

B. ROUTING CONSTRUCTION EQUIPMENT THOUGH LOCAL STREET NETWORK SHALL BE AVOIDED OR MINIMIZED.

C. FLASHING ARROW PANELS (FAPS AND PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE SOLAR POWERED.

D. JACKHAMMERS OR PAVEMENT BREAKERS SHALL BE OPERATED ELECTRICALLY OR HYDRAULICALLY. PNEUMATIC JACKHAMMERS SHALL ONLY BE USED IF EQUIPPED WITH PNEUMATIC DISCHARGE MUFFLERS, CERTIFIED BY THE MANUFACTURER.

E. EXHAUST MUFFLERS, CERTIFIED BY THE MANUFACTURER, SHALL BE USED ON ALL INTERNAL COMBUSTION ENGINES.

F. USE OF ELECTRIC SAWS RATHER THAN AIR OR GASOLINE POWERED SAWS SHALL BE REQUIRED.

CONSTRUCTION NOISE AND VIBRATION SHALL BE MINIMIZED NEAR THE HISTORIC RESOURCES COVERED BY SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT.

RAILROAD RESTRICTIONS

THE CONTRACTOR SHALL NOT PERFORM ANY WORK THAT WILL IMPACT THE RAILROADS INCLUDING USING THE RAILROAD CROSSING BETWEEN THE HOURS OF 10 PM TO 6 AM. TO OBTAIN APPROVAL, THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE PROJECT ENGINEER 14 DAYS PRIOR TO WORKING WITHIN THESE RESTRICTED HOURS OF 10 PM TO 6 AM.

16

NO.	DESCRIPTION	REV. BY	DATE
16	ADDED RR NOTE	CWL	1-11-24

CALCULATED ATR
CHECKED CWL

GENERAL NOTES

FRA-70-13.11

ITEM	EXTENSION	FUNDING SPLIT 01/IMS/PV	TOTAL	UNIT	DESCRIPTION	SEE SHEET
254	01000	6000	6000	SY	PAVEMENT PLANING, ASPHALT CONCRETE, 1.5"	59
410	12000	200	200	CY	TRAFFIC COMPACTED SURFACE, TYPE A OR B	54
607	30001	1000	1000	FT	FENCE, SNOW, AS PER PLAN	58
611	05900	174	174	FT	15" CONDUIT, TYPE B	
611	97010	1405	1405	FT	SLOTTED DRAIN, TYPE 2, 12"	
611	98150	1	1	EACH	CATCH BASIN, NO. 3	
611	98370	3	3	EACH	CATCH BASIN, NO. 6	
611	99500	5	5	EACH	INLET, MISC.: INLET, CAPPED BELOW GRADE	63
614	11000		LS		MAINTAINING TRAFFIC	54
614	11110	2400	2400	HOUR	LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE	58
614	11300	1	1	EACH	WORK ZONE TRAFFIC SIGNAL	58
614	11630	17120	17120	FT	INCREASED BARRIER DELINEATION 16	59
614	12380	12	12	EACH	WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL)	58
614	12420		LS		DETOUR SIGNING	60
614	12484	6	6	EACH	WORK ZONE INCREASED PENALTIES SIGN	60
614	12500	50	50	EACH	REPLACEMENT SIGN	59
614	12600	300	300	EACH	REPLACEMENT DRUM	59
614	12801	193	193	EACH	WORK ZONE RAISED PAVEMENT MARKER, AS PER PLAN	59
614	13310	352	352	EACH	BARRIER REFLECTOR, TYPE 1, ONE-WAY	59
614	13350	352	352	EACH	OBJECT MARKER, ONE WAY	59
614	18000	50000	50000	EACH	MAINTAINING TRAFFIC, MISC.: BRIDGE DECK AND PAVEMENT PATCHING	62
614	18030	1000	1000	FT	MAINTAINING TRAFFIC, MISC.: CONSTRUCTION FENCE	62
614	18601	144	144	SNMT	PORTABLE CHANGEABLE MESSAGE SIGN, AS PER PLAN	59
614	20011	2.21	2.21	MILE	WORK ZONE LANE LINE, CLASS I, 6" SPRAY THERMOPLASTIC, AS PER PLAN	59
614	20056	4.30	4.30	MILE	WORK ZONE LANE LINE, CLASS I, 6", 807 PAINT	
614	20560	1.69	1.69	MILE	WORK ZONE LANE LINE, CLASS III, 6", 642 PAINT	
614	21100	0.51	0.51	MILE	WORK ZONE CENTER LINE, CLASS I, 642 PAINT	
614	22011	5.98	5.98	MILE	WORK ZONE EDGE LINE, CLASS I, 6" SPRAY THERMOPLASTIC, AS PER PLAN	59
614	22056	9.22	9.22	MILE	WORK ZONE EDGE LINE, CLASS I, 6", 807 PAINT	
614	22360	1.22	1.22	MILE	WORK ZONE EDGE LINE, CLASS III, 6", 642 PAINT	59
614	23011	11491	11491	FT	WORK ZONE CHANNELIZING LINE, CLASS I, 12" SPRAY THERMOPLASTIC, AS PER PLAN	
614	23110	12539	12539	FT	WORK ZONE CHANNELIZING LINE, CLASS I, 12", 807 PAINT	
614	23690	3126	3126	FT	WORK ZONE CHANNELIZING LINE, CLASS III, 12", 642 PAINT 6	
614	24001	3302	3302	FT	WORK ZONE DOTTED LINE, CLASS I SPRAY THERMOPLASTIC, AS PER PLAN	59
614	24100	1525	1525	FT	WORK ZONE DOTTED LINE, CLASS I, 4", 807 PAINT	
614	24612	2409	2409	FT	WORK ZONE DOTTED LINE, CLASS III, 6", 642 PAINT	
614	26200	95	95	FT	WORK ZONE STOP LINE, CLASS I, 642 PAINT	
614	30200	6	6	EACH	WORK ZONE ARROW, CLASS I, 642 PAINT	
615	10000		LS		ROADS FOR MAINTAINING TRAFFIC	
615	25000	1545	1545	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS B	
615	25001	100	100	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS B, AS PER PLAN, TYPE 1	62
615	25001	50	50	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS B, AS PER PLAN, TYPE 2	62
615	25001	20	20	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS B, AS PER PLAN, TYPE 3	62
615	25001	20	20	SY	PAVEMENT FOR MAINTAINING TRAFFIC, CLASS B, AS PER PLAN, TYPE 4	62
616	10000	325	325	MGAL	WATER	59
622	41100	16790	16790	FT	PORTABLE BARRIER, UNANCHORED	
622	41110	1030	1030	FT	PORTABLE BARRIER, ANCHORED	
622	41050	1	1	EACH	PORTABLE BARRIER, "Y" CONNECTOR	
808	18700	72	72	SNMT	DIGITAL SPEED LIMIT (DSL) SIGN ASSEMBLY	60
829	00100	32	32	SNMT	WORK ZONE EGRESS WARNING SYSTEM	60
896	00010	108	108	SNMT	PORTABLE NON-INTRUSIVE TRAFFIC SENSOR, CLASS I	62
896	00021	36	36	SNMT	PORTABLE CHANGEABLE MESSAGE SIGN, AS PER PLAN	62

NO.	DESCRIPTION	REV. BY	DATE
6	QUANTITY CHANGES	EMK	11-6-2023

CALCULATED EMW
CHECKED RMK

MAINTENANCE OF TRAFFIC GENERAL SUMMARY

FRA-70-13.11

SHEET NUMBER								PARTICIPATION						ITEM	ITEM EXT.	GRAND TOTAL	UNIT	DESCRIPTION	SEE SHEET NO.
P1/65	P2/40 (2)	P3/197B	P4/49	P5/14B	(3)			01/IMS/04	02/IMS/11										
																		MAINTENANCE OF TRAFFIC	
6000								6000						254	01000	6000	SY	PAVEMENT PLANING, ASPHALT CONCRETE, 1.5"	P1
200								200						410	12000	200	CY	TRAFFIC COMPACTED SURFACE, TYPE A OR B	P1
1000			1000	(2)				2000	(2)					607	30001	2000	FT	FENCE, SNOW, AS PER PLAN	P1,P4 (2)
174								174						611	05900	174	FT	15" CONDUIT, TYPE B	
1405								1405						611	97010	1405	FT	SLOTTED DRAIN, TYPE 2, 12"	
1								1						611	98150	1	EACH	CATCH BASIN, NO. 3	
3								3						611	98370	3	EACH	CATCH BASIN, NO. 6	
5								5						611	99500	5	EACH	INLET, MISC.: INLET, CAPPED BELOW GRADE	
2400		944	2000					5344						614	11110	5344	HOUR	LAW ENFORCEMENT OFFICER WITH PATROL CAR FOR ASSISTANCE	P1
1 (16)			2					3 (16)						SPECIAL	61411300	(16) 3	EACH	WORK ZONE TRAFFIC SIGNAL	P1,P4
17120			27976	(14)				45096	(14)					614	11630	45096	FT	INCREASED BARRIER DELINEATION	P1
12		19	14	4				45	4					614	12380	49	EACH	WORK ZONE IMPACT ATTENUATOR, 24" WIDE HAZARDS, (UNIDIRECTIONAL)	P1
LS		LS	LS					LS						614	12420	LS (14)		DETOUR SIGNING	P1
			11					11						614	12470	11	EACH	WORK ZONE SPEED LIMIT SIGN	P1
6		9	10					25						614	12484	25	EACH	WORK ZONE INCREASED PENALTIES SIGN	
50		20	50					120						614	12500	120	EACH	REPLACEMENT SIGN	P1
300		50	300					650						614	12600	650	EACH	REPLACEMENT DRUM	P1
			2					2						614	12756	2	EACH	WORK ZONE CROSSOVER LIGHTING SYSTEM	
			3645					3645						614	12800	3645	EACH	WORK ZONE RAISED PAVEMENT MARKER	
193		3504						3697						614	12801	3697	EACH	WORK ZONE RAISED PAVEMENT MARKER, AS PER PLAN	P1,P3
				120					120					614	13310	120	EACH	BARRIER REFLECTOR, TYPE 1 (ONE WAY)	
352 (5)		1566					(5)	1918						614	13310	(5) 1918	EACH	BARRIER REFLECTOR, TYPE 1, ONE-WAY	P1
			1471	(14)			(14)	1471						614	13310	(14) 1471	EACH	BARRIER REFLECTOR, TYPE 1, BIDIRECTIONAL	
		29						29						614	13312	29	EACH	BARRIER REFLECTOR, TYPE 2, ONE-WAY	
352 (5)		548		40			(5)	900	40					614	13350	(5) 940	EACH	OBJECT MARKER, ONE WAY	P1
				4					4					614	13600	4	EACH	MAINTENANCE OF TRAFFIC, ONE LANE CLOSURE ON A TWO LANE HIGHWAY	
50000								50000						614	18000	50000	EACH	MAINTAINING TRAFFIC, MISC.: BRIDGE DECK AND PAVEMENT PATCHING	P1
1000								1000						614	18030	1000	FT	MAINTAINING TRAFFIC, MISC.: CONSTRUCTION FENCE	P1
		1000						1000						614	18030	1000	FT	MAINTAINING TRAFFIC, MISC.: PORTABLE WATER FILLED BARRIER PROTECTED PEDESTRIAN WALKWAY	P3
144		89	48					281						614	18601	281	SNMT	PORTABLE CHANGEABLE MESSAGE SIGN, AS PER PLAN	P1,P3,P4
2.21								2.21						614	20011	2.21	MILE	WORK ZONE LANE LINE, CLASS I, 6", AS PER PLAN, SPRAY THERMOPLASTIC	P1
4.30		12.87	3.41					20.58						614	20056	20.58	MILE	WORK ZONE LANE LINE, CLASS I, 6", 807 PAINT	
			0.62					0.62						614	20200	0.62	MILE	WORK ZONE LANE LINE, CLASS I, 4", 740.06, TYPE I	
1.69			6.24					7.93						614	20560	7.93	MILE	WORK ZONE LANE LINE, CLASS III, 6", 642 PAINT (5)	
		0.11						0.11						614	21050	0.11	MILE	WORK ZONE CENTER LINE, CLASS I, 807 PAINT, DOUBLE SOLID, WHITE	
0.51								0.51						614	21100	0.51	MILE	WORK ZONE CENTER LINE, CLASS I, 642 PAINT	
5.98								5.98						614	22011	5.98	MILE	WORK ZONE EDGE LINE, CLASS I, 6", AS PER PLAN, SPRAY THERMOPLASTIC	P1
9.22		25.10	13.08					47.40						614	22056	47.40	MILE	WORK ZONE EDGE LINE, CLASS I, 6", 807 PAINT	
			1.42					1.42						614	22200	1.42	MILE	WORK ZONE EDGE LINE, CLASS I, 4", 740.06, TYPE I	
1.22			4.46					5.68						614	22360	5.68	MILE	WORK ZONE EDGE LINE, CLASS III, 6", 642 PAINT (5)	
11491								11491						614	23011	11491	FT	WORK ZONE CHANNELIZING LINE, CLASS I, 12", AS PER PLAN, SPRAY THERMOPLASTIC	P1
12539 (5)		64782	30704				(5)	108025						614	23110	(5) 108025	FT	WORK ZONE CHANNELIZING LINE, CLASS I, 12", 807 PAINT	
			275					275						614	23400	275	FT	WORK ZONE CHANNELIZING LINE, CLASS I, 8", 740.06, TYPE I	
3126			5427					8553						614	23690	8553	FT	WORK ZONE CHANNELIZING LINE, CLASS III, 12", 642 PAINT (5)	
3102								3102						614	24001	3102	FT	WORK ZONE DOTTED LINE, CLASS I, AS PER PLAN, SPRAY THERMOPLASTIC	P1
1525 (5)			7974				(5)	9499						614	24100	(5) 9499	FT	WORK ZONE DOTTED LINE, CLASS I, 4", 807 PAINT	
		11051						11051						614	24102	11051	FT	WORK ZONE DOTTED LINE, CLASS I, 6", 807 PAINT	
			857					857						614	24400	857	FT	WORK ZONE DOTTED LINE, CLASS I, 740.06, TYPE I	
2409			8872					11281						614	24612	11281	FT	WORK ZONE DOTTED LINE, CLASS III, 6", 642 PAINT (5)	
			1159					1159						614	25000	1159	FT	WORK ZONE TRANSVERSE/DIAGONAL LINE, CLASS I	
95								95						614	26200	95	FT	WORK ZONE STOP LINE, CLASS I, 642 PAINT	
			53					53						614	26400	53	FT	WORK ZONE STOP LINE, CLASS I, 740.06 TYPE I	
			80					80						614	26610	80	FT	WORK ZONE STOP LINE, CLASS III, 642 PAINT (5)	
(2)	639		466					1105						614	27070	1105	FT	WORK ZONE CROSSWALK LINE, CLASS I, 12", 740.06, TYPE I	
		2026						2026						614	28400	2026	FT	WORK ZONE GORE MARKING, CLASS II, 740.06, TYPE I	
6								6						614	30200	6	EACH	WORK ZONE ARROW, CLASS I, 642 PAINT	
		8	12					20						614	30400	20	EACH	WORK ZONE ARROW, CLASS I, 740.06, TYPE I	
	(5)		2					2						614	30650	2	EACH	WORK ZONE ARROW, CLASS III, 642 PAINT	
		3						3						614	98200	3	EACH	WORK ZONE PAVEMENT MARKING, MISC.: 814 INTERSTATE ELONGATED ROUTE SHIELD SYMBOL MARKING	P3

NO.	DESCRIPTION	REV. BY	DATE
2	TEMP FENCE/BRICK X-WALK TEMP	CWL	10-13-23
3	REVISED P5 SHEET #	CWL	10-23-23
5	REV PARTS 1,3 & ADDED W2 III	CWL	11-6-23
14	REVISED PART 4	CWL	12-28-23
16	REVISED PART 1	CWL	1-11-24

CALCULATED CJC
CHECKED CWL

BIG BUILD MASTER GENERAL SUMMARY

FRA-70-13.11

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ARCHITECTURAL PRECAST CONCRETE

1.0 SUMMARY

THIS SECTION INCLUDES ARCHITECTURAL PRECAST CONCRETE WITH INTEGRAL COLOR, DECORATIVE FINISH, ANTI-GRAFFITI COATING, ALL HARDWARE, LEVELING CURBS, SHIMS, AND ACCESSORIES FOR THE FOLLOWING:

A. PRECAST PLANTER WALL TYPE A- HIGH STREET BRIDGE.
B. PRECAST PLANTER WALL TYPE B- HIGH STREET BRIDGE.
C. PRECAST PLANTER WALL TYPE C- HIGH STREET BRIDGE.
D. PRECAST HEADER CURB - HIGH STREET BRIDGE.
E. PRECAST STEPS- HIGH STREET BRIDGE.
F. WOOD CLAD PRECAST SEATWALL- HIGH STREET BRIDGE.
G. PRECAST PLINTH AT PLANTER POT- HIGH STREET BRIDGE.
H. COLORS, FINISHES, REVEALS, PATTERNS AND COLORS AS DETAILED ARE INCIDENTAL TO EACH TYPE.

1.2 METHOD OF MEASUREMENT

ARCHITECTURAL PRECAST CONCRETE PLANTERS SHALL BE MEASURED BY LUMP SUM FOR EACH BRIDGE.

1.3 BASIS OF PAYMENT

THE ACCEPTED ARCHITECTURAL PRECAST CONCRETE WILL BE PAID FOR AT THE CONTRACT PRICE DESIGNATED FOR EACH TYPE SHOWN. ALL COSTS FOR WORK IN THIS SECTION ARE TO BE INCLUDED IN THE LUMP SUM PRICE FOR EACH ARCHITECTURAL PRECAST CONCRETE TYPE.

1.4 PERFORMANCE REQUIREMENTS

A. STRUCTURAL PERFORMANCE: PROVIDE ARCHITECTURAL PRECAST CONCRETE UNITS AND CONNECTIONS CAPABLE OF WITHSTANDING THE FOLLOWING DESIGN LOADS WITHIN LIMITS AND UNDER CONDITIONS INDICATED:
   1. LATERAL EARTH PRESSURE DESIGN LOAD: 300 LBS/SQ. FT.
   2. THERMAL MOVEMENTS: PROVIDE FOR IN-PLANE THERMAL MOVEMENTS RESULTING FROM ANNUAL AMBIENT TEMPERATURE CHANGES OF 80 DEG F

1.5 REFERENCES

A. 5,000 PSI MINIMUM COMPRESSIVE STRENGTH AFTER 29 DAYS OF CURING, ASTM C211.1
B. LESS THAN 6% WATER ABSORPTION, ASTM C642
C. AIR ENTRAINMENT OF 4-1/2 TO 6%, ASTM C231 TEST
D. AIR ENTRAINING ADMIXTURES TO COMPLY WITH ASTM C260-95
E. WHITE CEMENT TO COMPLY WITH ASTM C150-95
F. AGGREGATES TO COMPLY WITH ASTM C33-93
G. PIGMENTS TO COMPLY WITH ASTM C979
H. ADMIXTURES TO COMPLY WITH ASTM C494-92
I. REINFORCING STEEL TO COMPLY WITH THE FOLLOWING:
   1. DEFORMED BAR: ASTM A615/A 615-96a
   2. EPOXY COATED BAR: ASTM A775
   3. WIRE MESH: ASTM A185-97

1.6 SUBMITTALS

A. DESIGN MIXTURES: FOR EACH PRECAST CONCRETE MIXTURE. INCLUDE COMPRESSIVE STRENGTH AND WATER-ABSORPTION TESTS.
B. SHOP DRAWINGS: DETAIL FABRICATION AND INSTALLATION OF ARCHITECTURAL PRECAST CONCRETE UNITS. INDICATE LOCATIONS, PLANS, ELEVATIONS, DIMENSIONS, SHAPES, AND CROSS SECTIONS OF EACH UNIT. INDICATE JOINTS, REVEALS, AND EXTENT AND LOCATION OF EACH SURFACE FINISH. INDICATE SEPARATE FACE AND BACKUP MIXTURE LOCATIONS AND THICKNESSES. INDICATE WELDED CONNECTIONS BY AWS STANDARD SYMBOLS. DETAIL LOOSE AND CAST-IN HARDWARE AND CONNECTIONS. INDICATE LOCATIONS, TOLERANCES, AND DETAILS OF ANCHORAGE DEVICES TO BE EMBEDDED IN OR ATTACHED TO STRUCTURE OR OTHER CONSTRUCTION. INDICATE LOCATIONS, EXTENT, AND TREATMENT OF DRY JOINTS IF TWO-STAGE CASTING IS PROPOSED. INCLUDE PLANS AND ELEVATIONS SHOWING UNIT LOCATION AND SEQUENCE OF ERECTION FOR SPECIAL CONDITIONS. INDICATE LOCATION OF EACH ARCHITECTURAL PRECAST CONCRETE UNIT BY SAME IDENTIFICATION MARK PLACED ON PANEL. INDICATE RELATIONSHIP OF ARCHITECTURAL PRECAST CONCRETE UNITS TO ADJACENT MATERIALS.
C. DESIGN MODIFICATIONS: IF DESIGN MODIFICATIONS ARE PROPOSED TO MEET PERFORMANCE REQUIREMENTS AND FIELD CONDITIONS, SUBMIT DESIGN CALCULATIONS AND SHOP DRAWINGS. DESIGN AND ANALYSIS IS TO BE DONE BY THE PRE-CASTER AND SEALED BY AN OHIO PROFESSIONAL ENGINEER. DO NOT ADVERSELY AFFECT THE APPEARANCE, DURABILITY, OR STRENGTH OF UNITS WHEN MODIFYING DETAILS OR MATERIALS AND MAINTAIN THE GENERAL DESIGN CONCEPT. COMPREHENSIVE ENGINEERING ANALYSIS SIGNED AND SEALED BY THE QUALIFIED PROFESSIONAL ENGINEER RESPONSIBLE FOR ITS PREPARATION. SHOW GOVERNING PANEL TYPES, CONNECTIONS, AND TYPES OF REINFORCEMENT, INCLUDING SPECIAL REINFORCEMENT. INDICATE LOCATION, TYPE, MAGNITUDE, AND DIRECTION OF LOADS IMPOSED ON THE ARCHITECTURAL PRECAST CONCRETE.
D. SAMPLES: FOR EACH TYPE OF FINISH INDICATED ON EXPOSED SURFACES OF ARCHITECTURAL PRECAST CONCRETE UNITS, IN SETS OF 3, ILLUSTRATING FULL RANGE OF FINISH, COLOR, AND TEXTURE VARIATIONS EXPECTED; APPROXIMATELY 12 BY 12 BY 2 INCHES. WHEN OTHER FACES OF PRECAST CONCRETE UNIT ARE EXPOSED, INCLUDE SAMPLES ILLUSTRATING WORKMANSHIP, COLOR, AND TEXTURE OF BACKUP CONCRETE AS WELL AS FACING CONCRETE. GROUT AND SEALANT SAMPLES FOR INITIAL SELECTION: COLOR CHARTS CONSISTING OF ACTUAL SECTIONS OF GROUT AND SEALANT SHOWING MANUFACTURER'S FULL RANGE OF COLORS. GROUT AND SEALANT SAMPLES FOR VERIFICATION: SHOWING COLOR AND TEXTURE OF JOINT TREATMENT.
E. WELDING CERTIFICATES.
F. QUALIFICATION DATA: FOR INSTALLER/ERECTOR AND FABRICATOR.
G. MATERIAL TEST REPORTS: FOR AGGREGATES.
H. MATERIAL CERTIFICATES: FOR THE FOLLOWING ITEMS, SIGNED BY MANUFACTURERS: CEMENTITIOUS MATERIALS, REINFORCING MATERIALS AND PRESTRESSING TENDONS, ADMIXTURES, BEARING PADS, STRUCTURAL-STEEL SHAPES AND HOLLOW STRUCTURAL SECTIONS, ANCHORS, AND SOURCE QUALITY-CONTROL TEST REPORTS.

1.7 QUALITY ASSURANCE

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A. INSTALLER QUALIFICATIONS: A MINIMUM OF 5 YEARS OF EXPERIENCE WITH PROJECTS OF A SIMILAR SCOPE, SCALE AND COMPLEXITY. REFER TO QUALIFICATION DATA UNDER SUBMITTALS.
B. FABRICATOR QUALIFICATIONS: A FIRM THAT ASSUMES RESPONSIBILITY FOR ENGINEERING ARCHITECTURAL PRECAST CONCRETE UNITS TO COMPLY WITH PERFORMANCE REQUIREMENTS. THIS RESPONSIBILITY INCLUDES PREPARATION OF SHOP DRAWINGS AND COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER. PRECAST CONCRETE FABRICATOR SHALL BE AN ODOT APPROVED SUPPLIER AND A CERTIFIED MEMBER OF ONE OF THE FOLLOWING ORGANIZATIONS:
   1. PRECAST CONCRETE INSTITUTE
   2. CAST STONE INSTITUTE
   3. NATIONAL PRECAST ASSOCIATION
C. DESIGN STANDARDS: COMPLY WITH ANSI/NAAMM AND PCI RECOMMENDATIONS OF PCI MNL 120, PCI DESIGN HANDBOOK - PRECAST AND PRESTRESSED CONCRETE, APPLICABLE TO TYPES OF ARCHITECTURAL PRECAST CONCRETE UNITS INDICATED.
D. QUALITY-CONTROL STANDARD: FOR MANUFACTURING PROCEDURES AND TESTING REQUIREMENTS, QUALITY-CONTROL RECOMMENDATIONS, AND DIMENSIONAL TOLERANCES FOR TYPES OF UNITS REQUIRED, COMPLY WITH PCI MNL 117, MANUAL FOR QUALITY CONTROL FOR PLANTS AND PRODUCTION OF ARCHITECTURAL PRECAST CONCRETE PRODUCTS.
E. WELDING: QUALIFY PROCEDURES AND PERSONNEL ACCORDING TO AWS D1.1/D.1.1M, STRUCTURAL WELDING CODE - STEEL; AND AWS D1.4, STRUCTURAL WELDING CODE - REINFORCING STEEL.
F. SAMPLE PANELS: AFTER SAMPLE APPROVAL AND BEFORE FABRICATING ARCHITECTURAL PRECAST CONCRETE UNITS, PRODUCE A MINIMUM OF 2 SAMPLE PANELS APPROXIMATELY 16 SQ. FT. IN AREA FOR REVIEW BY PROJECT ENGINEER. INCORPORATE FULL-SCALE DETAILS OF ARCHITECTURAL FEATURES, FINISHES, TEXTURES, AND TRANSITIONS IN SAMPLE PANELS INCLUDING INTERFACE WITH BRIDGE DECK AND/ OR SIDEWALK. LOCATE PANELS WHERE INDICATED OR, IF NOT INDICATED, AS DIRECTED BY PROJECT ENGINEER. DAMAGE PART OF AN EXPOSED-FACE SURFACE FOR EACH FINISH, COLOR, AND TEXTURE, AND DEMONSTRATE ADEQUACY OF REPAIR TECHNIQUES PROPOSED FOR REPAIR OF SURFACE BLEMISHES. AFTER ACCEPTANCE OF REPAIR TECHNIQUE, MAINTAIN ONE SAMPLE PANEL AT MANUFACTURER'S PLANT AND ONE AT PROJECT SITE IN AN UNDISTURBED CONDITION AS A STANDARD FOR JUDGING THE COMPLETED WORK. DEMOLISH AND REMOVE SAMPLE PANELS WHEN DIRECTED.
G. DIMENSIONAL TOLERANCES:
   1. FABRICATION:
      a. BOWING, CONCAVE OR CONVEX OF A FLAT SURFACE: NOT OVER L/360 WITH A MAXIMUM OF 3/4 INCH UP TO 30 FEET.
      b. MAXIMUM PERMISSIBLE WARPAGE OF ONE CORNER OUT OF THE PLANE OF THE OTHER THREE: THE GREATER OF 1/16 INCH/FOOT DISTANCE FROM THE NEAREST ADJACENT CORNER OR 1/8 INCH.
      c. UNITS 10 FEET OR UNDER: PLUS OR MINUS 1/8 INCH.
      d. UNITS 10 FEET TO 20 FEET: PLUS 1/8 INCH, MINUS 3/16 INCH.
      e. UNITS 20 FEET TO 30 FEET: PLUS 1/8 INCH, MINUS 1/4 INCH.
      f. UNITS OVER 30 FEET: PLUS OR MINUS 1/16 INCH FOR EACH ADDITIONAL 10 FEET.
      g. THICKNESS OF UNITS: PLUS 1/4 INCH, MINUS 1/8 INCH.
      h. OPENINGS WITHIN ONE UNIT: PLUS OR MINUS 1/4 INCH.
      i. ANGULAR DEVIATION OF PLANE OF SIDE MOLD: 1/32 INCH PER 3 INCHES DEPTH OR 1/16 INCH TOTAL, WHICHEVER IS GREATER.
      j. UNITS AND OPENINGS WITHIN UNITS: NOT OUT OF SQUARE MORE THAN 1/8 INCH PER 6 FEET OR 1/4 INCH TOTAL, WHICHEVER IS GREATER.
      k. TOLERANCES ON ANY DIMENSION NOT SPECIFIED: THE NUMERICALLY GREATER OF PLUS OR MINUS 1/16 INCH PER 10 FEET.
   2. POSITION TOLERANCES: FOR CAST-IN ITEMS MEASURED FROM DATUM LINE LOCATIONS AS SHOWN ON THE APPROVED SHOP DRAWINGS.
      a. LOCATION OF ANCHORS AND INSERTS: PLUS OR MINUS 3/8 INCH OF CENTERLINE LOCATION.
      b. LOCATION OF BLOCKOUTS AND REINFORCEMENT WHICH SUCH POSITIONS HAVE STRUCTURAL IMPLICATIONS OR AFFECT CONCRETE COVER: PLUS OR MINUS 1/4 INCH OF THE POSITION SHOWN, OTHERWISE PLUS OR MINUS 1/2 INCH.
   3. JOINTS:
      a. JOINT WIDTH BETWEEN ADJACENT UNITS SHALL NOT EXCEED 3/8 INCH.
      b. ACTUAL JOINT WIDTH SHALL NOT VARY MORE THAN 1/8-INCH PLUS OR MINUS FROM THE NOMINAL JOINT WIDTH.
      c. MANUFACTURER SHALL DETERMINE ACTUAL JOINT WIDTH REQUIRED TO ACCOMMODATE TOLERANCES, AND SHOW ON ERECTION SHOP DRAWINGS FOR APPROVAL BY PROJECT ENGINEER.
      d. WHERE JOINT WIDTHS ARE REQUIRED TO EXCEED TOLERANCES SPECIFIED ABOVE, CONTRACTOR SHALL SUBMIT DATA FOR PROJECT ENGINEER'S REVIEW AND APPROVAL PRIOR TO FABRICATION.
      e. ADJACENT ARCHITECTURAL PRECAST CONCRETE ACCESSORIES SHALL NOT BE BUTT JOINTED.
H. CONNECTIONS:
   1. MANUFACTURER SHALL PROVIDE STRUCTURAL ENGINEERING FOR ALL CONNECTIONS THAT ALLOW FOR VOLUME CHANGES DUE TO SHRINKAGE, CREEP, AND TEMPERATURE EFFECTS, IN ADDITION TO THE DESIGN FORCES. CONNECTIONS SHALL BE DESIGNED AND LOCATED SO AS TO PREVENT ANY LATERAL, LONGITUDINAL, OR VERTICAL MOVEMENT BETWEEN ADJACENT ARCHITECTURAL PRECAST CONCRETE ACCESSORIES.
   2. UPON COMPLETION OF INSTALLATION, CONNECTION HARDWARE SHALL NOT BE VISIBLE UNLESS PREVIOUSLY SHOWN AND INDICATED ON THE SHOP DRAWINGS AND APPROVED BY THE PROJECT ENGINEER.

1.8 PREINSTALLATION CONFERENCE

CONDUCT PREINSTALLATION CONFERENCE INCLUDING INSTALLER, FABRICATOR AND PROJECT ENGINEER.

1.9 DELIVERY, STORAGE, AND HANDLING

A. DELIVER ARCHITECTURAL PRECAST CONCRETE UNITS IN SUCH QUANTITIES AND AT SUCH TIMES TO LIMIT UNLOADING UNITS TEMPORARILY ON THE GROUND. SUPPORT UNITS DURING SHIPMENT ON NONSTAINING SHOCK-ABSORBING MATERIAL.
B. STORE UNITS WITH ADEQUATE DUNNAGE AND BRACING AND PROTECT UNITS TO PREVENT CONTACT WITH SOIL, TO PREVENT STAINING, AND TO PREVENT CRACKING, DISTORTION, WARPING OR OTHER PHYSICAL DAMAGE. PLACE STORED UNITS SO IDENTIFICATION MARKS ARE CLEARLY VISIBLE, AND UNITS CAN BE INSPECTED.
C. HANDLE AND TRANSPORT UNITS IN A POSITION CONSISTENT WITH THEIR SHAPE AND DESIGN IN ORDER TO AVOID EXCESSIVE STRESSES WHICH WOULD CAUSE CRACKING OR DAMAGE. LIFT AND SUPPORT UNITS ONLY AT DESIGNATED POINTS SHOWN ON SHOP DRAWINGS.

1.10 PROJECT CONDITIONS

A. FURNISH LOOSE CONNECTION HARDWARE AND ANCHORAGE ITEMS TO BE EMBEDDED IN OR ATTACHED TO OTHER CONSTRUCTION WITHOUT DELAYING THE WORK. PROVIDE LOCATIONS, SETTING DIAGRAMS, TEMPLATES, INSTRUCTIONS, AND DIRECTIONS, AS REQUIRED, FOR INSTALLATION.
B. PROVIDE ALL MISCELLANEOUS STEEL REQUIRED FOR LATERAL AND VERTICAL SUPPORT OF THE PRECAST PANELS, BUT NOT SHOWN ON THE DRAWINGS. PROVIDE ADDITIONAL BRACING AS REQUIRED BY THE CONTRACTOR AS PART OF THE WORK.

2.0 MOLD MATERIALS

A. MOLDS: RIGID, DIMENSIONALLY STABLE, NON-ABSORPTIVE MATERIAL, WARP AND BUCKLE FREE, THAT WILL PROVIDE CONTINUOUS AND TRUE PRECAST CONCRETE SURFACES WITHIN FABRICATION TOLERANCES INDICATED; NON-REACTIVE WITH CONCRETE AND SUITABLE FOR PRODUCING REQUIRED FINISHES.
B. MOLD-RELEASE AGENT: COMMERCIALLY PRODUCED LIQUID-RELEASE AGENT THAT WILL NOT BOND WITH, STAIN OR ADVERSELY AFFECT PRECAST CONCRETE SURFACES AND WILL NOT IMPAIR SUBSEQUENT SURFACE OR JOINT TREATMENTS OF PRECAST CONCRETE.
C. FORM LINERS: UNITS OF FACE DESIGN, TEXTURE, ARRANGEMENT, AND CONFIGURATION INDICATED. FURNISH WITH MANUFACTURER'S RECOMMENDED LIQUID-RELEASE AGENT THAT WILL NOT BOND WITH, STAIN, OR ADVERSELY AFFECT PRECAST CONCRETE SURFACES AND WILL NOT IMPAIR SUBSEQUENT SURFACE OR JOINT TREATMENTS OF PRECAST CONCRETE.

2.1 REINFORCING MATERIALS

GALVANIZED REINFORCING BARS: ASTM A 615, GRADE 60, DEFORMED BARS, ASTM A 767, CLASS II ZINC COATED, HOT-DIP GALVANIZED, AND CHROMATE WASH TREATED AFTER FABRICATION AND BENDING. SUPPORTS: SUSPEND REINFORCEMENT FROM BACK OF MOLD OR USE BOLSTERS, CHAIRS, SPACERS, AND OTHER DEVICES FOR SPACING, SUPPORTING, AND FASTENING REINFORCING BARS AND WELDED WIRE REINFORCEMENT IN PLACE ACCORDING TO PCI MNL 117.

2.2 CONCRETE MATERIALS

A. PORTLAND CEMENT: ASTM C 150, TYPE I OR TYPE III, WHITE, UNLESS OTHERWISE INDICATED.
B. NORMAL-WEIGHT AGGREGATES: EXCEPT AS MODIFIED BY PCI MNL 117, ASTM C 33, WITH COARSE AGGREGATES COMPLYING WITH CLASS 5S. STOCKPILE FINE AND COARSE AGGREGATES FOR EACH TYPE OF EXPOSED FINISH FROM A SINGLE SOURCE (PIT OR QUARRY) FOR PROJECT.
C. FACE-MIXTURE-COARSE AGGREGATES: SELECTED, HARD, AND DURABLE; FREE OF MATERIAL THAT REACTS WITH CEMENT OR CAUSES STAINING; TO MATCH SELECTED FINISH SAMPLE. GRADATION: TO MATCH BASIS OF DESIGN REFERENCE. FACE-MIXTURE-FINE AGGREGATES: SELECTED, NATURAL OR MANUFACTURED SAND OF SAME MATERIAL AS COARSE AGGREGATE, UNLESS OTHERWISE APPROVED BY PROJECT ENGINEER.
D. COLORING ADMIXTURE: ASTM C 979, SYNTHETIC OR NATURAL MINERAL-OXIDE PIGMENTS OR COLORED WATER-REDUCING ADMIXTURES, TEMPERATURE STABLE, AND NON-FADING.
E. WATER: POTABLE; FREE FROM DELETERIOUS MATERIAL THAT MAY AFFECT COLOR STABILITY, SETTING, OR STRENGTH OF CONCRETE AND COMPLYING WITH CHEMICAL LIMITS OF PCI MNL 117.
F. AIR-ENTRAINING ADMIXTURE: ASTM C 260, CERTIFIED BY MANUFACTURER TO BE COMPATIBLE WITH OTHER REQUIRED ADMIXTURES.
G. CHEMICAL ADMIXTURES: CERTIFIED BY MANUFACTURER TO BE COMPATIBLE WITH OTHER ADMIXTURES AND TO NOT CONTAIN CALCIUM CHLORIDE, OR MORE THAN 0.15 PERCENT CHLORIDE IONS OR OTHER SALTS BY WEIGHT OF ADMIXTURE.
   1. WATER-REDUCING ADMIXTURES: ASTM C 494/C 494M, TYPE A.
   2. RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE B.
   3. WATER-REDUCING AND RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE D.
   4. WATER-REDUCING AND ACCELERATING ADMIXTURE: ASTM C 494/C 494M, TYPE E.
   5. HIGH-RANGE, WATER-REDUCING ADMIXTURE: ASTM C 494/C 494M, TYPE F.
   6. HIGH-RANGE, WATER-REDUCING AND RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE G.
   7. PLASTICIZING AND RETARDING ADMIXTURE: ASTM C 1017/C 1017 M.

2.3 CONCRETE MIXTURES FOR LEVELING CURB

A. PREPARE DESIGN MIXTURES, PROPORTIONED ACCORDING TO ACI 301, FOR EACH TYPE AND STRENGTH OF NORMAL-WEIGHT CONCRETE DETERMINED BY EITHER LABORATORY TRIAL MIXES OR FIELD EXPERIENCE.
   1. USE A QUALIFIED INDEPENDENT TESTING AGENCY FOR PREPARING AND REPORTING PROPOSED CONCRETE MIXTURE DESIGNS FOR THE TRIAL BATCH METHOD.
B. PROPORTION MIXTURES TO PROVIDE NORMAL-WEIGHT CONCRETE WITH THE FOLLOWING PROPERTIES:
   1. COMPRESSIVE STRENGTH (28 DAYS): 4000PSI
   2. MAXIMUM WATER - CEMENTITIOUS MATERIALS RATIO AT POINT OF PLACEMENT: 0.45 TO 0.65.
   3. SLUMP LIMIT: 4 INCHES PLUS OR MINUS 1 INCH
   4. CEMENT QUANTITY PER YARD OF MIX:
      a. MINIMUM: 6 SACK
      b. MAXIMUM: 7 SACK
   4. FINE AGGREGATE: 46% OF AGGREGATE WEIGHT
   5. COURSE AGGREGATE: 64% OF AGGREGATE WEIGHT

2.4 STEEL CONNECTION MATERIALS:

A. CARBON-STEEL SHAPES AND PLATES: ASTM A 36.
B. CARBON-STEEL-HEADED STUDS: ASTM A 108, AISI 1018 THROUGH AISI 1020, COLD FINISHED, AWS D1.1/D1.1M, TYPE A OR B, WITH ARC SHIELDS AND WITH MINIMUM MECHANICAL PROPERTIES OF PCI MNL 117, TABLE 3.2.3.
C. CARBON-STEEL PLATE: ASTM A 283.
D. MALLEABLE IRON CASTINGS: ASTM A 47.
E. CARBON-STEEL CASTINGS: ASTM A 27, GRADE 60-30.
F. HIGH-STRENGTH, LOW-ALLOY STRUCTURAL STEEL: ASTM A 572.
G. CARBON-STEEL STRUCTURAL TUBING: ASTM A 500, GRADE B.
H. WROUGHT CARBON-STEEL BARS: ASTM A 675, GRADE 65.
I. DEFORMED-STEEL WIRE OR BAR ANCHORS: ASTM A 496 OR ASTM A 706.
J. CARBON-STEEL BOLTS AND STUDS: ASTM A 307, GRADE A; CARBON-STEEL, HEX-HEAD BOLTS AND STUDS; CARBON-STEEL NUTS, ASTM A 563; AND FLAT, UNHARDENED STEEL WASHERS, ASTM F 844.
K. ZINC-COATED FINISH: FOR EXTERIOR STEEL ITEMS AND ITEMS INDICATED FOR GALVANIZING, APPLY ZINC COATING BY [HOT-DIP PROCESS ACCORDING TO ASTM A 123 OR ASTM A 153. FOR STEEL SHAPES, PLATES, AND TUBING TO BE GALVANIZED, LIMIT SILICON CONTENT OF STEEL TO LESS THAN 0.03 PERCENT OR TO BETWEEN 0.15 AND 0.25 PERCENT OR LIMIT SUM OF SILICON AND 2.5 TIMES PHOSPHOROUS CONTENT TO 0.09 PERCENT. GALVANIZING REPAIR PAINT: HIGH-ZINC-DUST-CONTENT PAINT WITH DRY FILM CONTAINING NOT LESS THAN 94 PERCENT ZINC DUST BY WEIGHT, AND COMPLYING WITH DOD-P-21035A OR SSPC-PAINT 20.
L. WELDING ELECTRODES: COMPLY WITH AWS STANDARDS.
M. BEARING PADS: PROVIDE BEARING PADS FOR ARCHITECTURAL PRECAST CONCRETE UNITS AS RECOMMENDED BY PRECAST FABRICATOR FOR APPLICATION.
N. ACCESSORIES: REGLETS: STAINLESS STEEL, TYPE 302 OR 304 FELT OR FIBER FILLED, OR WITH FACE OPENING OF SLOTS COVERED. PRECAST ACCESSORIES: PROVIDE CLIPS, HANGERS, PLASTIC OR STEEL SHIMS, AND OTHER ACCESSORIES REQUIRED TO INSTALL ARCHITECTURAL PRECAST CONCRETE UNITS.
O. EPOXY ADHESIVE FOR DOWELS: ADHESIVE MEETING ASTM C 881 SPECIFICATION FOR TYPE I AND TYPE IV, GRADE 3, CLASS C EPOXY.

NO.	DESCRIPTION	REV. BY	DATE
16	SPECIFICATION UPDATE	LW/JB	1.11.24

MKSK
LANDSCAPE ARCHITECTURE • URBAN PLANNING
3524-E

CALCULATED LHW
R/W REVIEWER JRB

SPECIFICATIONS - ARCHITECTURAL PRECAST CONCRETE AESTHETIC ENHANCEMENTS

FRA-70-14.05C

384
395

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2.5 GROUT MATERIALS:

A. SAND-CEMENT GROUT: PORTLAND CEMENT, ASTM C 150, TYPE I, AND CLEAN, NATURAL SAND, ASTM C 144 OR ASTM C 404. MIX AT RATIO OF 1 PART CEMENT TO 2-1/2 PARTS SAND, BY VOLUME, WITH MINIMUM WATER REQUIRED FOR PLACEMENT AND HYDRATION.
B. NON-CORROSIVE, NON-STAINING GROUT CONTAINING SELECTED SILICA SANDS, PORTLAND CEMENT, SHRINKAGE-COMPENSATING AGENTS, PLASTICIZING AND WATER-REDUCING AGENTS, COMPLYING WITH ASTM C 1107, GRADE A FOR DRYPACK AND GRADES B AND C FOR FLOWABLE GROUT AND OF CONSISTENCY SUITABLE FOR APPLICATION WITHIN A 30-MINUTE WORKING TIME.
C. GROUT JOINTS FOR PRECAST CONCRETE PLANTER CURBS: COLOR MATCHED TYPE "S" GROUT BASED UPON APPROVED SAMPLES FOR ALL JOINTS EXPOSED TO VIEW.

2.6 ANTI-GRAFFITI COATING

A. TWO COATS TO BE APPLIED TO ALL PRECAST EXPOSED TO VIEW IN FINAL CONSTRUCTION.
B. A CLEAR-DRYING WATER-BASED SILICONE EMULSION FOR WEATHERPROOFING AND ENABLING GRAFFITI REMOVAL FROM TREATED SURFACES.
   1. FORM: MILKY WHITE LIQUID
   2. SPECIFIC GRAVITY: 1.00
   3. PH: NOT APPLICABLE
   4. WT/GAL: 8.32 LBS.
   5. ACTIVE CONTENT: 6%
   6. TOTAL SOLIDS: 6% ASTM D 5095
   7. VOC CONTENT: LESS THAN 20 GRAMS/LITER LOW SOLIDS COATING
   8. FLASH POINT: LESS THAN 212 DEGREES F. (100 DEGREES C.) ASTM D 3278
   9. FREEZE POINT: 32 DEGREES F. (0 DEGREES C.)
   10. SHELF LIFE: 1 YEAR IN TIGHTLY SEALED CONTAINER.

2.7 JOINT FILLERS

A. COMPATIBILITY: PROVIDE JOINT SEALANTS, BACKING MATERIALS, AND OTHER RELATED MATERIALS THAT ARE COMPATIBLE WITH ONE ANOTHER AND WITH JOINT SUBSTRATES UNDER CONDITIONS OF SERVICE AND APPLICATION, AS DEMONSTRATED BY JOINT-SEALANT MANUFACTURER BASED ON TESTING AND FIELD EXPERIENCE.
B. BACKER ROD: FOAM ROPE MATERIAL, SIZE AS DETAILED.
C. JOINT SEALANT: POLYURETHANE SEALANT FOR VERTICAL JOINTS IN CONCRETE: SINGLE-COMPONENT, LOW-MODULUS, NEUTRAL-CURING, NONSAG POLYURETHANE SEALANT COMPLYING WITH ASTM C 920-02, TYPE M, GRADE NS. COLOR SELECTED BY PROJECT ENGINEER.

2.8 CONCRETE MIXTURES

PREPARE DESIGN MIXTURES FOR EACH TYPE OF PRECAST CONCRETE REQUIRED. DESIGN MIXTURES MAY BE PREPARED BY A QUALIFIED INDEPENDENT TESTING AGENCY OR BY QUALIFIED PRECAST PLANT PERSONNEL AT ARCHITECTURAL PRECAST CONCRETE FABRICATOR'S OPTION. LIMIT WATER-SOLUBLE CHLORIDE IONS TO MAXIMUM PERCENTAGE BY WEIGHT OF CEMENT PERMITTED BY PCI MNL 117 WHEN TESTED ACCORDING TO ASTM C 1218/C 1218M.

2.9 NORMAL-WEIGHT CONCRETE MIXTURES

PROPORTION FACE AND BACKUP MIXTURES OR FULL-DEPTH MIXTURES, AT FABRICATOR'S OPTION BY EITHER LABORATORY TRIAL BATCH OR FIELD TEST DATA METHODS ACCORDING TO ACI 211.1, WITH MATERIALS TO BE USED ON PROJECT, TO PROVIDE NORMAL-WEIGHT CONCRETE WITH THE FOLLOWING PROPERTIES: COMPRESSIVE STRENGTH (28 DAYS): 5000 PSI MINIMUM, MAXIMUM WATER-CEMENTITIOUS MATERIALS RATIO: 0.45. WATER ABSORPTION: 6 PERCENT BY WEIGHT OR 14 PERCENT BY VOLUME, TESTED ACCORDING TO PCI MNL 117. ADD AIR-ENTRAINING ADMIXTURE AT MANUFACTURER'S PRESCRIBED RATE TO RESULT IN CONCRETE AT POINT OF PLACEMENT HAVING AN AIR CONTENT COMPLYING WITH PCI MNL 117. WHEN INCLUDED IN DESIGN MIXTURES, ADD OTHER ADMIXTURES TO CONCRETE MIXTURES ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

2.10 MOLD FABRICATION

A. ACCURATELY CONSTRUCT MOLDS, MORTAR TIGHT, OF SUFFICIENT STRENGTH TO WITHSTAND PRESSURES DUE TO CONCRETE-PLACEMENT OPERATIONS AND TEMPERATURE CHANGES AND FOR PRESTRESSING AND DETENSIONING OPERATIONS.
B. COAT CONTACT SURFACES OF MOLDS WITH RELEASE AGENT BEFORE REINFORCEMENT IS PLACED. AVOID CONTAMINATION OF REINFORCEMENT AND PRESTRESSING TENDONS BY RELEASE AGENT.
C. PLACE FORM LINERS ACCURATELY TO PROVIDE FINISHED SURFACE TEXTURE INDICATED. PROVIDE SOLID BACKING AND SUPPORTS TO MAINTAIN STABILITY OF LINERS DURING CONCRETE PLACEMENT. COAT FORM LINER WITH FORM-RELEASE AGENT.
D. MAINTAIN MOLDS TO PROVIDE COMPLETED ARCHITECTURAL PRECAST CONCRETE UNITS OF SHAPES, LINES, AND DIMENSIONS INDICATED, WITHIN FABRICATION TOLERANCES SPECIFIED. FORM JOINTS ARE NOT PERMITTED ON FACES EXPOSED TO VIEW IN THE FINISHED WORK.
E. EDGE AND CORNER TREATMENT: UNIFORMLY CHAMFERED.

2.11 FABRICATION

A. CAST-IN ANCHORS, INSERTS, PLATES, ANGLES, AND OTHER ANCHORAGE HARDWARE. FABRICATE ANCHORAGE HARDWARE WITH SUFFICIENT ANCHORAGE AND EMBEDMENT TO COMPLY WITH DESIGN REQUIREMENTS. ACCURATELY POSITION FOR ATTACHMENT OF LOOSE HARDWARE, AND SECURE IN PLACE DURING PRECASTING OPERATIONS. LOCATE ANCHORAGE HARDWARE WHERE IT DOES NOT AFFECT POSITION OF MAIN REINFORCEMENT OR CONCRETE PLACEMENT. WELD-HEADED STUDS AND DEFORMED BAR ANCHORS USED FOR ANCHORAGE ACCORDING TO AWS D1.1/D1.1M AND AWS C5.4, RECOMMENDED PRACTICES FOR STUD WELDING.
B. FURNISH LOOSE HARDWARE ITEMS INCLUDING STEEL PLATES, CLIP ANGLES, SEAT ANGLES, ANCHORS, DOWELS, CRAMPS, HANGERS, AND OTHER HARDWARE SHAPES FOR SECURING ARCHITECTURAL PRECAST CONCRETE UNITS TO SUPPORTING AND ADJACENT CONSTRUCTION.
C. CAST-IN REGLETS, SLOTS, HOLES, AND OTHER ACCESSORIES IN ARCHITECTURAL PRECAST CONCRETE UNITS AS INDICATED ON THE CONTRACT DRAWINGS.
D. CAST-IN OPENINGS LARGER THAN 6 INCHES IN ANY DIMENSION. DO NOT DRILL OR CUT OPENINGS OR PRESTRESSING STRAND WITHOUT PROJECT ENGINEER APPROVAL.

2.12 REINFORCEMENT

A. COMPLY WITH RECOMMENDATIONS IN PCI MNL 117 FOR FABRICATING, PLACING, AND SUPPORTING REINFORCEMENT. CLEAN REINFORCEMENT OF LOOSE RUST AND MILL SCALE, EARTH, AND OTHER MATERIALS THAT REDUCE OR DESTROY THE BOND WITH CONCRETE. WHEN DAMAGE TO GALVANIZED COATINGS OCCUR, PREPARE AND REPAIR DAMAGED AREAS WITH GALVANIZING REPAIR PAINT ACCORDING TO ASTM A 780.
B. ACCURATELY POSITION, SUPPORT, AND SECURE REINFORCEMENT AGAINST DISPLACEMENT DURING CONCRETE-PLACEMENT AND CONSOLIDATION OPERATIONS. COMPLETELY CONCEAL SUPPORT DEVICES TO PREVENT EXPOSURE ON FINISHED SURFACES. PLACE REINFORCEMENT TO MAINTAIN AT LEAST 3/4-INCH MINIMUM COVERAGE. ARRANGE, SPACE, AND SECURELY TIE BARS AND BAR SUPPORTS TO HOLD REINFORCEMENT IN POSITION WHILE PLACING CONCRETE. DIRECT WIRE TIE ENDS AWAY FROM FINISHED, EXPOSED CONCRETE SURFACES.
C. PLACE REINFORCING STEEL AND PRESTRESSING STRAND TO MAINTAIN AT LEAST 3/4-INCH MINIMUM CONCRETE COVER. INCREASE COVER REQUIREMENTS FOR REINFORCING STEEL TO 1-1/2 INCHES WHEN UNITS ARE EXPOSED TO CORROSIVE ENVIRONMENT OR SEVERE EXPOSURE CONDITIONS. ARRANGE, SPACE, AND SECURELY TIE BARS AND BAR SUPPORTS TO HOLD REINFORCEMENT IN POSITION WHILE PLACING CONCRETE. DIRECT WIRE TIE ENDS AWAY FROM FINISHED, EXPOSED CONCRETE SURFACES. INSTALL WELDED WIRE FABRIC IN LENGTHS AS LONG AS PRACTICABLE. LAP ADJOINING PIECES AT LEAST ONE FULL MESH SPACING AND WIRE TIE LAPS, WHERE REQUIRED BY DESIGN. OFFSET LAPS OF ADJOINING WIDTHS TO PREVENT CONTINUOUS LAPS IN EITHER DIRECTION.
D. REINFORCE ARCHITECTURAL PRECAST CONCRETE UNITS TO RESIST HANDLING, TRANSPORTATION, AND ERECTION STRESSES.
E. AT FABRICATOR'S OPTION, PRESTRESS TENDONS FOR ARCHITECTURAL PRECAST CONCRETE UNITS BY EITHER PRETENSIONING OR POST-TENSIONING METHODS. COMPLY WITH PCI MNL 117. DELAY DETENSIONING OR POST-TENSIONING OF PRECAST, PRESTRESSED ARCHITECTURAL CONCRETE UNITS UNTIL CONCRETE HAS REACHED ITS INDICATED MINIMUM DESIGN RELEASE COMPRESSIVE STRENGTH AS ESTABLISHED BY TEST CYLINDERS CURED UNDER SAME CONDITIONS AS CONCRETE. DETENSION PRETENSIONED TENDONS EITHER BY GRADUALLY RELEASING TENSIONING JACKS OR BY HEAT- CUTTING TENDONS, USING A SEQUENCE AND PATTERN TO PREVENT SHOCK OR UNBALANCED LOADING. IF CONCRETE HAS BEEN HEAT CURED, DETENSION WHILE CONCRETE IS STILL WARM AND MOIST TO AVOID DIMENSIONAL CHANGES THAT MAY CAUSE CRACKING OR UNDESIRABLE STRESSES. PROTECT STRAND ENDS AND ANCHORAGES WITH BITUMINOUS, ZINC-RICH, OR EPOXY PAINT TO AVOID CORROSION AND POSSIBLE RUST SPOTS.

2.13 PLACEMENT

A. COMPLY WITH REQUIREMENTS IN PCI MNL 117 AND REQUIREMENTS IN THIS SECTION FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE. AFTER CONCRETE BATCHING, NO ADDITIONAL WATER MAY BE ADDED.
B. PLACE FACE MIXTURE TO A MINIMUM THICKNESS AFTER CONSOLIDATION OF THE GREATER OF 1 INCH OR 1.5 TIMES THE MAXIMUM AGGREGATE SIZE, BUT NOT LESS THAN THE MINIMUM REINFORCING COVER SPECIFIED.
C. PLACE CONCRETE IN A CONTINUOUS OPERATION TO PREVENT SEAMS OR PLANES OF WEAKNESS FROM FORMING IN PRECAST CONCRETE UNITS.
D. PLACE BACKUP CONCRETE MIXTURE TO ENSURE BOND WITH FACE-MIXTURE CONCRETE.
E. THOROUGHLY CONSOLIDATE PLACED CONCRETE BY INTERNAL AND EXTERNAL VIBRATION WITHOUT DISLOCATING OR DAMAGING REINFORCEMENT AND BUILT-IN ITEMS, AND MINIMIZE POUR LINES, HONEYCOMBING, OR ENTRAPPED AIR ON SURFACES. USE EQUIPMENT AND PROCEDURES COMPLYING WITH PCI MNL 117. PLACE SELF-CONSOLIDATING CONCRETE WITHOUT VIBRATION ACCORDING TO PCI TR-6, INTERIM GUIDELINES FOR THE USE OF SELF-CONSOLIDATING CONCRETE IN PRECAST/PRESTRESSED CONCRETE INSTITUTE MEMBER PLANTS.
F. COMPLY WITH PCI MNL 117 FOR HOT- AND COLD-WEATHER CONCRETE PLACEMENT.
G. IDENTIFY PICKUP POINTS OF ARCHITECTURAL PRECAST CONCRETE UNITS AND ORIENTATION IN STRUCTURE WITH PERMANENT MARKINGS, COMPLYING WITH MARKINGS INDICATED ON SHOP DRAWINGS. IMPRINT OR PERMANENTLY MARK CASTING DATE ON EACH ARCHITECTURAL PRECAST CONCRETE UNIT ON A SURFACE THAT WILL NOT SHOW IN FINISHED STRUCTURE.
H. CURE CONCRETE, ACCORDING TO REQUIREMENTS IN PCI MNL 117, BY MOISTURE RETENTION WITHOUT HEAT OR BY ACCELERATED HEAT CURING USING LOW-PRESSURE LIVE STEAM OR RADIANT HEAT AND MOISTURE. CURE UNITS UNTIL COMPRESSIVE STRENGTH IS HIGH ENOUGH TO ENSURE THAT STRIPPING DOES NOT HAVE AN EFFECT ON PERFORMANCE OR APPEARANCE OF FINAL PRODUCT.
I. DISCARD AND REPLACE ARCHITECTURAL PRECAST CONCRETE UNITS THAT DO NOT COMPLY WITH REQUIREMENTS, INCLUDING STRUCTURAL, MANUFACTURING TOLERANCE, AND APPEARANCE, UNLESS REPAIRS MEET REQUIREMENTS IN PCI MNL 117 AND DESIGNER'S APPROVAL.

2.14 FINISHES

A. PANEL FACES SHALL BE FREE OF JOINT MARKS, GRAIN, AND OTHER OBVIOUS DEFECTS. CORNERS, INCLUDING FALSE JOINTS SHALL BE UNIFORM, STRAIGHT, AND SHARP. FINISH EXPOSED-FACE SURFACES OF ARCHITECTURAL PRECAST CONCRETE UNITS TO MATCH APPROVED MOCKUPS AND AS FOLLOWS:
   1. DESIGN REFERENCE SAMPLE IS AVAILABLE FOR REVIEW AT PROJECT ENGINEER'S OFFICE.
B. FINISH OTHER EXPOSED SURFACES OF ARCHITECTURAL PRECAST CONCRETE UNITS TO MATCH FACE-SURFACE FINISH. FINISH UNEXPOSED SURFACES OF ARCHITECTURAL PRECAST CONCRETE UNITS BY FLOAT FINISH.

2.15 SOURCE QUALITY CONTROL

A. QUALITY-CONTROL TESTING: TEST AND INSPECT PRECAST CONCRETE ACCORDING TO PCI MNL 117 REQUIREMENTS. IF USING SELF-CONSOLIDATING CONCRETE, ALSO TEST AND INSPECT ACCORDING TO PCI TR-6, INTERIM GUIDELINES FOR THE USE OF SELF-CONSOLIDATING CONCRETE IN PRECAST/PRESTRESSED CONCRETE INSTITUTE MEMBER PLANTS.
B. STRENGTH OF PRECAST CONCRETE UNITS WILL BE CONSIDERED DEFICIENT IF UNITS FAIL TO COMPLY WITH ACI 318 REQUIREMENTS FOR CONCRETE STRENGTH. IF THERE IS EVIDENCE THAT STRENGTH OF PRECAST CONCRETE UNITS MAY BE DEFICIENT OR MAY NOT COMPLY WITH ACI 318 REQUIREMENTS, PRECASTER WILL EMPLOY AN INDEPENDENT TESTING AGENCY TO OBTAIN, PREPARE, AND TEST CORES DRILLED FROM HARDENED CONCRETE TO DETERMINE COMPRESSIVE STRENGTH ACCORDING TO ASTM C 42/C 42M.
C. PATCHING: IF CORE TEST RESULTS ARE SATISFACTORY AND PRECAST CONCRETE UNITS COMPLY WITH REQUIREMENTS, CLEAN AND DAMPEN CORE HOLES AND SOLIDLY FILL WITH PRECAST CONCRETE MIXTURE THAT HAS NO COARSE AGGREGATE, AND FINISH TO MATCH ADJACENT PRECAST CONCRETE SURFACES.
D. DEFECTIVE WORK: PRECAST ARCHITECTURAL CONCRETE UNITS THAT DO NOT COMPLY WITH REQUIREMENTS, INCLUDING STRENGTH, MANUFACTURING TOLERANCES, AND FINISHES, ARE UNACCEPTABLE. PROVIDE NEW PRECAST CONCRETE UNITS THAT COMPLY WITH REQUIREMENTS.

3.0 EXAMINATION

EXAMINE SUPPORTING STRUCTURAL FOUNDATION AND CONDITIONS FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES, TRUE AND LEVEL BEARING SURFACES, AND OTHER CONDITIONS AFFECTING PERFORMANCE. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. DO NOT INSTALL PRECAST CONCRETE UNITS UNTIL SUPPORTING CAST-IN-PLACE STRUCTURAL FRAMING HAS ATTAINED MINIMUM ALLOWABLE DESIGN COMPRESSIVE STRENGTH OR SUPPORTING STEEL OR OTHER STRUCTURE IS COMPLETE.

3.1 INSTALLATION

A. INSTALL CLIPS, HANGERS, BEARING PADS, AND OTHER ACCESSORIES REQUIRED FOR CONNECTING ARCHITECTURAL PRECAST CONCRETE UNITS TO SUPPORTING MEMBERS AND BACKUP MATERIALS.
B. ERECT ARCHITECTURAL PRECAST CONCRETE LEVEL, PLUMB, AND SQUARE WITHIN SPECIFIED ALLOWABLE TOLERANCES. PROVIDE TEMPORARY SUPPORTS AND BRACING AS REQUIRED TO MAINTAIN POSITION, STABILITY, AND ALIGNMENT AS UNITS ARE BEING PERMANENTLY CONNECTED. INSTALL TEMPORARY STEEL OR PLASTIC SPACING SHIMS OR BEARING PADS AS PRECAST CONCRETE UNITS ARE BEING ERECTED. TACK WELD STEEL SHIMS TO EACH OTHER TO PREVENT SHIMS FROM SEPARATING. MAINTAIN HORIZONTAL AND VERTICAL JOINT ALIGNMENT AND UNIFORM JOINT WIDTH AS ERECTION PROGRESSES. REMOVE PROJECTING LIFTING DEVICES AND GROUT FILL VOIDS WITHIN RECESSED LIFTING DEVICES FLUSH WITH SURFACE OF ADJACENT PRECAST SURFACES WHEN RECESS IS EXPOSED. UNLESS OTHERWISE INDICATED, MAINTAIN UNIFORM JOINT WIDTHS OF 3/8 INCH.
C. CONNECT ARCHITECTURAL PRECAST CONCRETE UNITS IN POSITION BY BOLTING, WELDING, GROUTING, OR AS OTHERWISE INDICATED ON SHOP DRAWINGS. REMOVE TEMPORARY SHIMS, WEDGES, AND SPACERS AS SOON AS PRACTICAL AFTER CONNECTING AND GROUTING ARE COMPLETED. DO NOT PERMIT CONNECTIONS TO DISRUPT CONTINUITY OF ROOF FLASHING.
D. WELDING: COMPLY WITH APPLICABLE AWS D1.1/D1.1M AND AWS D1.4 FOR WELDING, WELDING ELECTRODES, APPEARANCE, QUALITY OF WELDS, AND METHODS USED IN CORRECTING WELDING WORK. PROTECT ARCHITECTURAL PRECAST CONCRETE UNITS AND BEARING PADS FROM DAMAGE BY FIELD WELDING OR CUTTING OPERATIONS, AND PROVIDE NONCOMBUSTIBLE SHIELDS AS REQUIRED. WELDS NOT SPECIFIED SHALL BE CONTINUOUS FILLET WELDS, USING NO LESS THAN THE MINIMUM FILLET AS SPECIFIED BY AWS. CLEAN WELD-AFFECTED METAL SURFACES WITH CHIPPING HAMMER FOLLOWED BY BRUSHING, AND APPLY A MINIMUM 4.0-MIL-(0.1-MM-) THICK COAT OF GALVANIZED REPAIR PAINT TO GALVANIZED SURFACES ACCORDING TO ASTM A 780. REMOVE, REWELD, OR REPAIR INCOMPLETE AND DEFECTIVE WELDS.
E. AT BOLTED CONNECTIONS, USE LOCK WASHERS, TACK WELDING, OR OTHER APPROVED MEANS TO PREVENT LOOSENING OF NUTS AFTER FINAL ADJUSTMENT. WHERE SLOTTED CONNECTIONS ARE USED, VERIFY BOLT POSITION AND TIGHTNESS. FOR SLIDING CONNECTIONS, PROPERLY SECURE BOLT BUT ALLOW BOLT TO MOVE WITHIN CONNECTION SLOT. FOR FRICTION CONNECTIONS, APPLY SPECIFIED BOLT TORQUE AND CHECK 25 PERCENT OF BOLTS AT RANDOM BY CALIBRATED TORQUE WRENCH.
F. GROUTING CONNECTIONS: GROUT CONNECTIONS WHERE REQUIRED OR INDICATED. RETAIN GROUT IN PLACE UNTIL HARD ENOUGH TO SUPPORT ITSELF. PACK SPACES WITH STIFF GROUT MATERIAL, TAMPING UNTIL VOIDS ARE COMPLETELY FILLED. PLACE GROUT TO FINISH SMOOTH, LEVEL, AND PLUMB WITH ADJACENT CONCRETE SURFACES. KEEP GROUTED JOINTS DAMP FOR NOT LESS THAN 24 HOURS AFTER INITIAL SET. PROMPTLY REMOVE GROUT MATERIAL FROM EXPOSED SURFACES BEFORE IT AFFECTS FINISHES OR HARDENS.
G. ERECTION TOLERANCES: ERECT ARCHITECTURAL PRECAST CONCRETE UNITS LEVEL, PLUMB, SQUARE, TRUE, AND IN ALIGNMENT WITHOUT EXCEEDING THE NON-CUMULATIVE ERECTION TOLERANCES OF PCI MNL 117, APPENDIX I.
H. INSTALL JOINT FILLERS ACCORDING TO DETAILS, APPROVED MOCKUP, AND MANUFACTURER5#32S WRITTEN INSTRUCTIONS AFTER CLEANING OF PRECAST.
I. APPLY ANTI-GRAFFITI COATING ACCORDING TO APPROVED MOCKUP AND MANUFACTURER'S WRITTEN INSTRUCTIONS FOLLOWING CLEANING OF PRECAST AND INSTALLATION OF JOINT SEALANTS.

3.2 FIELD QUALITY CONTROL

A. TESTING AGENCY: ENGAGE A QUALIFIED TESTING AGENCY TO PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS. FIELD WELDS WILL BE SUBJECT TO VISUAL INSPECTIONS AND NONDESTRUCTIVE TESTING ACCORDING TO ASTM E 165 OR ASTM E 709. HIGH-STRENGTH BOLTED CONNECTIONS WILL BE SUBJECT TO INSPECTIONS. TESTING AGENCY WILL REPORT TEST RESULTS PROMPTLY AND IN WRITING TO CONTRACTOR AND DESIGNER.
B. REPAIR OR REMOVE AND REPLACE WORK WHERE TESTS AND INSPECTIONS INDICATE THAT IT DOES NOT COMPLY WITH SPECIFIED REQUIREMENTS. ADDITIONAL TESTING AND INSPECTING, AT CONTRACTOR'S EXPENSE, WILL BE PERFORMED TO DETERMINE COMPLIANCE OF REPLACED OR ADDITIONAL WORK WITH SPECIFIED REQUIREMENTS.

3.3 REPAIRS

A. REPAIR ARCHITECTURAL PRECAST CONCRETE UNITS IF PERMITTED BY PROJECT ENGINEER. THE PROJECT ENGINEER RESERVES THE RIGHT TO REJECT REPAIRED UNITS THAT DO NOT COMPLY WITH REQUIREMENTS.
B. THE FABRICATOR SHALL BE RESPONSIBLE FOR SATISFACTORY REPAIR OF ANY CHIPPING, SPALLING, CRACKING OR OTHER DAMAGE CAUSED TO THE PRECAST UNITS. DAMAGED UNITS WHICH CANNOT BE SATISFACTORILY REPAIRED SHALL BE REJECTED.
C. MIX PATCHING MATERIALS AND REPAIR UNITS SO CURED PATCHES BLEND WITH COLOR, TEXTURE, AND UNIFORMITY OF ADJACENT EXPOSED SURFACES AND SHOW NO APPARENT LINE OF DEMARCATION BETWEEN ORIGINAL AND REPAIRED WORK, WHEN VIEWED IN TYPICAL DAYLIGHT ILLUMINATION FROM A DISTANCE OF 4 FEET.
D. PREPARE AND REPAIR DAMAGED GALVANIZED COATINGS WITH GALVANIZING REPAIR PAINT ACCORDING TO ASTM A 780.
E. REMOVE AND REPLACE DAMAGED ARCHITECTURAL PRECAST CONCRETE UNITS WHEN REPAIRS DO NOT COMPLY WITH REQUIREMENTS.

3.4 CLEANING

A. CLEAN SURFACES OF PRECAST CONCRETE UNITS EXPOSED TO VIEW. CLEAN MORTAR, PLASTER, FIREPROOFING, WELD SLAG, AND OTHER DELETERIOUS MATERIAL FROM CONCRETE SURFACES AND ADJACENT MATERIALS IMMEDIATELY. CLEAN EXPOSED SURFACES OF PRECAST CONCRETE UNITS AFTER ERECTION AND COMPLETION OF JOINT TREATMENT TO REMOVE WELD MARKS, OTHER MARKINGS, DIRT, AND STAINS. PERFORM CLEANING PROCEDURES, IF NECESSARY, ACCORDING TO PRECAST CONCRETE FABRICATOR'S RECOMMENDATIONS. CLEAN SOILED PRECAST CONCRETE SURFACES WITH DETERGENT AND WATER, USING STIFF FIBER BRUSHES AND SPONGES, AND RINSE WITH CLEAN WATER. PROTECT OTHER WORK FROM STAINING OR DAMAGE DUE TO CLEANING OPERATIONS. DO NOT USE CLEANING MATERIALS OR PROCESSES THAT COULD CHANGE THE APPEARANCE OF EXPOSED CONCRETE FINISHES OR DAMAGE ADJACENT MATERIALS.

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NO.	DESCRIPTION	REV. BY	DATE
16	SPECIFICATION UPDATE	LW/JB	1.11.24

MKSK
LANDSCAPE ARCHITECTURE + URBAN PLANNING

3524-E

CALCULATED
L.HW
R/W REVIEWER
JRB

SPECIFICATIONS - ARCHITECTURAL PRECAST CONCRETE AESTHETIC ENHANCEMENTS

FRA-70-14.05C

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ARCHITECTURAL PRECAST CONCRETE

1.0 SUMMARY:

THIS SECTION INCLUDES ARCHITECTURAL PRECAST CONCRETE WITH INTEGRAL COLOR, DECORATIVE FINISH, ANTI-GRAFFITI COATING,
ALL HARDWARE, LEVELING CURBS, SHIMS, AND ACCESSORIES FOR THE FOLLOWING:

A. PRECAST FACING AND CAP AT END PYLON- FOURTH STREET BRIDGE.
B. PRECAST FACING AND CAP AT PILASTER- FOURTH STREET BRIDGE
C. PRECAST TALL PLANTER AND CAP- FOURTH STREET BRIDGE.
D. PRECAST LOW PLANTER AND CAP- FOURTH STREET BRIDGE.
E. PRECAST PLINTH BASE AND CAP- FOURTH STREET BRIDGE.
F. PRECAST OBELISK- FOURTH STREET BRIDGE.
G. COLORS, FINISH, REVEALS, BRICK, CAST STONE SIMULATED PATTERNS AND COLORS AS DETAILED ARE INCIDENTAL TO EACH TYPE.

1.2 METHOD OF MEASUREMENT:

ARCHITECTURAL PRECAST CONCRETE PLANTERS SHALL BE MEASURED BY LUMP SUM FOR EACH BRIDGE.

1.3 BASIS OF PAYMENT:

THE ACCEPTED ARCHITECTURAL PRECAST CONCRETE WILL BE PAID FOR AT THE CONTRACT PRICE DESIGNATED FOR EACH TYPE SHOWN. ALL COSTS FOR WORK IN THIS SECTION ARE TO BE INCLUDED IN THE LUMP SUM PRICE FOR EACH ARCHITECTURAL PRECAST CONCRETE TYPE.

1.4 PERFORMANCE REQUIREMENTS:

A. STRUCTURAL PERFORMANCE: PROVIDE ARCHITECTURAL PRECAST CONCRETE UNITS AND CONNECTIONS CAPABLE OF WITHSTANDING THE FOLLOWING DESIGN LOADS WITHIN LIMITS AND UNDER CONDITIONS INDICATED:
   1. LATERAL EARTH PRESSURE DESIGN LOAD: 300 LBS/SQ. FT.
   2. THERMAL MOVEMENTS: PROVIDE FOR IN-PLANE THERMAL MOVEMENTS RESULTING FROM ANNUAL AMBIENT TEMPERATURE CHANGES OF 80 DEG F

1.5 REFERENCES:

A. 5,000 PSI MINIMUM COMPRESSIVE STRENGTH AFTER 29 DAYS OF CURING, ASTM C211.1
B. LESS THAN 6% WATER ABSORPTION, ASTM C642
C. AIR ENTRAINMENT OF 4-1/2 TO 6%, ASTM C231 TEST
D. AIR ENTRAINING ADMIXTURES TO COMPLY WITH ASTM C260-95
E. WHITE CEMENT TO COMPLY WITH ASTM C150-95
F. AGGREGATES TO COMPLY WITH ASTM C33-93
G. PIGMENTS TO COMPLY WITH ASTM C979
H. ADMIXTURES TO COMPLY WITH ASTM C494-92
I. REINFORCING STEEL TO COMPLY WITH THE FOLLOWING:
   1. DEFORMED BAR: ASTM A615/A 615-96a
   2. EPOXY COATED BAR: ASTM A775
   3. WIRE MESH: ASTM A185-97

1.6 SUBMITTALS:

A. DESIGN MIXTURES: FOR EACH PRECAST CONCRETE MIXTURE. INCLUDE COMPRESSIVE STRENGTH AND WATER-ABSORPTION TESTS.
B. SHOP DRAWINGS: DETAIL FABRICATION AND INSTALLATION OF ARCHITECTURAL PRECAST CONCRETE UNITS. INDICATE LOCATIONS, PLANS, ELEVATIONS, DIMENSIONS, SHAPES, AND CROSS SECTIONS OF EACH UNIT. INDICATE JOINTS, REVEALS, AND EXTENT AND LOCATION OF EACH SURFACE FINISH. INDICATE SEPARATE FACE AND BACKUP MIXTURE LOCATIONS AND THICKNESSES. INDICATE WELDED CONNECTIONS BY AWS STANDARD SYMBOLS. DETAIL LOOSE AND CAST-IN HARDWARE AND CONNECTIONS. INDICATE LOCATIONS, TOLERANCES, AND DETAILS OF ANCHORAGE DEVICES TO BE EMBEDDED IN OR ATTACHED TO STRUCTURE OR OTHER CONSTRUCTION. INDICATE LOCATIONS, EXTENT, AND TREATMENT OF DRY JOINTS IF TWO-STAGE CASTING IS PROPOSED. INCLUDE PLANS AND ELEVATIONS SHOWING UNIT LOCATION AND SEQUENCE OF ERECTION FOR SPECIAL CONDITIONS. INDICATE LOCATION OF EACH ARCHITECTURAL PRECAST CONCRETE UNIT BY SAME IDENTIFICATION MARK PLACED ON PANEL. INDICATE RELATIONSHIP OF ARCHITECTURAL PRECAST CONCRETE UNITS TO ADJACENT MATERIALS.
C. DESIGN MODIFICATIONS: IF DESIGN MODIFICATIONS ARE PROPOSED TO MEET PERFORMANCE REQUIREMENTS AND FIELD CONDITIONS, SUBMIT DESIGN CALCULATIONS AND SHOP DRAWINGS. DESIGN AND ANALYSIS IS TO BE DONE BY THE PRE-CASTER AND SEALED BY AN OHIO PROFESSIONAL ENGINEER. DO NOT ADVERSELY AFFECT THE APPEARANCE, DURABILITY, OR STRENGTH OF UNITS WHEN MODIFYING DETAILS OR MATERIALS AND MAINTAIN THE GENERAL DESIGN CONCEPT. COMPREHENSIVE ENGINEERING ANALYSIS SIGNED AND SEALED BY THE QUALIFIED PROFESSIONAL ENGINEER RESPONSIBLE FOR ITS PREPARATION. SHOW GOVERNING PANEL TYPES, CONNECTIONS, AND TYPES OF REINFORCEMENT, INCLUDING SPECIAL REINFORCEMENT. INDICATE LOCATION, TYPE, MAGNITUDE, AND DIRECTION OF LOADS IMPOSED ON THE ARCHITECTURAL PRECAST CONCRETE.
D. SAMPLES: FOR EACH TYPE OF FINISH INDICATED ON EXPOSED SURFACES OF ARCHITECTURAL PRECAST CONCRETE UNITS, IN SETS OF 3, ILLUSTRATING FULL RANGE OF FINISH, COLOR, AND TEXTURE VARIATIONS EXPECTED; APPROXIMATELY 12 BY 12 BY 2 INCHES. WHEN OTHER FACES OF PRECAST CONCRETE UNIT ARE EXPOSED, INCLUDE SAMPLES ILLUSTRATING WORKMANSHIP, COLOR, AND TEXTURE OF BACKUP CONCRETE AS WELL AS FACING CONCRETE. GROUT AND SEALANT SAMPLES FOR INITIAL SELECTION: COLOR CHARTS CONSISTING OF ACTUAL SECTIONS OF GROUT AND SEALANT SHOWING MANUFACTURER'S FULL RANGE OF COLORS. GROUT AND SEALANT SAMPLES FOR VERIFICATION: SHOWING COLOR AND TEXTURE OF JOINT TREATMENT.
E. WELDING CERTIFICATES.
F. QUALIFICATION DATA: FOR INSTALLER/ERECTOR AND FABRICATOR.
G. MATERIAL TEST REPORTS: FOR AGGREGATES.
H. MATERIAL CERTIFICATES: FOR THE FOLLOWING ITEMS, SIGNED BY MANUFACTURERS: CEMENTITIOUS MATERIALS, REINFORCING MATERIALS AND PRESTRESSING TENDONS, ADMIXTURES, BEARING PADS, STRUCTURAL-STEEL SHAPES AND HOLLOW STRUCTURAL SECTIONS, ANCHORS, AND SOURCE QUALITY-CONTROL TEST REPORTS.

1.7 QUALITY ASSURANCE:

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A. INSTALLER QUALIFICATIONS: A MINIMUM OF 5 YEARS OF EXPERIENCE WITH PROJECTS OF A SIMILAR SCOPE, SCALE AND COMPLEXITY. REFER TO QUALIFICATION DATA UNDER SUBMITTALS.
B. FABRICATOR QUALIFICATIONS: A FIRM THAT ASSUMES RESPONSIBILITY FOR ENGINEERING ARCHITECTURAL PRECAST CONCRETE UNITS TO COMPLY WITH PERFORMANCE REQUIREMENTS. HIS RESPONSIBILITY INCLUDES PREPARATION OF SHOP DRAWINGS AND COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER. PRECAST CONCRETE FABRICATOR SHALL BE AN ODOT APPROVED SUPPLIER AND A CERTIFIED MEMBER OF ONE OF THE FOLLOWING ORGANIZATIONS:
   1. PRECAST CONCRETE INSTITUTE
   2. CAST STONE INSTITUTE
   3. NATIONAL PRECAST ASSOCIATION
C. DESIGN STANDARDS: COMPLY WITH ACI 318 AND DESIGN RECOMMENDATIONS OF PCI MNL 120, PCI DESIGN HANDBOOK - PRECAST AND PRESTRESSED CONCRETE, APPLICABLE TO TYPES OF ARCHITECTURAL PRECAST CONCRETE UNITS INDICATED.
D. QUALITY-CONTROL STANDARD: FOR MANUFACTURING PROCEDURES AND TESTING REQUIREMENTS, QUALITY-CONTROL RECOMMENDATIONS, AND DIMENSIONAL TOLERANCES FOR TYPES OF UNITS REQUIRED, COMPLY WITH PCI MNL 117, MANUAL FOR QUALITY CONTROL FOR PLANTS AND PRODUCTION OF ARCHITECTURAL PRECAST CONCRETE PRODUCTS.
E. WELDING: QUALIFY PROCEDURES AND PERSONNEL ACCORDING TO AWS D1.1/D1.1M, STRUCTURAL WELDING CODE - STEEL; AND AWS D1.4, STRUCTURAL WELDING CODE - REINFORCING STEEL.
F. SAMPLE PANELS: AFTER SAMPLE APPROVAL AND BEFORE FABRICATING ARCHITECTURAL PRECAST CONCRETE UNITS, PRODUCE A MINIMUM OF 2 SAMPLE PANELS APPROXIMATELY 16 SQ. FT. IN AREA FOR REVIEW BY PROJECT ENGINEER. INCORPORATE FULL-SCALE DETAILS OF ARCHITECTURAL FEATURES, FINISHES, TEXTURES, AND TRANSITIONS IN SAMPLE PANELS INCLUDING INTERFACE WITH BRIDGE DECK AND/ OR SIDEWALK. LOCATE PANELS WHERE INDICATED OR, IF NOT INDICATED, AS DIRECTED BY PROJECT ENGINEER. DAMAGE PART OF AN EXPOSED-FACE SURFACE FOR EACH FINISH, COLOR, AND TEXTURE, AND DEMONSTRATE ADEQUACY OF REPAIR TECHNIQUES PROPOSED FOR REPAIR OF SURFACE BLEMISHES. AFTER ACCEPTANCE OF REPAIR TECHNIQUE, MAINTAIN ONE SAMPLE PANEL AT MANUFACTURER'S PLANT AND ONE AT PROJECT SITE IN AN UNDISTURBED CONDITION AS A STANDARD FOR JUDGING THE COMPLETED WORK. DEMOLISH AND REMOVE SAMPLE PANELS WHEN DIRECTED.
G. DIMENSIONAL TOLERANCES:
   1. FABRICATION:
      a. BOWING, CONCAVE OR CONVEX OF A FLAT SURFACE: NOT OVER L/360 WITH A MAXIMUM OF 3/4 INCH UP TO 30 FEET.
      b. MAXIMUM PERMISSIBLE WARPAGE OF ONE CORNER OUT OF THE PLANE OF THE OTHER THREE: THE GREATER OF 1/16 INCH/FOOT DISTANCE FROM THE NEAREST ADJACENT CORNER OR 1/8 INCH.
      c. UNITS 10 FEET OR UNDER: PLUS OR MINUS 1/8 INCH.
      d. UNITS 10 FEET TO 20 FEET: PLUS 1/8 INCH, MINUS 3/16 INCH.
      e. UNITS 20 FEET TO 30 FEET: PLUS 1/8 INCH, MINUS 1/4 INCH.
      f. UNITS OVER 30 FEET: PLUS OR MINUS 1/16 INCH FOR EACH ADDITIONAL 10 FEET.
      g. THICKNESS OF UNITS: PLUS 1/4 INCH, MINUS 1/8 INCH.
      h. OPENINGS WITHIN ONE UNIT: PLUS OR MINUS 1/4 INCH.
      i. ANGULAR DEVIATION OF PLANE OF SIDE MOLD: 1/32 INCH PER 3 INCHES DEPTH OR 1/16 INCH TOTAL, WHICHEVER IS GREATER.
      j. UNITS AND OPENINGS WITHIN UNITS: NOT OUT OF SQUARE MORE THAN 1/8 INCH PER 6 FEET OR 1/4 INCH TOTAL, WHICHEVER IS GREATER.
      k. TOLERANCES ON ANY DIMENSION NOT SPECIFIED: THE NUMERICALLY GREATER OF PLUS OR MINUS 1/16 INCH PER 10 FEET.
   2. POSITION TOLERANCES: FOR CAST-IN ITEMS MEASURED FROM DATUM LINE LOCATIONS AS SHOWN ON THE APPROVED SHOP DRAWINGS.
      a. LOCATION OF ANCHORS AND INSERTS: PLUS OR MINUS 3/8 INCH OF CENTERLINE LOCATION.
      b. LOCATION OF BLOCKOUTS AND REINFORCEMENT WHICH SUCH POSITIONS HAVE STRUCTURAL IMPLICATIONS OR AFFECT CONCRETE COVER: PLUS OR MINUS 1/4 INCH OF THE POSITION SHOWN, OTHERWISE PLUS OR MINUS 1/2 INCH.
   3. JOINTS:
      a. JOINT WIDTH BETWEEN ADJACENT UNITS SHALL NOT EXCEED 3/8 INCH.
      b. ACTUAL JOINT WIDTH SHALL NOT VARY MORE THAN 1/8-INCH PLUS OR MINUS FROM THE NOMINAL JOINT WIDTH.
      c. MANUFACTURER SHALL DETERMINE ACTUAL JOINT WIDTH REQUIRED TO ACCOMMODATE TOLERANCES, AND SHOW ON ERECTION SHOP DRAWINGS FOR APPROVAL BY PROJECT ENGINEER.
      d. WHERE JOINT WIDTHS ARE REQUIRED TO EXCEED TOLERANCES SPECIFIED ABOVE, CONTRACTOR SHALL SUBMIT DATA FOR PROJECT ENGINEER'S REVIEW AND APPROVAL PRIOR TO FABRICATION.
      e. ADJACENT ARCHITECTURAL PRECAST CONCRETE ACCESSORIES SHALL NOT BE BUTT JOINTED.
H. CONNECTIONS:
   1. MANUFACTURER SHALL PROVIDE STRUCTURAL ENGINEERING FOR ALL CONNECTIONS THAT ALLOW FOR VOLUME CHANGES DUE TO SHRINKAGE, CREEP, AND TEMPERATURE EFFECTS, IN ADDITION TO THE DESIGN FORCES. CONNECTIONS SHALL BE DESIGNED AND LOCATED SO AS TO PREVENT ANY LATERAL, LONGITUDINAL, OR VERTICAL MOVEMENT BETWEEN ADJACENT ARCHITECTURAL PRECAST CONCRETE ACCESSORIES.
   2. UPON COMPLETION OF INSTALLATION, CONNECTION HARDWARE SHALL NOT BE VISIBLE UNLESS PREVIOUSLY SHOWN AND INDICATED ON THE SHOP DRAWINGS AND APPROVED BY THE PROJECT ENGINEER.

1.8 PREINSTALLATION CONFERENCE:

CONDUCT PREINSTALLATION CONFERENCE INCLUDING INSTALLER, FABRICATOR AND PROJECT ENGINEER.

1.9 DELIVERY, STORAGE, AND HANDLING:

A. DELIVER ARCHITECTURAL PRECAST CONCRETE UNITS IN SUCH QUANTITIES AND AT SUCH TIMES TO LIMIT UNLOADING UNITS TEMPORARILY ON THE GROUND. SUPPORT UNITS DURING SHIPMENT ON NONSTAINING SHOCK-ABSORBING MATERIAL.
B. STORE UNITS WITH ADEQUATE DUNNAGE AND BRACING AND PROTECT UNITS TO PREVENT CONTACT WITH SOIL, TO PREVENT STAINING, AND TO PREVENT CRACKING, DISTORTION, WARPING OR OTHER PHYSICAL DAMAGE. PLACE STORED UNITS SO IDENTIFICATION MARKS ARE CLEARLY VISIBLE, AND UNITS CAN BE INSPECTED.
C. HANDLE AND TRANSPORT UNITS IN A POSITION CONSISTENT WITH THEIR SHAPE AND DESIGN IN ORDER TO AVOID EXCESSIVE STRESSES WHICH WOULD CAUSE CRACKING OR DAMAGE. LIFT AND SUPPORT UNITS ONLY AT DESIGNATED POINTS SHOWN ON SHOP DRAWINGS.

1.10 PROJECT CONDITIONS:

A. FURNISH LOOSE CONNECTION HARDWARE AND ANCHORAGE ITEMS TO BE EMBEDDED IN OR ATTACHED TO OTHER CONSTRUCTION WITHOUT DELAYING THE WORK. PROVIDE LOCATIONS, SETTING DIAGRAMS, TEMPLATES, INSTRUCTIONS, AND DIRECTIONS, AS REQUIRED, FOR INSTALLATION.
B. PROVIDE ALL MISCELLANEOUS STEEL REQUIRED FOR LATERAL AND VERTICAL SUPPORT OF THE PRECAST PANELS, BUT NOT SHOWN ON THE DRAWINGS. PROVIDE ADDITIONAL BRACING AS REQUIRED BY THE CONTRACTOR AS PART OF THE WORK.

2.0 MOLD MATERIALS:

A. MOLDS: RIGID, DIMENSIONALLY STABLE, NON-ABSORPTIVE MATERIAL, WARP AND BUCKLE FREE, THAT WILL PROVIDE CONTINUOUS AND TRUE PRECAST CONCRETE SURFACES WITHIN FABRICATION TOLERANCES INDICATED; NONREACTIVE WITH CONCRETE AND SUITABLE FOR PRODUCING REQUIRED FINISHES.
B. MOLD-RELEASE AGENT: COMMERCIALLY PRODUCED LIQUID-RELEASE AGENT THAT WILL NOT BOND WITH, STAIN OR ADVERSELY AFFECT PRECAST CONCRETE SURFACES AND WILL NOT IMPAIR SUBSEQUENT SURFACE OR JOINT TREATMENTS OF PRECAST CONCRETE.
C. FORM LINERS: UNITS OF FACE DESIGN, TEXTURE, ARRANGEMENT, AND CONFIGURATION INDICATED. FURNISH WITH MANUFACTURER'S RECOMMENDED LIQUID-RELEASE AGENT THAT WILL NOT BOND WITH, STAIN, OR ADVERSELY AFFECT PRECAST CONCRETE SURFACES AND WILL NOT IMPAIR SUBSEQUENT SURFACE OR JOINT TREATMENTS OF PRECAST CONCRETE.

2.1 REINFORCING MATERIALS:

GALVANIZED REINFORCING BARS: ASTM A 615, GRADE 60, DEFORMED BARS, ASTM A 767, CLASS II ZINC COATED, HOT-DIP GALVANIZED, AND CHROMATE WASH TREATED AFTER FABRICATION AND BENDING. SUPPORTS: SUSPEND REINFORCEMENT FROM BACK OF MOLD OR USE BOLSTERS, CHAIRS, SPACERS, AND OTHER DEVICES FOR SPACING, SUPPORTING, AND FASTENING REINFORCING BARS AND WELDED WIRE REINFORCEMENT IN PLACE ACCORDING TO PCI MNL 117.

2.2 CONCRETE MATERIALS:

A. PORTLAND CEMENT: ASTM C 150, TYPE I OR TYPE III, WHITE, UNLESS OTHERWISE INDICATED.
B. NORMAL-WEIGHT AGGREGATES: EXCEPT AS MODIFIED BY PCI MNL 117, ASTM C 33, WITH COARSE AGGREGATES COMPLYING WITH CLASS 5S. STOCKPILE FINE AND COARSE AGGREGATES FOR EACH TYPE OF EXPOSED FINISH FROM A SINGLE SOURCE (PIT OR QUARRY) FOR PROJECT.
C. FACE-MIXTURE-COARSE AGGREGATES: SELECTED, HARD, AND DURABLE; FREE OF MATERIAL THAT REACTS WITH CEMENT OR CAUSES STAINING; TO MATCH SELECTED FINISH SAMPLE. GRADATION: TO MATCH BASIS OF DESIGN REFERENCE. FACE-MIXTURE-FINE AGGREGATES: SELECTED, NATURAL OR MANUFACTURED SAND OF SAME MATERIAL AS COARSE AGGREGATE, UNLESS OTHERWISE APPROVED BY PROJECT ENGINEER.
D. COLORING ADMIXTURE: ASTM C 979, SYNTHETIC OR NATURAL MINERAL-OXIDE PIGMENTS OR COLORED WATER-REDUCING ADMIXTURES, TEMPERATURE STABLE, AND NON-FADING.
E. WATER: POTABLE; FREE FROM DELETERIOUS MATERIAL THAT MAY AFFECT COLOR STABILITY, SETTING, OR STRENGTH OF CONCRETE AND COMPLYING WITH CHEMICAL LIMITS OF PCI MNL 117.
F. AIR-ENTRAINING ADMIXTURE: ASTM C 260, CERTIFIED BY MANUFACTURER TO BE COMPATIBLE WITH OTHER REQUIRED ADMIXTURES.
G. CHEMICAL ADMIXTURES: CERTIFIED BY MANUFACTURER TO BE COMPATIBLE WITH OTHER ADMIXTURES AND TO NOT CONTAIN CALCIUM CHLORIDE, OR MORE THAN 0.15 PERCENT CHLORIDE IONS OR OTHER SALTS BY WEIGHT OF ADMIXTURE.
   1. WATER-REDUCING ADMIXTURES: ASTM C 494/C 494M, TYPE A.
   2. RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE B.
   3. WATER-REDUCING AND RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE D.
   4. WATER-REDUCING AND ACCELERATING ADMIXTURE: ASTM C 494/C 494M, TYPE E.
   5. HIGH-RANGE, WATER-REDUCING ADMIXTURE: ASTM C 494/C 494M, TYPE F.
   6. HIGH-RANGE, WATER-REDUCING AND RETARDING ADMIXTURE: ASTM C 494/C 494M, TYPE G.
   7. PLASTICIZING AND RETARDING ADMIXTURE: ASTM C 1017/C 1017 M.

2.3 CONCRETE MIXTURES FOR LEVELING CURB

A. PREPARE DESIGN MIXTURES, PROPORTIONED ACCORDING TO ACI 301, FOR EACH TYPE AND STRENGTH OF NORMAL-WEIGHT CONCRETE DETERMINED BY EITHER LABORATORY TRIAL MIXES OR FIELD EXPERIENCE.
   1. USE A QUALIFIED INDEPENDENT TESTING AGENCY FOR PREPARING AND REPORTING PROPOSED CONCRETE MIXTURE DESIGNS FOR THE TRIAL BATCH METHOD.
B. PROPORTION MIXTURES TO PROVIDE NORMAL-WEIGHT CONCRETE WITH THE FOLLOWING PROPERTIES:
   1. COMPRESSIVE STRENGTH (28 DAYS): 4000PSI
   2. MAXIMUM WATER - CEMENTITIOUS MATERIALS RATIO AT POINT OF PLACEMENT: 0.45 TO 0.65.
   3. SLUMP LIMIT: 4 INCHES PLUS OR MINUS 1 INCH
   4. CEMENT QUANTITY PER YARD OF MIX:
      a. MINIMUM: 6 SACK
      b. MAXIMUM: 7 SACK
   4. FINE AGGREGATE: 46% OF AGGREGATE WEIGHT
   5. COURSE AGGREGATE: 64% OF AGGREGATE WEIGHT

2.4 STEEL CONNECTION MATERIALS:

A. CARBON-STEEL SHAPES AND PLATES: ASTM A 36.
B. CARBON-STEEL-HEADED STUDS: ASTM A 108, AISI 1018 THROUGH AISI 1020, COLD FINISHED, AWS D1.1/D1.1M, TYPE A OR B, WITH ARC SHIELDS AND WITH MINIMUM MECHANICAL PROPERTIES OF PCI MNL 117, TABLE 3.2.3.

NO.	DESCRIPTION	REV. BY	DATE
16	SPECIFICATION UPDATE	LW/JB	1.11.24

MKSK
LANDSCAPE ARCHITECTURE + URBAN PLANNING

3555-E

CALCULATED LHW/AH
R/W REVIEWER JRB

SPECIFICATIONS - ARCHITECTURAL PRECAST CONCRETE AESTHETIC ENHANCEMENTS

FRA-70-14.05

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C. CARBON-STEEL PLATE: ASTM A 283.
D. MALLEABLE IRON CASTINGS: ASTM A 47.
E. CARBON-STEEL CASTINGS: ASTM A 27, GRADE 60-30.
F. HIGH-STRENGTH, LOW-ALLOY STRUCTURAL STEEL: ASTM A 572.
G. CARBON-STEEL STRUCTURAL TUBING: ASTM A 500, GRADE B.
H. WROUGHT CARBON-STEEL BARS: ASTM A 675, GRADE 65.
I. DEFORMED-STEEL WIRE OR BAR ANCHORS: ASTM A 496 OR ASTM A 706.
J. CARBON-STEEL BOLTS AND STUDS: ASTM A 307, GRADE A; CARBON-STEEL, HEX-HEAD BOLTS AND STUDS; CARBON-STEEL NUTS, ASTM A 563; AND FLAT, UNHARDENED STEEL WASHERS, ASTM F 844.
K. ZINC-COATED FINISH: FOR EXTERIOR STEEL ITEMS AND ITEMS INDICATED FOR GALVANIZING, APPLY ZINC COATING BY [HOT-DIP PROCESS ACCORDING TO ASTM A 123 OR ASTM A 153. FOR STEEL SHAPES, PLATES, AND TUBING TO BE GALVANIZED, LIMIT SILICON CONTENT OF STEEL TO LESS THAN 0.03 PERCENT OR TO BETWEEN 0.15 AND 0.25 PERCENT OR LIMIT SUM OF SILICON AND 2.5 TIMES PHOSPHOROUS CONTENT TO 0.09 PERCENT. GALVANIZING REPAIR PAINT: HIGH-ZINC-DUST-CONTENT PAINT WITH DRY FILM CONTAINING NOT LESS THAN 94 PERCENT ZINC DUST BY WEIGHT, AND COMPLYING WITH DOD-P-21035A OR SSPC-PAINT 20.
L. WELDING ELECTRODES: COMPLY WITH AWS STANDARDS.
M. BEARING PADS: PROVIDE BEARING PADS FOR ARCHITECTURAL PRECAST CONCRETE UNITS AS RECOMMENDED BY PRECAST FABRICATOR FOR APPLICATION
N. ACCESSORIES: REGLETS: STAINLESS STEEL, TYPE 302 OR 304 FELT OR FIBER FILLED, OR WITH FACE OPENING OF SLOTS COVERED. PRECAST ACCESSORIES: PROVIDE CLIPS, HANGERS, PLASTIC OR STEEL SHIMS, AND OTHER ACCESSORIES REQUIRED TO INSTALL ARCHITECTURAL PRECAST CONCRETE UNITS
O. EPOXY ADHESIVE FOR DOWELS: ADHESIVE MEETING ASTM C 881 SPECIFICATION FOR TYPE I AND TYPE IV, GRADE 3, CLASS C EPOXY.

2.5 GROUT MATERIALS:

A. SAND-CEMENT GROUT: PORTLAND CEMENT, ASTM C 150, TYPE I, AND CLEAN, NATURAL SAND, ASTM C 144 OR ASTM C 404. MIX AT RATIO OF 1 PART CEMENT TO 2-1/2 PARTS SAND, BY VOLUME, WITH MINIMUM WATER REQUIRED FOR PLACEMENT AND HYDRATION.
B. NONMETALLIC, NONSHRINK GROUT: PREMIXED, NONMETALLIC, NONCORROSIVE, NONSTAINING GROUT CONTAINING SELECTED SILICA SANDS, PORTLAND CEMENT, SHRINKAGE-COMPENSATING AGENTS, PLASTICIZING AND WATER-REDUCING AGENTS, COMPLYING WITH ASTM C 1107, GRADE A FOR DRYPACK AND GRADES B AND C FOR FLOWABLE GROUT AND OF CONSISTENCY SUITABLE FOR APPLICATION WITHIN A 30-MINUTE WORKING TIME.
C. GROUT JOINTS FOR PRECAST CONCRETE PLANTER CURBS: COLOR MATCHED TYPE "S" GROUT BASED UPON APPROVED SAMPLES FOR ALL JOINTS EXPOSED TO VIEW.

2.6 ANTI-GRAFFITI COATING:

A. TWO COATS TO BE APPLIED TO ALL PRECAST EXPOSED TO VIEW IN FINAL CONSTRUCTION.
B. A CLEAR-DRYING WATER-BASED SILICONE EMULSION FOR WEATHERPROOFING AND ENABLING GRAFFITI REMOVAL FROM TREATED SURFACES.
0. FORM: MILKY WHITE LIQUID
1. SPECIFIC GRAVITY: 1.00
2. PH: NOT APPLICABLE
3. WT/GAL: 8.32 LBS.
4. ACTIVE CONTENT: 6%
5. TOTAL SOLIDS: 6% ASTM D 5095
6. VOC CONTENT: LESS THAN 20 GRAMS/LITER LOW SOLIDS COATING
7. FLASH POINT: LESS THAN 212 DEGREES F. (100 DEGREES C.) ASTM D 3278
8. FREEZE POINT: 32 DEGREES F. (0 DEGREES C.)
9. SHELF LIFE: 1 YEAR IN TIGHTLY SEALED CONTAINER.

2.7 JOINT FILLERS:

A. COMPATIBILITY: PROVIDE JOINT SEALANTS, BACKING MATERIALS, AND OTHER RELATED MATERIALS THAT ARE COMPATIBLE WITH ONE ANOTHER AND WITH JOINT SUBSTRATES UNDER CONDITIONS OF SERVICE AND APPLICATION, AS DEMONSTRATED BY JOINT-SEALANT MANUFACTURER BASED ON TESTING AND FIELD EXPERIENCE.
B. BACKER ROD: FOAM ROPE MATERIAL, SIZE AS DETAILED.
C. JOINT SEALANT: POLYURETHANE SEALANT FOR VERTICAL JOINTS IN CONCRETE: SINGLE-COMPONENT, LOW-MODULUS, NEUTRAL-CURING, NONSAG POLYURETHANE SEALANT COMPLYING WITH ASTM C 920-02, TYPE M, GRADE NS. COLOR SELECTED BY PROJECT ENGINEER.

2.8 CONCRETE MIXTURES:

PREPARE DESIGN MIXTURES FOR EACH TYPE OF PRECAST CONCRETE REQUIRED. DESIGN MIXTURES MAY BE PREPARED BY A QUALIFIED INDEPENDENT TESTING AGENCY OR BY QUALIFIED PRECAST PLANT PERSONNEL AT ARCHITECTURAL PRECAST CONCRETE FABRICATOR'S OPTION. LIMIT WATER-SOLUBLE CHLORIDE IONS TO MAXIMUM PERCENTAGE BY WEIGHT OF CEMENT PERMITTED BY PCI MNL 117 WHEN TESTED ACCORDING TO ASTM C 1218/C 1218M.

2.9 NORMAL-WEIGHT CONCRETE MIXTURES:

PROPORTION FACE AND BACKUP MIXTURES OR FULL-DEPTH MIXTURES, AT FABRICATOR'S OPTION BY EITHER LABORATORY TRIAL BATCH OR FIELD TEST DATA METHODS ACCORDING TO ACI 211.1, WITH MATERIALS TO BE USED ON PROJECT, TO PROVIDE NORMAL-WEIGHT CONCRETE WITH THE FOLLOWING PROPERTIES: COMPRESSIVE STRENGTH (28 DAYS): 5000 PSI MINIMUM, MAXIMUM WATER-CEMENTITIOUS MATERIALS RATIO: 0.45. WATER ABSORPTION: 6 PERCENT BY WEIGHT OR 14 PERCENT BY VOLUME, TESTED ACCORDING TO PCI MNL 117. ADD AIR-ENTRAINING ADMIXTURE AT MANUFACTURER'S PRESCRIBED RATE TO RESULT IN CONCRETE AT POINT OF PLACEMENT HAVING AN AIR CONTENT COMPLYING WITH PCI MNL 117. WHEN INCLUDED IN DESIGN MIXTURES, ADD OTHER ADMIXTURES TO CONCRETE MIXTURES ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.

2.10 MOLD FABRICATION:

A. ACCURATELY CONSTRUCT MOLDS, MORTAR TIGHT, OF SUFFICIENT STRENGTH TO WITHSTAND PRESSURES DUE TO CONCRETE-PLACEMENT OPERATIONS AND TEMPERATURE CHANGES AND FOR PRESTRESSING AND DETENSIONING OPERATIONS.
B. COAT CONTACT SURFACES OF MOLDS WITH RELEASE AGENT BEFORE REINFORCEMENT IS PLACED. AVOID CONTAMINATION OF REINFORCEMENT AND PRESTRESSING TENDONS BY RELEASE AGENT.
C. PLACE FORM LINERS ACCURATELY TO PROVIDE FINISHED SURFACE TEXTURE INDICATED. PROVIDE SOLID BACKING AND SUPPORTS TO MAINTAIN STABILITY OF LINERS DURING CONCRETE PLACEMENT. COAT FORM LINER WITH FORM-RELEASE AGENT.
D. MAINTAIN MOLDS TO PROVIDE COMPLETED ARCHITECTURAL PRECAST CONCRETE UNITS OF SHAPES, LINES, AND DIMENSIONS INDICATED, WITHIN FABRICATION TOLERANCES SPECIFIED. FORM JOINTS ARE NOT PERMITTED ON FACES EXPOSED TO VIEW IN THE FINISHED WORK.
E. EDGE AND CORNER TREATMENT: UNIFORMLY CHAMFERED.

2.11 FABRICATION:

A. CAST-IN ANCHORS, INSERTS, PLATES, ANGLES, AND OTHER ANCHORAGE HARDWARE. FABRICATE ANCHORAGE HARDWARE WITH SUFFICIENT ANCHORAGE AND EMBEDMENT TO COMPLY WITH DESIGN REQUIREMENTS. ACCURATELY POSITION FOR ATTACHMENT OF LOOSE HARDWARE, AND SECURE IN PLACE DURING PRECASTING OPERATIONS. LOCATE ANCHORAGE HARDWARE WHERE IT DOES NOT AFFECT POSITION OF MAIN REINFORCEMENT OR CONCRETE PLACEMENT. WELD-HEADED STUDS AND DEFORMED BAR ANCHORS USED FOR ANCHORAGE ACCORDING TO AWS D1.1/D1.1M AND AWS C5.4, RECOMMENDED PRACTICES FOR STUD WELDING.
B. FURNISH LOOSE HARDWARE ITEMS INCLUDING STEEL PLATES, CLIP ANGLES, SEAT ANGLES, ANCHORS, DOWELS, CRAMPS, HANGERS, AND OTHER HARDWARE SHAPES FOR SECURING ARCHITECTURAL PRECAST CONCRETE UNITS TO SUPPORTING AND ADJACENT CONSTRUCTION.
C. CAST-IN REGLETS, SLOTS, HOLES, AND OTHER ACCESSORIES IN ARCHITECTURAL PRECAST CONCRETE UNITS AS INDICATED ON THE CONTRACT DRAWINGS.
D. CAST-IN OPENINGS LARGER THAN 6 INCHES IN ANY DIMENSION. DO NOT DRILL OR CUT OPENINGS OR PRESTRESSING STRAND WITHOUT PROJECT ENGINEER APPROVAL.

2.12 REINFORCEMENT:

A. COMPLY WITH RECOMMENDATIONS IN PCI MNL 117 FOR FABRICATING, PLACING, AND SUPPORTING REINFORCEMENT. CLEAN REINFORCEMENT OF LOOSE RUST AND MILL SCALE, EARTH, AND OTHER MATERIALS THAT REDUCE OR DESTROY THE BOND WITH CONCRETE. WHEN DAMAGE TO GALVANIZED COATINGS OCCUR, PREPARE AND REPAIR DAMAGED AREAS WITH GALVANIZING REPAIR PAINT ACCORDING TO ASTM A 780.
B. ACCURATELY POSITION, SUPPORT, AND SECURE REINFORCEMENT AGAINST DISPLACEMENT DURING CONCRETE-PLACEMENT AND CONSOLIDATION OPERATIONS. COMPLETELY CONCEAL SUPPORT DEVICES TO PREVENT EXPOSURE ON FINISHED SURFACES. PLACE REINFORCEMENT TO MAINTAIN AT LEAST 3/4-INCH MINIMUM COVERAGE. ARRANGE, SPACE, AND SECURELY TIE BARS AND BAR SUPPORTS TO HOLD REINFORCEMENT IN POSITION WHILE PLACING CONCRETE. DIRECT WIRE TIE ENDS AWAY FROM FINISHED, EXPOSED CONCRETE SURFACES.
C. PLACE REINFORCING STEEL AND PRESTRESSING STRAND TO MAINTAIN AT LEAST 3/4-INCH MINIMUM CONCRETE COVER. INCREASE COVER REQUIREMENTS FOR REINFORCING STEEL TO 1-1/2 INCHES WHEN UNITS ARE EXPOSED TO CORROSIVE ENVIRONMENT OR SEVERE EXPOSURE CONDITIONS. ARRANGE, SPACE, AND SECURELY TIE BARS AND BAR SUPPORTS TO HOLD REINFORCEMENT IN POSITION WHILE PLACING CONCRETE. DIRECT WIRE TIE ENDS AWAY FROM FINISHED, EXPOSED CONCRETE SURFACES. INSTALL WELDED WIRE FABRIC IN LENGTHS AS LONG AS PRACTICABLE. LAP ADJOINING PIECES AT LEAST ONE FULL MESH SPACING AND WIRE TIE LAPS, WHERE REQUIRED BY DESIGN. OFFSET LAPS OF ADJOINING WIDTHS TO PREVENT CONTINUOUS LAPS IN EITHER DIRECTION.
D. REINFORCE ARCHITECTURAL PRECAST CONCRETE UNITS TO RESIST HANDLING, TRANSPORTATION, AND ERECTION STRESSES.
E. AT FABRICATOR'S OPTION, PRESTRESS TENDONS FOR ARCHITECTURAL PRECAST CONCRETE UNITS BY EITHER PRETENSIONING OR POST-TENSIONING METHODS. COMPLY WITH PCI MNL 117. DELAY DETENSIONING OR POST-TENSIONING OF PRECAST, PRESTRESSED ARCHITECTURAL CONCRETE UNITS UNTIL CONCRETE HAS REACHED ITS INDICATED MINIMUM DESIGN RELEASE COMPRESSIVE STRENGTH AS ESTABLISHED BY TEST CYLINDERS CURED UNDER SAME CONDITIONS AS CONCRETE. DETENSION PRETENSIONED TENDONS EITHER BY GRADUALLY RELEASING TENSIONING JACKS OR BY HEAT- CUTTING TENDONS, USING A SEQUENCE AND PATTERN TO PREVENT SHOCK OR UNBALANCED LOADING. IF CONCRETE HAS BEEN HEAT CURED, DETENSION WHILE CONCRETE IS STILL WARM AND MOIST TO AVOID DIMENSIONAL CHANGES THAT MAY CAUSE CRACKING OR UNDESIRABLE STRESSES. PROTECT STRAND ENDS AND ANCHORAGES WITH BITUMINOUS, ZINC-RICH, OR EPOXY PAINT TO AVOID CORROSION AND POSSIBLE RUST SPOTS.

2.13 PLACEMENT:

A. COMPLY WITH REQUIREMENTS IN PCI MNL 117 AND REQUIREMENTS IN THIS SECTION FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE. AFTER CONCRETE BATCHING, NO ADDITIONAL WATER MAY BE ADDED.
B. PLACE FACE MIXTURE TO A MINIMUM THICKNESS AFTER CONSOLIDATION OF THE GREATER OF 1 INCH OR 1.5 TIMES THE MAXIMUM AGGREGATE SIZE, BUT NOT LESS THAN THE MINIMUM REINFORCING COVER SPECIFIED.
C. PLACE CONCRETE IN A CONTINUOUS OPERATION TO PREVENT SEAMS OR PLANES OF WEAKNESS FROM FORMING IN PRECAST CONCRETE UNITS.
D. PLACE BACKUP CONCRETE MIXTURE TO ENSURE BOND WITH FACE-MIXTURE CONCRETE.
E. THOROUGHLY CONSOLIDATE PLACED CONCRETE BY INTERNAL AND EXTERNAL VIBRATION WITHOUT DISLOCATING OR DAMAGING REINFORCEMENT AND BUILT-IN ITEMS, AND MINIMIZE POUR LINES, HONEYCOMBING, OR ENTRAPPED AIR ON SURFACES. USE EQUIPMENT AND PROCEDURES COMPLYING WITH PCI MNL 117. PLACE SELF-CONSOLIDATING CONCRETE WITHOUT VIBRATION ACCORDING TO PCI TR-6, INTERIM GUIDELINES FOR THE USE OF SELF-CONSOLIDATING CONCRETE IN PRECAST/PRESTRESSED CONCRETE INSTITUTE MEMBER PLANTS.
F. COMPLY WITH PCI MNL 117 FOR HOT- AND COLD-WEATHER CONCRETE PLACEMENT.
G. IDENTIFY PICKUP POINTS OF ARCHITECTURAL PRECAST CONCRETE UNITS AND ORIENTATION IN STRUCTURE WITH PERMANENT MARKINGS, COMPLYING WITH MARKINGS INDICATED ON SHOP DRAWINGS. IMPRINT OR PERMANENTLY MARK CASTING DATE ON EACH ARCHITECTURAL PRECAST CONCRETE UNIT ON A SURFACE THAT WILL NOT SHOW IN FINISHED STRUCTURE.
H. CURE CONCRETE, ACCORDING TO REQUIREMENTS IN PCI MNL 117, BY MOISTURE RETENTION WITHOUT HEAT OR BY ACCELERATED HEAT CURING USING LOW-PRESSURE LIVE STEAM OR RADIANT HEAT AND MOISTURE. CURE UNITS UNTIL COMPRESSIVE STRENGTH IS HIGH ENOUGH TO ENSURE THAT STRIPPING DOES NOT HAVE AN EFFECT ON PERFORMANCE OR APPEARANCE OF FINAL PRODUCT.
I. DISCARD AND REPLACE ARCHITECTURAL PRECAST CONCRETE UNITS THAT DO NOT COMPLY WITH REQUIREMENTS, INCLUDING STRUCTURAL, MANUFACTURING TOLERANCE, AND APPEARANCE, UNLESS REPAIRS MEET REQUIREMENTS IN PCI MNL 117 AND DESIGNER'S APPROVAL.

2.14 FINISHES:

A. PANEL FACES SHALL BE FREE OF JOINT MARKS, GRAIN, AND OTHER OBVIOUS DEFECTS. CORNERS, INCLUDING FALSE JOINTS SHALL BE UNIFORM, STRAIGHT, AND SHARP. FINISH EXPOSED-FACE SURFACES OF ARCHITECTURAL PRECAST CONCRETE UNITS TO MATCH APPROVED MOCKUPS AND AS FOLLOWS:
1. DESIGN REFERENCE SAMPLE IS AVAILABLE FOR REVIEW AT PROJECT ENGINEER'S OFFICE.
B. FINISH OTHER EXPOSED SURFACES OF ARCHITECTURAL PRECAST CONCRETE UNITS TO MATCH FACE-SURFACE FINISH. FINISH UNEXPOSED SURFACES OF ARCHITECTURAL PRECAST CONCRETE UNITS BY FLOAT FINISH.

2.15 SOURCE QUALITY CONTROL:

A. QUALITY-CONTROL TESTING: TEST AND INSPECT PRECAST CONCRETE ACCORDING TO PCI MNL 117 REQUIREMENTS. IF USING SELF-CONSOLIDATING CONCRETE, ALSO TEST AND INSPECT ACCORDING TO PCI TR-6, INTERIM GUIDELINES FOR THE USE OF SELF-CONSOLIDATING CONCRETE IN PRECAST/PRESTRESSED CONCRETE INSTITUTE MEMBER PLANTS.
B. STRENGTH OF PRECAST CONCRETE UNITS WILL BE CONSIDERED DEFICIENT IF UNITS FAIL TO COMPLY WITH ACI 318 REQUIREMENTS FOR CONCRETE STRENGTH. IF THERE IS EVIDENCE THAT STRENGTH OF PRECAST CONCRETE UNITS MAY BE DEFICIENT OR MAY NOT COMPLY WITH ACI 318 REQUIREMENTS, PRECASTER WILL EMPLOY AN INDEPENDENT TESTING AGENCY TO OBTAIN, PREPARE, AND TEST CORES DRILLED FROM HARDENED CONCRETE TO DETERMINE COMPRESSIVE STRENGTH ACCORDING TO ASTM C 42/C 42M.
C. PATCHING: IF CORE TEST RESULTS ARE SATISFACTORY AND PRECAST CONCRETE UNITS COMPLY WITH REQUIREMENTS, CLEAN AND DAMPEN CORE HOLES AND SOLIDLY FILL WITH PRECAST CONCRETE MIXTURE THAT HAS NO COARSE AGGREGATE, AND FINISH TO MATCH ADJACENT PRECAST CONCRETE SURFACES.
D. DEFECTIVE WORK: PRECAST ARCHITECTURAL CONCRETE UNITS THAT DO NOT COMPLY WITH REQUIREMENTS, INCLUDING STRENGTH, MANUFACTURING TOLERANCES, AND FINISHES, ARE UNACCEPTABLE. PROVIDE NEW PRECAST CONCRETE UNITS THAT COMPLY WITH REQUIREMENTS.

3.0 EXAMINATION:

EXAMINE SUPPORTING STRUCTURAL FOUNDATION AND CONDITIONS FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES, TRUE AND LEVEL BEARING SURFACES, AND OTHER CONDITIONS AFFECTING PERFORMANCE. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. DO NOT INSTALL PRECAST CONCRETE UNITS UNTIL SUPPORTING CAST-IN-PLACE STRUCTURAL FRAMING HAS ATTAINED MINIMUM ALLOWABLE DESIGN COMPRESSIVE STRENGTH OR SUPPORTING STEEL OR OTHER STRUCTURE IS COMPLETE.

3.1 INSTALLATION:

A. INSTALL CLIPS, HANGERS, BEARING PADS, AND OTHER ACCESSORIES REQUIRED FOR CONNECTING ARCHITECTURAL PRECAST CONCRETE UNITS TO SUPPORTING MEMBERS AND BACKUP MATERIALS.
B. ERECT ARCHITECTURAL PRECAST CONCRETE LEVEL, PLUMB, AND SQUARE WITHIN SPECIFIED ALLOWABLE TOLERANCES. PROVIDE TEMPORARY SUPPORTS AND BRACING AS REQUIRED TO MAINTAIN POSITION, STABILITY, AND ALIGNMENT AS UNITS ARE BEING PERMANENTLY CONNECTED. INSTALL TEMPORARY STEEL OR PLASTIC SPACING SHIMS OR BEARING PADS AS PRECAST CONCRETE UNITS ARE BEING ERECTED. TACK WELD STEEL SHIMS TO EACH OTHER TO PREVENT SHIMS FROM SEPARATING. MAINTAIN HORIZONTAL AND VERTICAL JOINT ALIGNMENT AND UNIFORM JOINT WIDTH AS ERECTION PROGRESSES. REMOVE PROJECTING LIFTING DEVICES AND GROUT FILL VOIDS WITHIN RECESSED LIFTING DEVICES FLUSH WITH SURFACE OF ADJACENT PRECAST SURFACES WHEN RECESS IS EXPOSED. UNLESS OTHERWISE INDICATED, MAINTAIN UNIFORM JOINT WIDTHS OF 3/8 INCH.
C. CONNECT ARCHITECTURAL PRECAST CONCRETE UNITS IN POSITION BY BOLTING, WELDING, GROUTING, OR AS OTHERWISE INDICATED ON SHOP DRAWINGS. REMOVE TEMPORARY SHIMS, WEDGES, AND SPACERS AS SOON AS PRACTICAL AFTER CONNECTING AND GROUTING ARE COMPLETED. DO NOT PERMIT CONNECTIONS TO DISRUPT CONTINUITY OF ROOF FLASHING.
D. WELDING: COMPLY WITH APPLICABLE AWS D1.1/D1.1M AND AWS D1.4 FOR WELDING, WELDING ELECTRODES, APPEARANCE, QUALITY OF WELDS, AND METHODS USED IN CORRECTING WELDING WORK. PROTECT ARCHITECTURAL PRECAST CONCRETE UNITS AND BEARING PADS FROM DAMAGE BY FIELD WELDING OR CUTTING OPERATIONS, AND PROVIDE NONCOMBUSTIBLE SHIELDS AS REQUIRED. WELDS NOT SPECIFIED SHALL BE CONTINUOUS FILLET WELDS, USING NO LESS THAN THE MINIMUM FILLET AS SPECIFIED BY AWS. CLEAN WELD-AFFECTED METAL SURFACES WITH CHIPPING HAMMER FOLLOWED BY BRUSHING, AND APPLY A MINIMUM 4.0-MIL- (0.1-MM-) THICK COAT OF GALVANIZED REPAIR PAINT TO GALVANIZED SURFACES ACCORDING TO ASTM A 780. REMOVE, REWELD, OR REPAIR INCOMPLETE AND DEFECTIVE WELDS.
E. AT BOLTED CONNECTIONS, USE LOCK WASHERS, TACK WELDING, OR OTHER APPROVED MEANS TO PREVENT LOOSENING OF NUTS AFTER FINAL ADJUSTMENT. WHERE SLOTTED CONNECTIONS ARE USED, VERIFY BOLT POSITION AND TIGHTNESS. FOR SLIDING CONNECTIONS, PROPERLY SECURE BOLT BUT ALLOW BOLT TO MOVE WITHIN CONNECTION SLOT. FOR FRICTION CONNECTIONS, APPLY SPECIFIED BOLT TORQUE AND CHECK 25 PERCENT OF BOLTS AT RANDOM BY CALIBRATED TORQUE WRENCH.

CALCULATED LHW/AH
R/W REVIEWER JRB

SPECIFICATIONS - ARCHITECTURAL PRECAST CONCRETE AESTHETIC ENHANCEMENTS

FRA-70-14.05

NO.	DESCRIPTION	REV. BY	DATE
16	SPECIFICATION UPDATE	LW/JB	1.11.24

16

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F. GROUTING CONNECTIONS: GROUT CONNECTIONS WHERE REQUIRED OR INDICATED. RETAIN GROUT IN PLACE UNTIL HARD ENOUGH TO SUPPORT ITSELF. PACK SPACES WITH STIFF GROUT MATERIAL, TAMPING UNTIL VOIDS ARE COMPLETELY FILLED. PLACE GROUT TO FINISH SMOOTH, LEVEL, AND PLUMB WITH ADJACENT CONCRETE SURFACES. KEEP GROUTED JOINTS DAMP FOR NOT LESS THAN 24 HOURS AFTER INITIAL SET. PROMPTLY REMOVE GROUT MATERIAL FROM EXPOSED SURFACES BEFORE IT AFFECTS FINISHES OR HARDENS.

G. ERECTION TOLERANCES: ERECT ARCHITECTURAL PRECAST CONCRETE UNITS LEVEL, PLUMB, SQUARE, TRUE, AND IN ALIGNMENT WITHOUT EXCEEDING THE NONCUMULATIVE ERECTION TOLERANCES OF PCI MNL 117, APPENDIX I.

H. INSTALL JOINT FILLERS ACCORDING TO DETAILS, APPROVED MOCKUP, AND MANUFACTURER5#32S WRITTEN INSTRUCTIONS AFTER CLEANING OF PRECAST.

I. APPLY ANTI-GRAFFITI COATING ACCORDING TO APPROVED MOCKUP AND MANUFACTURER'S WRITTEN INSTRUCTIONS FOLLOWING CLEANING OF PRECAST AND INSTALLATION OF JOINT SEALANTS.

3.2 FIELD QUALITY CONTROL:

A. TESTING AGENCY: ENGAGE A QUALIFIED TESTING AGENCY TO PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS. FIELD WELDS WILL BE SUBJECT TO VISUAL INSPECTIONS AND NONDESTRUCTIVE TESTING ACCORDING TO ASTM E 165 OR ASTM E 709. HIGH-STRENGTH BOLTED CONNECTIONS WILL BE SUBJECT TO INSPECTIONS. TESTING AGENCY WILL REPORT TEST RESULTS PROMPTLY AND IN WRITING TO CONTRACTOR AND DESIGNER.

B. REPAIR OR REMOVE AND REPLACE WORK WHERE TESTS AND INSPECTIONS INDICATE THAT IT DOES NOT COMPLY WITH SPECIFIED REQUIREMENTS. ADDITIONAL TESTING AND INSPECTING, AT CONTRACTOR'S EXPENSE, WILL BE PERFORMED TO DETERMINE COMPLIANCE OF REPLACED OR ADDITIONAL WORK WITH SPECIFIED REQUIREMENTS.

3.3 REPAIRS:

A. REPAIR ARCHITECTURAL PRECAST CONCRETE UNITS IF PERMITTED BY PROJECT ENGINEER. THE PROJECT ENGINEER RESERVES THE RIGHT TO REJECT REPAIRED UNITS THAT DO NOT COMPLY WITH REQUIREMENTS.

B. THE FABRICATOR SHALL BE RESPONSIBLE FOR SATISFACTORY REPAIR OF ANY CHIPPING, SPALLING, CRACKING OR OTHER DAMAGE CAUSED TO THE PRECAST UNITS. DAMAGED UNITS WHICH CANNOT BE SATISFACTORILY REPAIRED SHALL BE REJECTED.

C. MIX PATCHING MATERIALS AND REPAIR UNITS SO CURED PATCHES BLEND WITH COLOR, TEXTURE, AND UNIFORMITY OF ADJACENT EXPOSED SURFACES AND SHOW NO APPARENT LINE OF DEMARCATION BETWEEN ORIGINAL AND REPAIRED WORK, WHEN VIEWED IN TYPICAL DAYLIGHT ILLUMINATION FROM A DISTANCE OF 4 FEET.

D. PREPARE AND REPAIR DAMAGED GALVANIZED COATINGS WITH GALVANIZING REPAIR PAINT ACCORDING TO ASTM A 780.

E. REMOVE AND REPLACE DAMAGED ARCHITECTURAL PRECAST CONCRETE UNITS WHEN REPAIRS DO NOT COMPLY WITH REQUIREMENTS.

3.4 CLEANING:

A. CLEAN SURFACES OF PRECAST CONCRETE UNITS EXPOSED TO VIEW. CLEAN MORTAR, PLASTER, FIREPROOFING, WELD SLAG, AND OTHER DELETERIOUS MATERIAL FROM CONCRETE SURFACES AND ADJACENT MATERIALS IMMEDIATELY. CLEAN EXPOSED SURFACES OF PRECAST CONCRETE UNITS AFTER ERECTION AND COMPLETION OF JOINT TREATMENT TO REMOVE WELD MARKS, OTHER MARKINGS, DIRT, AND STAINS. PERFORM CLEANING PROCEDURES, IF NECESSARY, ACCORDING TO PRECAST CONCRETE FABRICATOR'S RECOMMENDATIONS. CLEAN SOILED PRECAST CONCRETE SURFACES WITH DETERGENT AND WATER, USING STIFF FIBER BRUSHES AND SPONGES, AND RINSE WITH CLEAN WATER. PROTECT OTHER WORK FROM STAINING OR DAMAGE DUE TO CLEANING OPERATIONS. DO NOT USE CLEANING MATERIALS OR PROCESSES THAT COULD CHANGE THE APPEARANCE OF EXPOSED CONCRETE FINISHES OR DAMAGE ADJACENT MATERIALS.

NO.	DESCRIPTION	REV. BY	DATE
16	SPECIFICATION UPDATE	LW/JB	1.11.24

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CALCULATED L.HW./A.H.
R/W REVIEWER JRB

SPECIFICATIONS - ARCHITECTURAL PRECAST CONCRETE AESTHETIC ENHANCEMENTS

FRA-70-14.05

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STANDARD DRAWINGS AND SUPPLEMENTAL SPECIFICATIONS

REFER TO THE FOLLOWING STANDARD BRIDGE DRAWINGS:
AS-1-15 DATED (REVISED) 7/17/15
AS-2-15 DATED (REVISED) 1/18/19
EXJ-4-87 DATED (REVISED) 1/19/18
SBR-1-13 DATED (REVISED) 7/20/18

DESIGN SPECIFICATIONS

THIS STRUCTURE CONFORMS TO THE 8TH EDITION OF THE "LRFD BRIDGE DESIGN SPECIFICATIONS" ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS. 2017 AND THE ODOT BRIDGE DESIGN MANUAL, 2020.

DESIGN LOADINGS

HL-93 DESIGN LOADING
FUTURE WEARING SURFACE (FWS) OF 10 LBS./SQ. FT.

DESIGN DATA

CONCRETE CLASS QC2 - COMPRESSIVE STRENGTH 4500 PSI (SUPERSTRUCTURE)

CONCRETE CLASS QC1 - COMPRESSIVE STRENGTH 4000 PSI (SUBSTRUCTURE)

REINFORCING STEEL - ASTM A709, GRADE 60, MINIMUM YIELD STRENGTH 60,000 PSI

EXISTING STRUCTURAL STEEL - ASTM A36 - YIELD STRENGTH 20,000 PSI

DECK PROTECTION METHOD

CLASS HP CONCRETE
EPOXY COATED REINFORCING STEEL
2" CONCRETE COVER
SEALING OF CONCRETE SURFACES

MONOLITHIC WEARING SURFACE

MONOLITHIC WEARING SURFACE IS ASSUMED, FOR DESIGN PURPOSES, TO BE 1" THICK.

CUT LINE CONSTRUCTION JOINT PREPARATION

SAW CUT BOUNDARIES OF PROPOSED CONCRETE REMOVALS 1 INCH DEEP. REMOVE CONCRETE TO A ROUGH SURFACE. LEAVE THE EXISTING REINFORCING STEEL, IF REQUIRED IN THE PLANS, IN PLACE. INSTALL DOWEL BARS IF SPECIFIED. PRIOR TO CONCRETE PLACEMENT ABRASIVELY CLEAN JOINT SURFACES AND EXISTING EXPOSED REINFORCEMENT TO REMOVE LOOSE AND DISINTEGRATED CONCRETE AND LOOSE RUST. THOROUGHLY CLEAN THE JOINT SURFACE AND EXPOSED REINFORCEMENT OF ALL DIRT, DUST, RUST OR OTHER FOREIGN MATERIAL BY THE USE OF WATER, AIR UNDER PRESSURE, OR OTHER METHODS THAT PRODUCE SATISFACTORY RESULTS. EXISTING REINFORCING STEEL DOES NOT HAVE TO HAVE A BRIGHT STEEL FINISH, BUT REMOVE ALL PACK AND LOOSE RUST. THOROUGHLY DRENCH EXISTING CONCRETE SURFACES WITH CLEAN WATER AND ALLOW TO DRY TO A DAMP CONDITION BEFORE PLACING CONCRETE.

DECK PLACEMENT DESIGN ASSUMPTIONS

THE FOLLOWING ASSUMPTIONS OF CONSTRUCTION MEANS AND METHODS WERE MADE FOR THE ANALYSIS AND DESIGN OF THE SUPERSTRUCTURE. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF THE FALSEWORK SUPPORT SYSTEM WITHIN THESE PARAMETERS AND WILL ASSUME RESPONSIBILITY FOR SUPERSTRUCTURE ANALYSIS FOR DEVIATION FROM THESE DESIGN ASSUMPTIONS.

AN EIGHT WHEEL FINISHING MACHINE WITH A MAXIMUM WHEEL LOAD OF 1.13 KIPS FOR A TOTAL MACHINE LOAD OF 9.0 KIPS.

A MINIMUM OUT-TO-OUT WHEEL SPACING AT EACH END OF THE MACHINE OF 103".

A MAXIMUM SPACING OF OVERHANG FALSEWORK BRACKETS OF 48 IN.

A MAXIMUM DISTANCE FROM THE CENTERLINE OF THE FASCIA BEAM TO THE FACE OF THE SAFETY HANDRAIL OF 65".

SUBSTRUCTURE CONCRETE REMOVAL

REMOVE CONCRETE BY MEANS OF APPROVED PNEUMATIC HAMMERS EMPLOYING POINTED AND BLUNT CHISEL TOOLS. HYDRAULIC HOE-RAM TYPE HAMMERS WILL NOT BE PERMITTED. THE WEIGHT OF THE HAMMER SHALL NOT BE MORE THAN 35 POUNDS FOR REMOVAL WITHIN 18 INCHES OF PORTIONS TO BE PRESERVED. OUTSIDE THE 18 INCH LIMIT, THE CONTRACTOR MAY USE HAMMERS NOT EXCEEDING 90 POUNDS UPON THE APPROVAL OF THE ENGINEER. DO NOT PLACE PNEUMATIC HAMMERS IN DIRECT CONTACT WITH REINFORCING STEEL THAT IS TO BE RETAINED IN THE REBUILT STRUCTURE.

UTILITY LINES

THE UTILITIES SHALL BORE ALL EXPENSE INVOLVED IN RELOCATING (INSTALLING) THE AFFECTED UTILITY LINES. THE CONTRACTOR AND UTILITIES ARE TO COOPERATE BY ARRANGING THEIR WORK IN SUCH A MANNER THAT INCONVENIENCE TO EITHER WILL BE HELD TO A MINIMUM.

ITEM 202, PORTIONS OF STRUCTURE REMOVED, OVER 20 FOOT SPAN, AS PER PLAN

THIS WORK CONSISTS OF THE REMOVAL OF CONCRETE DECKS INCLUDING PARAPETS, RAILINGS, DECK JOINTS AND OTHER APPURTENANCES FROM STEEL SUPPORTING SYSTEMS (BEAMS, CROSS FRAMES, ETC.). THE PROVISIONS OF ITEM 202 APPLY EXCEPT AS SPECIFIED BY THE FOLLOWING NOTES. PERFORM WORK CAREFULLY DURING DECK REMOVALS TO PROTECT PORTIONS OF SUCH SYSTEMS THAT ARE TO BE SALVAGED AND INCORPORATED INTO THE PROPOSED STRUCTURE. THE USE OF EXPLOSIVES, HEADACHE BALLS AND/OR HOE RAM TYPE OF EQUIPMENT IS PROHIBITED. SUBMIT CONSTRUCTION PLANS ACCORDING TO CMS 501.05.

PROTECTION OF STEEL SUPPORT SYSTEMS: BEFORE DECK SLAB CUTTING IS PERMITTED, DRAW THE OUTLINE OF PRIMARY STEEL MEMBERS IN CONTACT WITH THE BOTTOM OF THE DECK ON THE SURFACE OF DECK. DRILL SMALL DIAMETER PILOT HOLES 2 INCHES OUTSIDE THESE LINES TO CONFIRM THE LOCATION OF FLANGE EDGES. DECK CUTS OVER OR WITHIN 2 INCHES OF FLANGE EDGES SHALL NOT EXTEND LOWER THAN THE BOTTOM LAYER OF DECK SLAB REINFORCING STEEL. CUTS MADE OUTSIDE 2 INCHES OF FLANGE EDGES MAY EXTEND THE FULL DEPTH OF THE DECK. PERFORM WORK CAREFULLY DURING CUTTING OF THE DECK SLAB TO AVOID DAMAGING STEEL MEMBERS THAT ARE TO BE INCORPORATED INTO THE PROPOSED STRUCTURE. REPLACE OR REPAIR STEEL MEMBERS DAMAGED BY THE DECK SLAB CUTTING OPERATIONS AT NO COST TO THE PROJECT. AT LEAST 7 DAYS BEFORE PERFORMING REPAIR WORK, SUBMIT A PROPOSED REPAIR PLAN, DEVELOPED BY AN OHIO REGISTERED PROFESSIONAL ENGINEER TO THE DIRECTOR. OBTAIN THE DIRECTOR'S APPROVAL BEFORE PERFORMING REPAIR.

REMOVAL METHODS: THE CONTRACTOR MAY REMOVE CONCRETE BY CUTTING AND BY MEANS OF HAND OPERATED PNEUMATIC HAMMERS EMPLOYING POINTED OR BLUNTED CHISEL TYPE TOOLS. FOR REMOVALS OVER STRUCTURAL MEMBERS (STEEL BEAM), THE CONTRACTOR MAY USE A HAMMER HEAVIER THAN 35 POUNDS BUT NOT TO EXCEED 90 POUNDS UNLESS APPROVED BY THE ENGINEER. REMOVAL METHODS OVER STRUCTURAL MEMBERS SHALL ENSURE ADEQUATE DEPTH CONTROL AND PREVENT NICKING OR GOUGING THE PRIMARY STRUCTURAL MEMBERS.

DUE TO THE POSSIBLE PRESENCE OF ATTACHMENTS (E.G., FINISHING MACHINE, SCUPPER AND FORM SUPPORTS, ETC.) TO EXISTING STRUCTURAL MEMBERS, PERFORM WORK CAREFULLY DURING DECK REMOVAL TO AVOID DAMAGING STRUCTURAL MEMBERS THAT ARE TO REMAIN. REPLACE OR REPAIR STRUCTURAL MEMBERS DAMAGED BY THE REMOVAL OPERATIONS AT NO COST TO THE PROJECT. AT LEAST 7 DAYS BEFORE PERFORMING REPAIR WORK, SUBMIT A PROPOSED REPAIR PLAN, DEVELOPED BY AN OHIO REGISTERED PROFESSIONAL ENGINEER TO THE DIRECTOR. OBTAIN THE DIRECTOR'S APPROVAL BEFORE PERFORMING REPAIR.

EXISTING WELDED ATTACHMENTS: REMOVE EXISTING WELDED ATTACHMENTS (E.G., FINISHING MACHINE AND FORM SUPPORTS; AND SUPPORTS FOR SCUPPERS AND BULB ANGLES WHICH ARE TO BE REMOVED) LOCATED IN THE DESIGNATED TENSION PORTIONS OF THE TOP FLANGES OF EXISTING STEEL MEMBERS AND GRIND THE FLANGE SURFACES SMOOTH. CAREFULLY GRIND PARALLEL TO THE FLANGES.

MEASUREMENT & PAYMENT: THE DEPARTMENT WILL MEASURE THE QUANTITY OF REMOVALS ON A LUMP SUM BASIS. THE DEPARTMENT WILL PAY FOR THE ACCEPTED QUANTITIES OF REMOVALS AT THE CONTRACT PRICE FOR ITEM 202 - PORTIONS OF STRUCTURE REMOVED, OVER 20' SPAN, AS PER PLAN. FOR MODIFICATIONS TO OR EXTENSIONS OF EXISTING CONCRETE SUBSTRUCTURE MEMBERS WHERE AESTHETICS IS A CONCERN, INCLUDE THE FOLLOWING NOTES IN AN ITEM 202, AS PER PLAN NOTE.

EXISTING STRUCTURE VERIFICATION

DETAILS AND DIMENSIONS SHOWN ON THESE PLANS PERTAINING TO THE EXISTING STRUCTURE HAVE BEEN OBTAINED FROM PLANS OF THE EXISTING STRUCTURE AND FROM FIELD OBSERVATIONS AND MEASUREMENTS. CONSEQUENTLY, THEY ARE INDICATIVE OF THE EXISTING STRUCTURE AND THE PROPOSED WORK BUT THEY SHALL BE CONSIDERED TENTATIVE AND APPROXIMATE. THE CONTRACTOR IS REFERRED TO CMS SECTIONS 102.05, 105.02 AND 513.04. BASE CONTRACT BID PRICES UPON A RECOGNITION OF THE UNCERTAINTIES DESCRIBED ABOVE AND UPON A PREBID EXAMINATION OF THE EXISTING STRUCTURE. HOWEVER, THE DEPARTMENT WILL PAY FOR ALL PROJECT WORK BASED UPON ACTUAL DETAILS AND DIMENSIONS THAT HAVE BEEN VERIFIED IN THE FIELD.

ITEM 511 CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK (PARAPET), AS PER PLAN

GLASS FIBER REINFORCED POLYMER (G.F.R.P.) BARS SHALL BE USED FOR DIAGONAL REINFORCEMENT AS SHOWN IN THE PLANS. PAYMENT FOR G.F.R.P. BARS SHALL BE INCIDENTAL TO THE COST OF ITEM 511 - CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK (PARAPET), AS PER PLAN.

ITEM 513 - STRUCTURAL STEEL FOR REHABILITATION, AS PER PLAN

AN ALLOWANCE OF 2520 LBS IS INCLUDED IN THE CONTRACT DOCUMENTS FOR REMOVAL AND REPLACEMENT IN KIND OF DETERIORATED STEEL CROSSFRAMES AT BOTH ABUTMENTS AND INTERNAL HINGE. COST TO REMOVE DETERIORATED MEMBERS IS INCIDENTAL TO ITEM 513 - STRUCTURAL STEEL FOR REHABILITATION, AS PER PLAN.

ITEM 516 - RESET BEARING, AS PER PLAN

A CONTINGENCY QUANTITY OF 12 EACH IS INCLUDED IN THE CONTRACT DOCUMENTS FOR RESETTING OF ALL EXISTING BEARINGS AT BOTH ABUTMENTS. BEARINGS WILL BE RESET AS PER THE REQUIREMENTS OF ITEM 516 - RESET BEARING, AS PER PLAN.

ITEM 516 - JACKING AND TEMPORARY SUPPORT OF SUPERSTRUCTURE, AS PER PLAN

THIS WORK CONSISTS OF RAISING OR RE-POSITIONING EXISTING STRUCTURES TO THE DIMENSIONS AND REQUIREMENTS DEFINED IN THE PROJECT PLANS.

SUBMIT CONSTRUCTION PLANS IN ACCORDANCE WITH CMS 501.05.

IF, DURING THE JACKING OPERATIONS, CRACKING OF THE CONCRETE SUPERSTRUCTURE, SEPARATION OF THE CONCRETE DECK FROM THE STEEL STRINGERS, OR OTHER DAMAGE TO THE STRUCTURE IS VISUALLY OBSERVED, IMMEDIATELY CEASE THE JACKING OPERATION AND INSTALL SUPPORTS TO THE SATISFACTION OF THE ENGINEER. ANALYZE THE DAMAGE AND SUBMIT A METHOD OF CORRECTION TO THE ENGINEER FOR APPROVAL. EPOXY INJECT ALL BEAMS THAT SEPARATE FROM THE DECK FOR THE DISTANCE OF THE SEPARATION IN ACCORDANCE WITH CMS 512.07. THE DEPARTMENT WILL NOT PAY FOR THE COST OF THIS EPOXY INJECTION OR OTHER REQUIRED REPAIRS. THE BRIDGE BEARINGS SHALL BE FULLY SEATED AT ALL CONTACT AREAS. IF FULL SEATING IS NOT OBTAINED, SUBMIT A REPAIR PLAN TO THE ENGINEER. THE DEPARTMENT WILL NOT PAY FOR THE REPAIR COSTS TO ENSURE FULL SEATING ON BEARINGS.

ITEM 519 - PATCHING CONCRETE STRUCTURE, AS PER PLAN

PRIOR TO THE SURFACE CLEANING SPECIFIED IN 519.04 AND WITHIN 24 HOURS OF PLACING PATCHING MATERIAL, BLAST CLEAN ALL SURFACES TO BE PATCHED INCLUDING THE EXPOSED REINFORCING STEEL. ACCEPTABLE METHODS INCLUDE HIGH PRESSURE WATER BLASTING WITH OR WITHOUT ABRASIVES IN THE WATER, ABRASIVE BLASTING WITH CONTAINMENT, OR VACUUM ABRASIVE BLASTING. AN ALLOWANCE OF 200 S.F. IS INCLUDED IN THE CONTRACT DOCUMENTS TO PATCH DEFICIENT AREAS OF THE CONCRETE SUBSTRUCTURES. AREAS REQUIRING PATCHING WILL BE DETERMINED IN THE FIELD BY THE PROJECT ENGINEER AND REPAIRED AS PER THE REQUIREMENTS OF ITEM 519 - PATCHING CONCRETE STRUCTURE, AS PER PLAN.

INSPECTION OF EXISTING STRUCTURAL STEEL

THE ENGINEER WILL VISUALLY INSPECT ALL EXISTING BUTT-WELDED SPLICES AND/OR TOP FLANGE COVER PLATE FILLET WELDS TO ENSURE THE WELDS, PLATES AND BEAMS ARE FREE OF DEFECTS AND CRACKS. IF NECESSARY, REMOVE ALL DECK SLAB HAUNCH FORMS IMMEDIATELY ADJACENT TO SUCH WELDS THAT MAY INTERFERE WITH THE ENGINEER'S INSPECTION. THE INSPECTION WILL NOT TAKE PLACE UNTIL THE TOP FLANGES ARE CLEANED ACCORDING TO 511.10, BUT IT WILL BE DONE BEFORE THE DECK SLAB REINFORCEMENT IS INSTALLED. THE DEPARTMENT WILL PAY FOR THE COST ASSOCIATED WITH THIS INSPECTION WITH ITEM 511, CLASS QC2 CONCRETE WITH QC/QA, BRIDGE DECK. THE ENGINEER WILL REPORT ALL CRACKS FOUND TO THE OFFICE OF CONSTRUCTION ADMINISTRATION, BRIDGE CONSTRUCTION SPECIALIST, ALONG WITH SPECIFIC INFORMATION ON LOCATION OF THE CRACKS, LENGTH, AND DEPTH SO AN EVALUATION AND REPAIR OR REPLACEMENT RECOMMENDATION CAN BE MADE.

PAINTING AND SEALING OPERATIONS

THE CONTRACTOR SHALL TAKE ALL PRECAUTIONS NECESSARY TO PREVENT EPOXY-URETHANE SEALER, PAINT, OR OTHER MATERIALS USED TO REPAIR, CLEAN, SEAL, OR TREAT ANY BRIDGE STRUCTURE FROM ENTERING ANY STREAMS, WETLANDS OR OTHER WATERS OF THE UNITED STATES AND TAKE THE APPROPRIATE ACTIONS IN THE EVENT OF A RELEASE. THE TABULATED PAINT AND SURFACE PREP QUANTITIES ARE TO BE USED AS DIRECTED BY THE ENGINEER ON THE CROSSFRAMES AND GIRDER ENDS IMMEDIATELY ADJACENT TO THE HINGE.

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ITEM SPECIAL - MISC.: VERTICAL CLEARANCE

AFTER ALL CONSTRUCTION HAS BEEN COMPLETED, A REGISTERED SURVEYOR WILL TAKE VERTICAL CLEARANCE MEASUREMENTS AT LOCATIONS INDICATED ON THE APPROVED ODOT FORM (AVAILABLE IN THE DISTRICT 4 STRUCTURES AND PAVEMENT OFFICE). THE FINAL MEASUREMENTS SHALL BE RECORDED ON THE FORM AND SUBMITTED TO THE PROJECT ENGINEER AND THE DISTRICT 4 STRUCTURES AND PAVEMENT ENGINEER. THE RECORD SHALL BEAR THE SEAL OF THE LICENSED SURVEYOR WHO HAS TAKEN THE MEASUREMENTS.

ASBESTOS NOTIFICATION

AN ASBESTOS SURVEY OF THE FRA-70-1301L, SFN 2504677 AND FRA-70-1301R, SFN 2504766 BRIDGES WAS CONDUCTED BY A CERTIFIED ASBESTOS HAZARD EVALUATION SPECIALIST. THE SURVEY DETERMINED THAT ASBESTOS IS PRESENT AT THE BRIDGES.

A COPY OF THE OHIO ENVIRONMENTAL PROTECTION AGENCY (OEPA) NOTIFICATION OF DEMOLITION AND RENOVATION FORMS, PARTIALLY COMPLETED AND SIGNED BY THE BRIDGE OWNER, WILL BE PROVIDED TO THE SUCCESSFUL BIDDER. THE CONTRACTOR SHALL COMPLETE THE FORM AND SUBMIT IT TO:

OHIO EPA/DIVISION OF AIR POLLUTION CONTROL
CENTRAL DISTRICT OFFICE
P.O. BOX 1049
COLUMBUS, OHIO 43216-1049
KELLY TOTH
PHONE: 614-728-3778
FAX: 614-728-3898

AT LEAST TEN (10) WORKING DAYS PRIOR TO THE START OF ANY DEMOLITION AND/OR REHABILITATION. THE CONTRACTOR SHALL PROVIDE A COPY OF THE COMPLETED FORM TO THE ENGINEER.

INFORMATION REQUIRED ON THE FORM WILL INCLUDE: 1) THE CONTRACTORS NAME AND ADDRESS, 2) THE SCHEDULED DATES FOR THE START AND COMPLETION OF THE BRIDGE REMOVAL AND 3) A DESCRIPTION OF THE PLANNED DEMOLITION WORK AND THE METHOD(S) TO BE USED.

THE CONTRACTOR SHALL FURNISH ALL FEES, LABOR, AND MATERIAL NECESSARY TO COMPLETE AND SUBMIT THE OEPA NOTIFICATION FORM.

BASIS OF PAYMENT:
THE CONTRACTOR SHALL FURNISH ALL THE FEES LABOR, EQUIPMENT AND MATERIALS NECESSARY TO COMPLETE THE OEPA NOTIFICATION OF DEMOLITION AND RENOVATION FORM AND PROPERLY REMOVE, ENCAPSULATE, HANDLE, TRANSPORT AND DISPOSE OF ASBESTOS CONTAINING MATERIALS IN A LANDFILL LICENSED BY THE LOCAL HEALTH DEPARTMENT AND PERMITTED BY THE OHIO ENVIRONMENTAL PROTECTION AGENCY DIVISION OF AIR POLLUTION CONTROL TO ACCEPT ASBESTOS CONTAINING MATERIAL. PAYMENT FOR THIS WORK SHALL BE MADE AT THE CONTRACT PRICE BID OF LUMP SUM.

PAYMENT FOR THIS WORK SHALL BE INCLUDED IN ITEM 202 PORTIONS OF STRUCTURE REMOVED OVER 20 FOOT SPAN, AS PER PLAN.

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PROPOSED WORK

REMOVE AND REPLACE CONCRETE DECK, APPROACH SLABS AND PARAPETS INCLUDING EXPANSION JOINTS.

INSTALL SHEAR STUDS TO EXISTING BEAMS AND GIRDERS.

REPLACE ACCESS DOORS TO STEEL BOX PIER CAP.

PATCH DETERIORATED CONCRETE AS DIRECTED BY THE ENGINEER.

REPLACE DETERIORATED STRUCTURAL STEEL AS DIRECTED BY THE ENGINEER.

RESET BEARINGS AS DIRECTED BY THE ENGINEER.

NO.	DESCRIPTION	REV. BY	DATE
5	UPDATED NOTE	ACW	11/6/23
16	UPDATED NOTE	ACW	1/8/24

DESIGN AGENCY
ms consultants, inc.
2221 Schrock Road
Columbus, Ohio 43229

DESIGNED	DRAWN	REVIEWED	DATE
ATM	ATM	YSJ	3/8/2023
CHECKED	REVISED	STRUCTURE FILE NUMBER	
DEA		2504677	

GENERAL NOTES
BRIDGE NO. FRA-70-1301L
WESTBOUND I-70 OVER S.R. 315

FRA-70-13.01
PID No. 77372