

- SEQUENCE & TIMING NOTES:**
- IF THE ASSIGNED RIGHT OF WAY FOR ANY TRAFFIC MOVEMENT IS TO REMAIN IN EFFECT DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATIONS FOR THAT TRAFFIC MOVEMENT WILL NOT CHANGE DURING THE CLEARANCE INTERVAL.
 - THE RIGHT OF WAY MAY BE ASSIGNED TO ANY PHASE OR ANY COMBINATION OF NON-CONFLICTING PHASES.
 - IF CALLS EXIST ON ALL PHASES, THE ASSIGNMENT OF RIGHT OF WAY SHALL BE IN ACCORDANCE WITH THE PREFERENTIAL PHASE SEQUENCE.
 - IF THE ASSIGNED RIGHT-OF-WAY FOR ANY TRAFFIC MOVEMENT IS TO CHANGE DURING THE NEXT CALLED PHASE, THE SIGNAL INDICATION FOR THAT MOVEMENT WILL DISPLAY THE APPROPRIATE CLEARANCE INTERVALS.

SEQUENCE AND TIMING FOR FULLY ACTUATED CONTROL (COORDINATED)

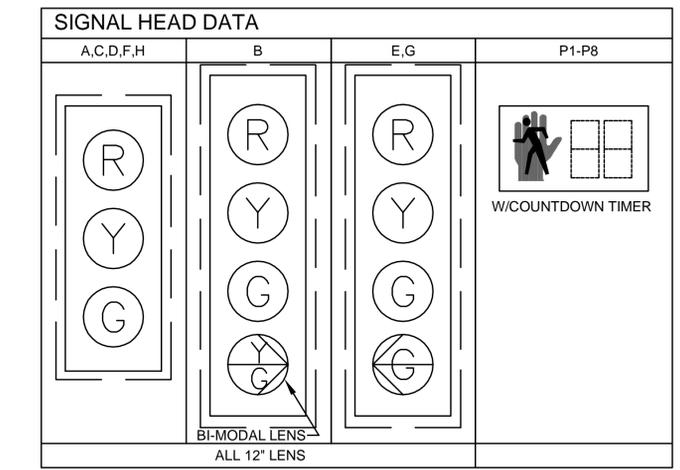
APPROACH	DIRECTION	HOUSING	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	FLASH
GREAT PLAIN AVENUE	EB	A	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R	R	R	FY
GREAT PLAIN AVENUE	EB	B	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
GREAT PLAIN AVENUE	WB	C,D	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FY
DEDHAM AVENUE	NB	E	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
DEDHAM AVENUE	NB	F	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
HIGHLAND AVENUE	SB	G	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
HIGHLAND AVENUE	SB	H	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	FR
PEDESTRIAN X-ING	ALL	P1-P8	DW	OUT																				

TIMING IN SECONDS																								
MINIMUM GREEN (INITIAL)			5			5				5														..
PASSAGE TIME (VEHICLE)			2			2				2														..
MAXIMUM 1 (NORMAL OPERATION)			25			20				20														..
MAXIMUM 2 (DURING TIMING PLAN 1/1/1)			40			25				25														..
MAXIMUM 3 (DURING TIMING PLAN 2/1/1)			40			25				25														..
YELLOW CLEARANCE				3.5			3				3.5													3
RED CLEARANCE					1.5			3.5				3												3.5
PEDESTRIAN WALK														7										
PEDESTRIAN CLEARANCE														20										

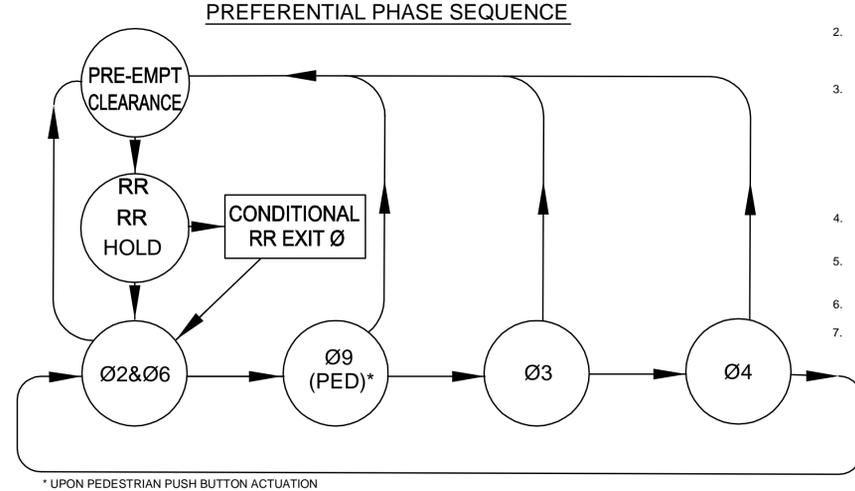
CONFLICT FLASH OPERATION ONLY

DETECTOR MEMORY		NON-LOCK		NON-LOCK		NON-LOCK		NON-LOCK		NON-LOCK		-		-		
RECALL		MIN		OFF		OFF		MIN		OFF		-		-		
COORDINATION DATA																
TIMING PLAN			CYCLE	OFFSET	Ø2	Ø3	Ø4	Ø6	Ø9							
1/1/1 M-F 7AM-9AM			120	0	37	18	35	37	30							
2/1/1 M-F 2PM-6PM			110	0	27	28	25	27	30							
3/1/1 M-F 11AM-2PM, SAT&SUN 10AM-2PM			100	0	25	20	25	25	30							
4/1/1 M-F 6AM-7AM, 9AM-11AM, 6PM-9PM, SAT&SUN 2PM-8PM			90	0	21	17	22	21	30							
5/1/1 M-F 9PM-11PM, SAT&SUN 8AM-10AM, 8PM-11PM			80	0	18	15	17	18	30							
MODE			COORD Ø			COORD Ø										

- NOTES:**
- AUTOMATIC FLASHING OPERATION PER 2009 M.U.T.C.D., AS AMENDED.
 - * UPON PEDESTRIAN PUSH BUTTON ACTUATION
 - OL = OVERLAP
 - PERM = PERMISSIVE
 - Y = YIELD CONTROL
 - STOP AND GO OPERATION FOR 24 HOURS PER DAY. FLASHING OPERATION FOR EMERGENCY ONLY.
 - DURING PEDESTRIAN INTERVAL, FDW THROUGH YELLOW OPERATION SHALL NOT BE IN EFFECT.
 - ** RAILROAD PRE-EMPTION HOLD TO BE DETERMINED BY THE RAILROAD AGENCY.
 - Ø2&Ø6 "CALL NOT ACTUATED" DURING COORDINATION.
 - OFFSET: END OF Ø2&Ø6 GREEN.
 - CYCLE FORCE OFF SHALL BE IN EFFECT.
 - SPLIT TIMES EQUAL GREEN PLUS CLEARANCES.
 - INHIBIT MAX TERMINATION SHALL BE IN EFFECT DURING COORDINATION.
 - YIELD MODE SHALL BE IN EFFECT.
 - TRAFFIC RESPONSIVE OPERATION TO BE PROGRAMMED IN THE SYSTEM MASTER. IT SHALL INITIALLY OPERATE IN STAND-BY MODE. SEE SPECIAL PROVISIONS FOR SPECIFIC REQUIREMENTS.



- NOTES:**
- THE GREEN DISPLAYS ON SIGNAL HEADS A AND B SHALL BE EQUIPPED WITH LOUVERS.
 - ALL SIGNAL HEADS SHALL BE RIGID MOUNTED.
 - ALL SIGNAL HEADS SHALL BE EQUIPPED WITH 5"± LOUVERED BACKPLATES. ALL BACKPLATES SHALL CONTAIN A 2" WIDE YELLOW REFLECTIVE BORDER.
 - ALL SIGNAL HEADS SHALL BE EQUIPPED WITH TUNNEL VISORS.
 - ALL SIGNAL DISPLAYS SHALL BE EQUIPPED WITH L.E.D. MODULES.



- * UPON PEDESTRIAN PUSH BUTTON ACTUATION
- RAILROAD OPERATION**
- UPON RAILROAD PRE-EMPTION, THE CONTROLLER SHALL TERMINATE ANY CONFLICTING VEHICULAR PHASE(S) WITH THE APPROPRIATE CHANGE INTERVALS AND IMMEDIATELY SERVE THE PRE-EMPTION.
 - RAILROAD PRE-EMPTION SHALL OVERRIDE EMERGENCY VEHICLE PRE-EMPTION AND COORDINATION.
 - RAIL PREEMPTION OPERATION SHALL BEGIN UPON RECEIPT OF A RAIL PREEMPTION CALL. THE PREEMPTION OPERATION SHALL START SIMULTANEOUSLY AT BOTH THIS LOCATION AND AT THE GREAT PLAIN AVENUE/ CHAPEL STREET/CHESTNUT STREET INTERSECTION.
 - FOLLOWING RAILROAD PRE-EMPTION, CONTROLLER SHALL RESUME NORMAL OPERATION STARTING WITH PHASE 2&6 OR UTILIZE A CONDITIONAL EXIT PHASE DEPENDING ON QUEUE LENGTHS ON GREAT PLAIN AVENUE EASTBOUND.
 - SEE SPECIAL PROVISIONS FOR OPERATION OF CONDITIONAL EXIT PHASE.

PRE-EMPTION PHASING & PRIORITY

DETECTOR & PRIORITY	PRE-EMPT PHASE ASSIGNMENT	MOVEMENT	VEHICLE PHASE ASSIGNMENT
D1	1	↔	Ø2
D2	2	↕	Ø6
D3	3	↑↑	Ø4
D4	4	↓↓	Ø3

- EMERGENCY VEHICLE PRE-EMPTION OPERATION**
- EMERGENCY VEHICLE PRE-EMPTION SIGNALS SHALL BE OPTICALLY TRANSMITTED BY OPTICAL EMITTERS MOUNTED IN EMERGENCY VEHICLES AND RECEIVED BY OPTICAL DETECTORS LOCATED AT EACH INTERSECTION.
 - PRE-EMPTION SIGNALS SHALL BE SERVICED ON A PRIORITY BASIS WITH DETECTORS D1, D2, D3 OR D4 ASSIGNED DESCENDING PRIORITIES AS FOLLOWS: (D1 HIGHEST AND D4 LOWEST)
 - IN RESPONSE TO A PRE-EMPTION SIGNAL RECEIVED AT AN INTERSECTION BY OPTICAL DETECTOR D1 (OR D2, D3, D4) THE CONTROLLER SHALL HOLD OR ADVANCE TO AND HOLD IN EMERGENCY VEHICLE PRE-EMPTION PHASE #1 (OR #2, #3, #4) GREEN FOR A MINIMUM OF TEN (10) SECONDS OR UNTIL PRE-EMPTION SIGNAL CEASES. THE CONTROLLER SHALL THEN TIME PRE-EMPTION PHASE CLEARANCES FOR THE ASSOCIATED PHASE(S) AS SHOWN IN THE SEQUENCE AND TIMING CHART AND SERVICE SUBSEQUENT EMERGENCY VEHICLE PRE-EMPTION PHASES AS NECESSARY.
 - MINIMUM GREEN AND NORMAL VEHICLE CLEARANCE SHALL BE PROVIDED ON PHASES THAT ARE TO BE TERMINATED BY PRE-EMPTION DEMAND.
 - PRE-EMPTION STROBE SHALL BE ILLUMINATED WHENEVER ANY EMERGENCY VEHICLE PRE-EMPTION GREEN IS ON.
 - EMERGENCY VEHICLE PRE-EMPTION SHALL OVERRIDE COORDINATION.
 - RAILROAD PRE-EMPTION SHALL OVERRIDE EMERGENCY VEHICLE PRE-EMPTION AND COORDINATION.

LIST OF MAJOR ITEMS REQUIRED
GREAT PLAIN AVENUE AT HIGHLAND AVENUE AND DEHAM AVENUE

PAY ITEM	QUANTITY	DESCRIPTION
	1	Ø TS 2 TYPE 1 CONTROLLER IN A TYPE 6 BASE MOUNTED CABINET INCLUDING FOUNDATION
	1	ORNAMENTAL TS 20' MAST ARM, W/LUMINAIRE, STEEL, INCL. FOUNDATION
	1	ORNAMENTAL TS 25' MAST ARM, W/LUMINAIRE, STEEL, INCL. FOUNDATION
	1	ORNAMENTAL TS 40' MAST ARM, W/LUMINAIRE, STEEL, INCL. FOUNDATION
	5	ORNAMENTAL TS POST 8' STANDARD INCL. FOUNDATION
	5	SIGNAL HEAD, 3-SECTION, 12" LENSES
	2	SIGNAL DISPLAY LOUVER
	2	SIGNAL HEAD, 4-SECTION, 12" LENSES
	1	SIGNAL HEAD, 4-SECTION BI-MODAL, 12" LENSES
	8	PEDESTRIAN SIGNAL HEAD (L.E.D.)
	4	PEDESTRIAN PUSH BUTTON W/R10-3e(L)
	4	PEDESTRIAN PUSH BUTTON W/R10-3e(R)
	6	TYPE C, 2-CHANNEL CARD RACK LOOP DETECTOR AMPLIFIER
	18	WIRE LOOP DETECTOR
	4	VIDEO MONITORING SYSTEM (4 CAMERAS, VDP & CABLES)
	4	EMERGENCY PRE-EMPTION OPTICAL DETECTORS & DETECTOR CABLE
	1	EMERGENCY PRE-EMPTION 4 CHANNEL PHASE SELECTOR
	1	EMERGENCY PRE-EMPTION SYSTEM CHASSIS
	1	EMERGENCY PRE-EMPTION STROBE (WHITE LENS)
	1	SERVICE CONNECTION (UNDERGROUND)
12.2.20c	13	PULL BOX-12"x12"

PLUS NECESSARY DUCT, CABLE, LABOR, MISCELLANEOUS MATERIAL AND EQUIPMENT TO COMPLETE THE INSTALLATION AND PROVIDE AN OPERATING TRAFFIC CONTROL SIGNAL.

LOOP DETECTOR DATA

DETECTOR NO.	NO. SECTION/ SIZE	NO. OF TURNS	OPERATIONS	DELAY /EXT	CALL PHASE	LOOP CONNECTION
15	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø2	SERIES
16	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø2	SERIES
17	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø6	SERIES
18	1-6'X6' 1-6'X30' QUADRUPOLE	2-4-2	PRESENCE	0	Ø6	SERIES
19	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	SERIES
20	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø4	SERIES
21	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø3	SERIES
22	2-6'X20' QUADRUPOLE	2-4-2	PRESENCE	0	Ø3	SERIES
23	1-6'X6'	3	PRESENCE	0	SYSTEM	SINGLE
24	1-6'X6'	3	PRESENCE	0	SYSTEM	SINGLE

NOTE: DELAY AND EXTENSION TIMINGS SHALL BE PROGRAMMED IN THE CONTROLLER ONLY

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REVISIONS				

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DESIGNED BY: AED
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PREPARED BY:

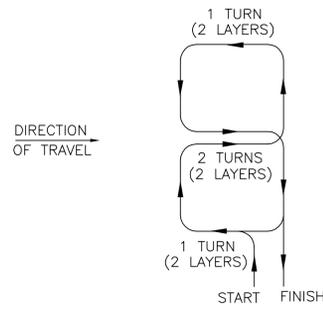
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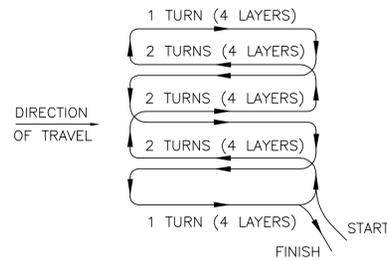
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PHASE-I IMPROVEMENTS
TRAFFIC SIGNAL PLANS
NEEDHAM, MASSACHUSETTS**

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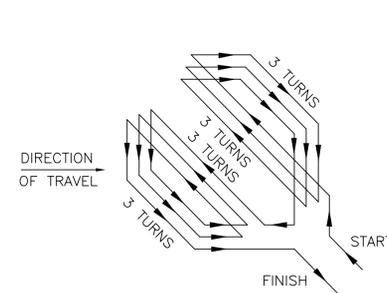
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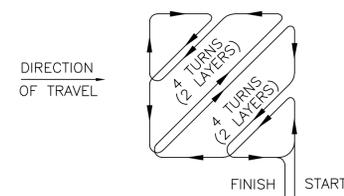
TYPE Q DETECTOR



TYPE D-Q DETECTOR

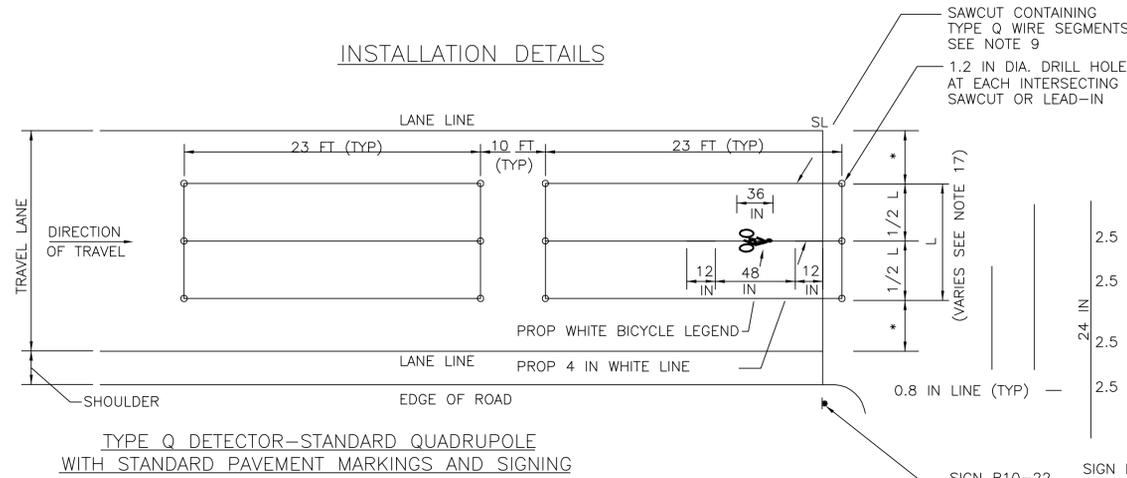


TYPE D-1 DETECTOR

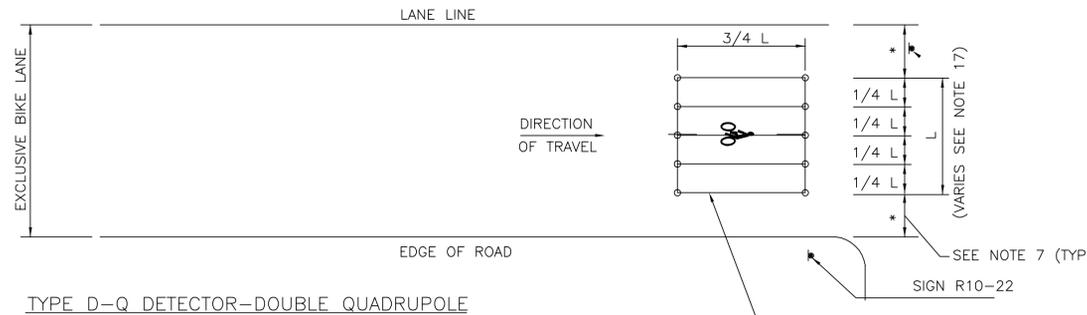


TYPE D-2 DETECTOR

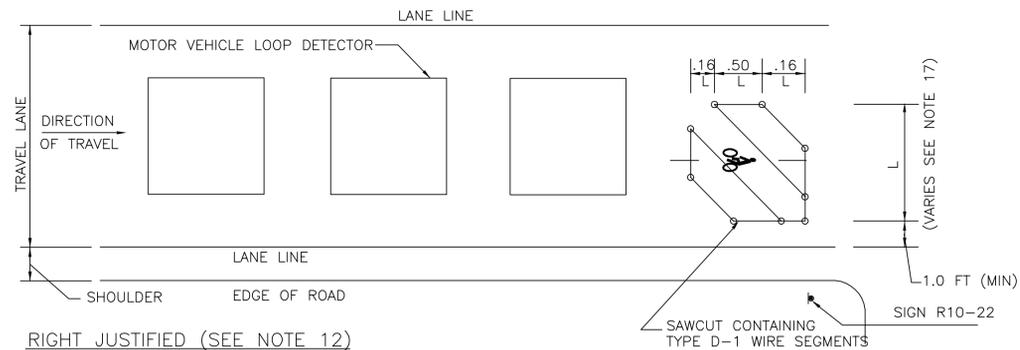
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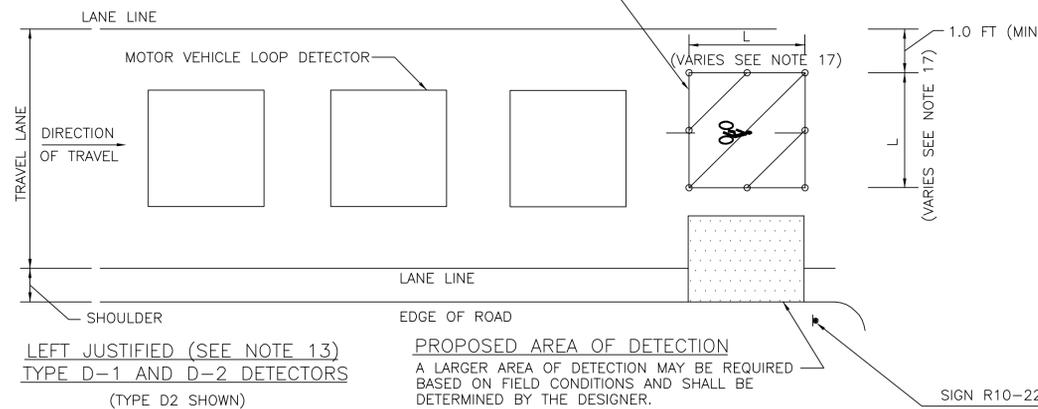
TYPE Q DETECTOR--STANDARD QUADRUPOLE WITH STANDARD PAVEMENT MARKINGS AND SIGNING



TYPE D-Q DETECTOR--DOUBLE QUADRUPOLE



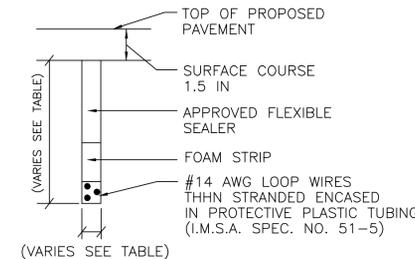
RIGHT JUSTIFIED (SEE NOTE 12) TYPE D-1 AND D-2 DETECTORS (TYPE D1 SHOWN)



LEFT JUSTIFIED (SEE NOTE 13) TYPE D-1 AND D-2 DETECTORS (TYPE D2 SHOWN)



SIGN BORDER: R=1.5, TH=0.5, INS=.38
WHITE BACKGROUND BLACK LEGEND AND LINES
NOTE: ALL SIGN DIMENSIONS IN INCHES
NOTE: SIGN PANEL NOT SHOWN TO SCALE



SECTION THRU LOOP DETECTOR

TURNS OF WIRE	SLOT SIZE	
	DEPTH (IN)	WIDTH (IN)
1	1.5	0.5
2	1.5	0.5
3	1.5	0.5
4	2.0	0.5
5	2.0	0.5
6	2.0	0.5
7	2.0	0.5
8	2.0	0.5

BICYCLE LOOP DETECTOR DETAILS

- NOTES:
- REFER TO VEHICLE LOOP DETECTOR DETAIL SHEET FOR ADDITIONAL NOTES AND CONSTRUCTION DETAILS.
 - ALL DETAILS ARE GRAPHICAL WITH NO SCALE.
 - THE NUMBER, SIZE, LOCATION AND LENGTH OF DETECTION AREA VARIES AND SHALL BE DETERMINED BY THE DESIGNER REFER TO TRAFFIC SIGNAL PLAN.
 - BICYCLE LOOPS SHALL BE CONNECTED TO SEPARATE LOOP DETECTOR AMPLIFIERS CAPABLE OF HIGHER LEVELS OF SENSITIVITY.
 - BICYCLE LOOPS SHALL BE INSTALLED IN THE BASE COURSE OF EXISTING PAVEMENT. THE EXISTING PAVEMENT SHALL BE COLD PLANNED TO THE BASE COURSE AND SAWCUT FOR LOOP INSTALLATION.
 - SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED FOR ALL BICYCLE DETECTORS TO INFORM CYCLISTS OF THE DETECTION AREA.
 - OFFSETS FROM LANE LINE EQUAL UNLESS OTHERWISE NOTED. SEE PLANS.
 - TYPE Q DETECTORS SHALL BE WIRED IN A FIGURE EIGHT PATTERN WITH A DOUBLE LAYER DESIGN ("2-4-2") WITH 2 TURNS IN THE PERIMETER SLOTS AND 4 TURNS IN THE CENTER SLOT AS SHOWN IN THE WINDING DETAIL.
 - BICYCLES WILL BE DETECTED WITHIN 4 IN. OF THE INTERIOR LONGITUDINAL LOOP WIRES FOR TYPE Q AND D-Q DETECTORS.
 - PROVIDE 3 TURNS FOR TYPE D-1 DETECTORS.
 - INSTALL 2 LAYERS OF WIRE WOUND IN THE SAME DIRECTION IN BOTH LAYERS FOR TYPE D-2 DETECTORS. THE RESULT IS 4 TURNS IN EACH DIAGONAL.
 - RIGHT JUSTIFIED LOOP DETECTORS SHALL BE CONSIDERED FOR THE FOLLOWING CONDITIONS:
 - BICYCLE STOPPING ON THE RIGHT SIDE OF A THRU TRAVEL LANE.
 - BICYCLE STOPPING ON THE RIGHT SIDE OF AN EXCLUSIVE LEFT TURN LANE.
 - LEFT JUSTIFIED LOOP DETECTORS SHALL BE CONSIDERED FOR THE FOLLOWING CONDITIONS:
 - BICYCLE STOPPING ON THE LEFT SIDE OF A SHARED LEFT/THRU LANE.
 - BICYCLE STOPPING JUST TO THE RIGHT OF THE CENTERLINE WHEN TURNING LEFT ON A TWO-LANE ROADWAY.
 - RECTANGULAR LOOP DETECTORS SHALL BE CONSIDERED FOR BICYCLES STOPPING ON EITHER THE LEFT OR RIGHT SIDE OF A TWO-LANE ROADWAY. THE MINIMUM OFFSET FROM LANE LINE OR CURB LINE SHALL BE 1.0 FT.
 - PAVEMENT CORES OR TEST PITS MAY BE REQUIRED TO DETERMINE THE DEPTH OF EXISTING PAVEMENT AND CONFIRM THAT THE DETECTION OPTION CHOSEN AND CORRESPONDING WINDING PATTERN CAN BE ACCOMMODATED.
 - THESE DETAILS APPLY TO BICYCLE LOOPS INSTALLED IN ROADWAYS. PUSH BUTTON ACTUATION SHALL BE CONSIDERED FOR RECREATIONAL BIKE PATHS.
 - THE MINIMUM DIMENSION FOR L SHALL BE 6 FT MIN. FOR DETECTORS TYPE D-Q, D-1 & D-2. FINAL DIMENSIONS SHALL BE DETERMINED BY THE DESIGN ENGINEER.

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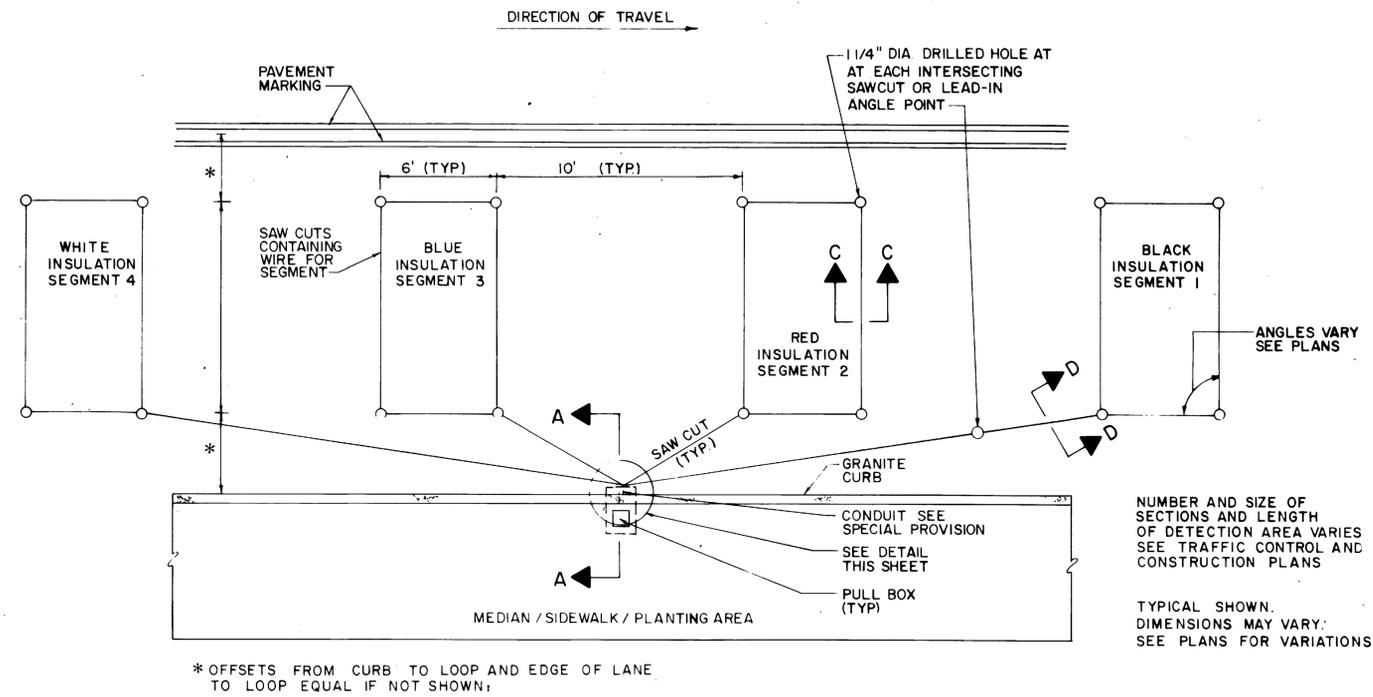


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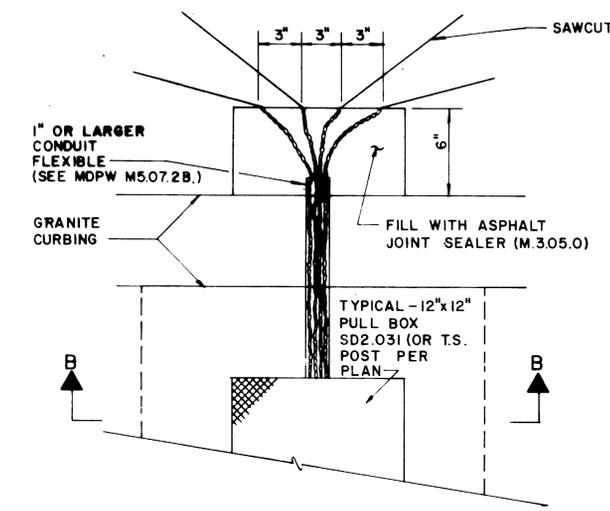
TOWN CENTER
PHASE-I IMPROVEMENTS
BICYCLE LOOP DETECTOR DETAILS
NEEDHAM, MASSACHUSETTS

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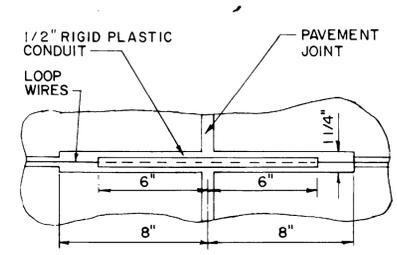


* OFFSETS FROM CURB TO LOOP AND EDGE OF LANE TO LOOP EQUAL IF NOT SHOWN.

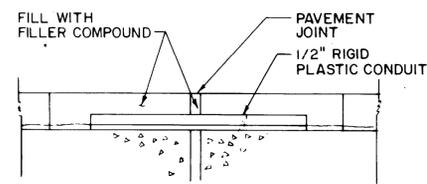
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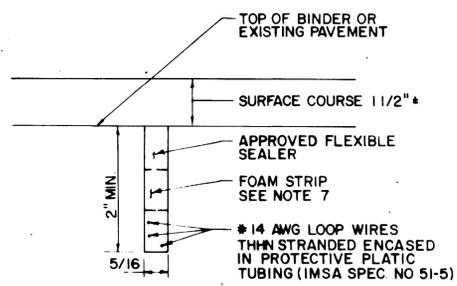
DETAIL - PLAN VIEW
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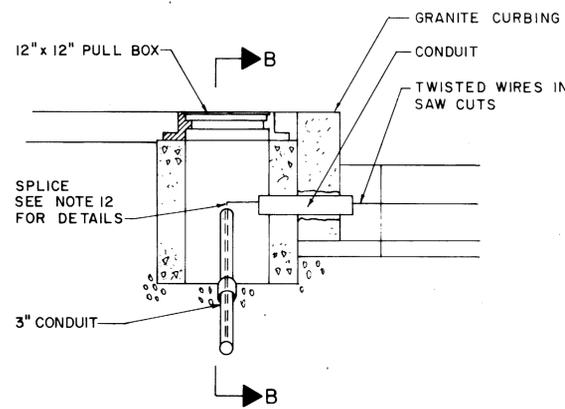
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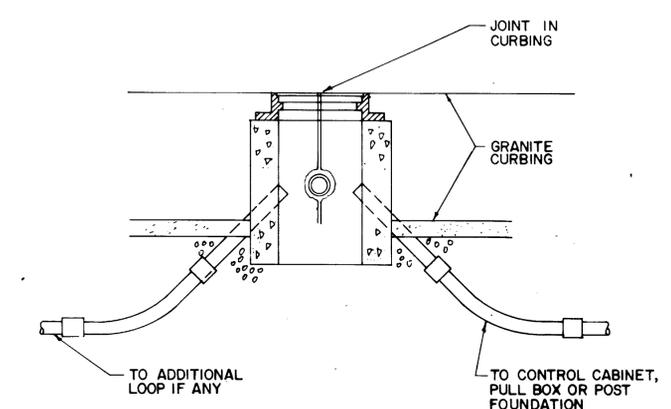
VERTICAL SECTION
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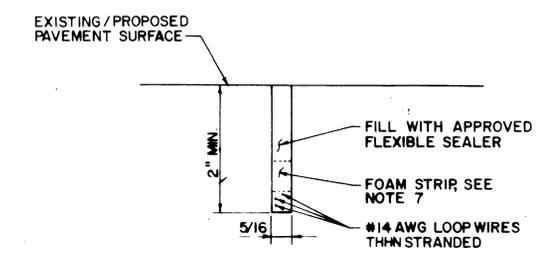
SECTION C-C & D-D
LOOPS IN BINDER COURSE OR EXISTING PAVEMENT TO BE RESURFACE
NOT TO SCALE



SECTION A-A
NOT TO SCALE



SECTION B-B
NOT TO SCALE



SECTION C-C & D-D
LOOPS IN SURFACE COURSE
NOT TO SCALE

DETECTOR NOTES

- 1 IN BASE OR HANDHOLE, SPLICE ALL SEGMENTS TO TYPE II-SHIELDED LOOP DETECTOR LEAD-IN CABLE. SEGMENTS SHALL BE SPLICED IN IN PARALLEL, IN SERIES, OR IN A COMBINATION OF PARALLEL & SERIES AS SHOWN ON THE PLAN SHEET FOR EACH DETECTOR. NUMBER OF TURNS OF WIRE SHALL ALSO BE AS SHOWN ON THE PLAN SHEET FOR EACH DETECTOR. SEE NOTE 12.
 - 2 SEE SPECIAL PROVISIONS FOR REQUIREMENTS OF DETECTOR AMPLIFIER.
 - 3 LEAD-IN WIRES SHALL BE TWISTED FROM SEGMENT TO SPLICE WITH SHIELDED CABLE. FIVE TURNS PER FOOT. LEAD-IN SHALL BE TYPE II (M8.16.11).
 - 4 BEFORE STARTING ANY SPLICING THE ELECTRICAL CONTRACTOR SHALL FURNISH DATA SHEETS ON THE MATERIALS AND/OR METHODS TO BE USED IN ACCORDANCE WITH THE DEPARTMENTS STANDARD OPERATING PROCEDURES FOR APPROVAL OF SHOP DRAWINGS. SEE SECTION 815.64, ESPECIALLY PARAGRAPH 1.
 - 5 THE METALLIC SHIELD WHICH SHALL ENCASE THE DETECTOR LEADS FROM A SPLICE (TYPICALLY LOCATED IN A PULL BOX NEAR THE ROADWAY COMPONENT OF THE DETECTOR) TO THE CONTROLLER, AND THE DRAIN WIRE UNDER THE METALLIC SHIELD, SHALL BE FIRMLY BONDED TO THE EARTH GROUNDING BUS IN THE CONTROLLER. HOWEVER, THE SHIELD AND DRAIN WIRE SHALL BE CAREFULLY INSULATED FROM THE TRANSFORMER NEUTRAL OR FROM EARTH GROUND AT ALL OTHER POINTS ALONG ITS LENGTH. SPECIFICALLY, THIS INCLUDES CAREFUL INSULATION OF THE EXPOSED PORTION OF THE SHIELD AND THE DRAIN WIRE AT THE END AWAY FROM THE CONTROLLER WHERE IT IS SPLICED TO WIRES LEADING TO THE ROADWAY COMPONENT OF THE DETECTOR. THIS IS IMPORTANT TO AVOID A GROUND RETURN LOOP.
 - 6 FILL ALL CONDUIT OPENINGS WITH DUCT SEAL.
 - 7 AFTER SAW CUTS ARE COMPLETE, BLOW OUT OIL AND WATER WITH FREE COMPRESSED AIR UNTIL CUTS ARE CLEAN AND DRY. INSERT WIRE INTO CLEAN SLOT WITH A BLUNT, SMOOTH, ROUND EGED TOOL OF WOOD OR PLASTIC SUCH AS A PAINT STIRRER, DO NOT USE A SCREWDRIVER. THEN INSERT FOAM PLASTIC HOLD DOWN STRIPS, SIMILAR TO ETHA FOAM SB. STRIPS SHALL BE ABOUT 2" LONG, PLACED IN THE SLOT ABOUT EVERY 2 FEET. THEN POUR SEALER, TAKING CARE TO ELIMINATE BUBBLES.
 - 8 THE COMBINED ROADWAY LOOP, TWISTED LEAD-IN WIRES, SPLICE AND SHIELDED LEAD-IN CABLE SHALL HAVE A RESISTANCE TO GROUND OF AT LEAST 100 MEGOHMS. SEE SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
 - 9 FOR INSTALLATION OF SINGLE (ONE SEGMENT) SMALL WIRE LOOP DETECTOR. DETAIL IS THE SAME.
 - 10 CUT LOOPS IN BINDER AND FILL WITH APPROVED FLEXIBLE SEALER.
 - 11 DETECTOR WIRE SHALL BE A DIFFERENT COLOR FOR EACH SEGMENT OF A DETECTOR GROUP. SEE DETAIL.
 - 12 SPLICING PATTERN P= SERIES/PARALLEL: SPLICE SEGMENTS 1 AND 3 OF AN INDIVIDUAL DETECTOR IN SERIES. SPLICE SEGMENTS 2 AND 4 IN SERIES. SPLICE THE RESULTANT TWO GROUPS IN PARALLEL. SPLICE THE RESULTANT COMBINATION TO ONE LEAD-IN CABLE. CONNECT THIS CABLE TO AN OTHERWISE UNUSED AMPLIFIER CHANNEL.
- SPLICING PATTERN S=SERIES: SPLICE ALL SEGMENTS (TYPICALLY FOUR, BUT MAY BE LESS) OF AN INDIVIDUAL DETECTOR IN SERIES. SPLICE THE RESULTANT COMBINATION TO ONE LEAD-IN CABLE TO AN OTHERWISE UNUSED AMPLIFIER CHANNEL.

THIS PLAN NOT DESIGNED BY VANASSE HANGEN BRUSTLIN, INC. IT WAS PROVIDED BY THE MASSACHUSETTS HIGHWAY DEPARTMENT AND ALL INFORMATION CONTAINED HEREIN IS ASSUMED TO BE CORRECT.

0:\5100s\5126 - Needham - Downtown Streetscape Phase 1\Drawing Files\Plan Set\LOOPDET.dwg

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS	DESCRIPTION

DRAWN BY: AED
DESIGNED BY: AED
CHECKED BY: PTN

PE STAMP: [Blank]

PREPARED BY: [Logo: vhb]

SCALE: [Blank]

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**TOWN CENTER
PHASE-I IMPROVEMENTS
LOOP DETECTOR DETAILS
NEEDHAM, MASSACHUSETTS**

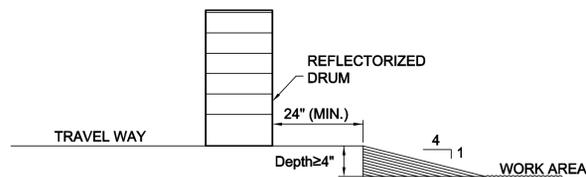
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PLOT DATE: 2/11/2016 4:40 PM
ISSUE DATE: 12/10/2015
SHEET No. 23 OF 42
File: LOOPDET.dwg

NOTES:

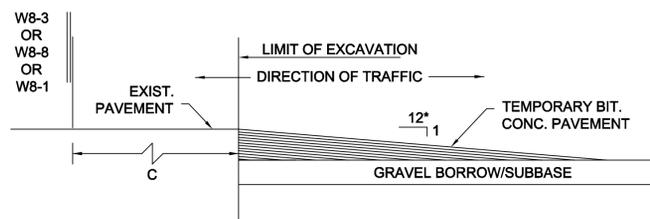
- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
- ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
- CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT, AND SIMILAR OPERATIONS.
- THE FIRST FIVE PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH TYPE A LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET (3.3m) UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.

LEGEND:

- REFLECTORIZED PLASTIC DRUM OR 36" CONE
- DIRECTION OF TRAFFIC
- WORK ZONE
- WORK VEHICLE
- P/F POLICE/FLAGGER DETAIL
- IMPACT ATTENUATOR
- TRUCK MOUNTED ATTENUATOR
- TYPE III BARRICADE
- MEDIAN BARRIER
- TRAFFIC OR PEDESTRIAN SIGNAL
- CHANGEABLE MESSAGE SIGN
- MEDIAN BARRIER WITH WARNING LIGHTS
- ARROW BOARD
- SIGN



LATERAL DROP-OFF DETAIL
NOT TO SCALE



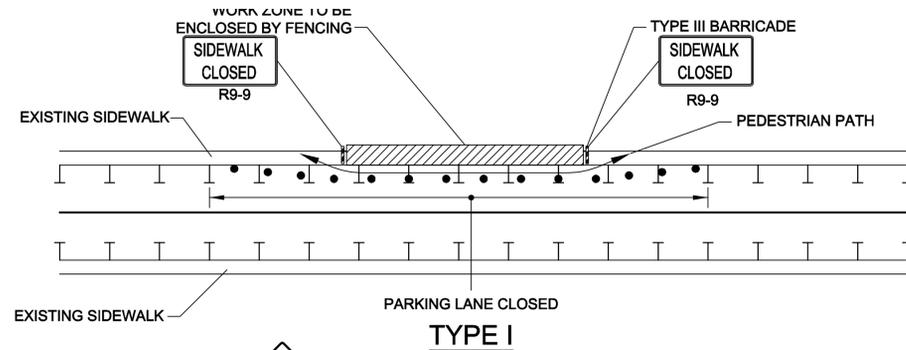
LONGITUDINAL DROP-OFF DETAIL
NOT TO SCALE

* - INCREASE SLOPE RATIO FOR HIGHER SPEEDS

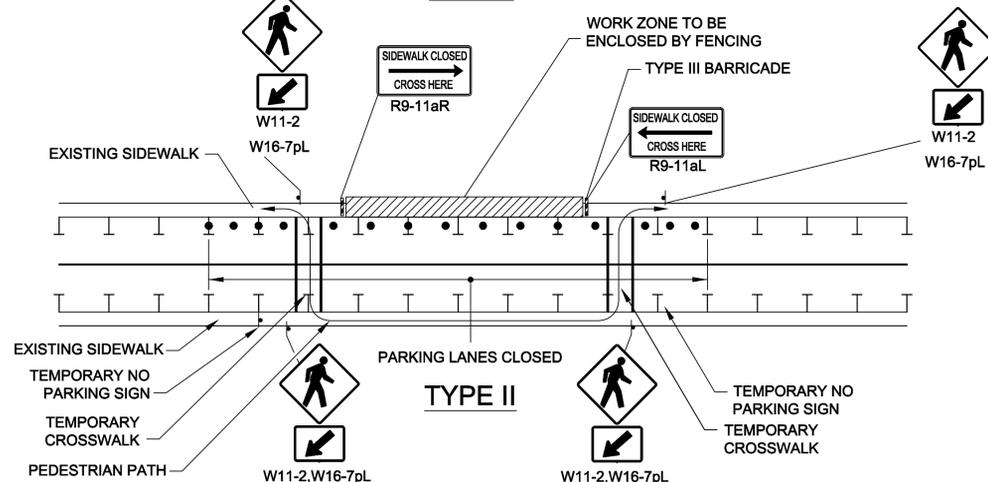
TAPER LENGTH

SPEED LIMIT	FORMULA
40 MPH or Less	$L = WS^2/60$
45 MPH or Greater	$L = W \times S$

L = TAPER LENGTH IN FEET
W = WIDTH OF OFFSET IN FEET
S = POSTED SPEED IN MPH



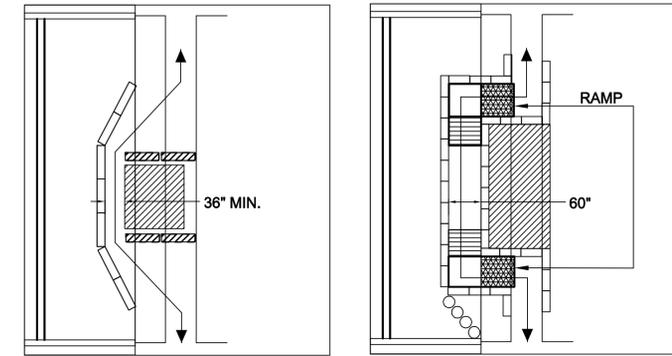
TYPE I



TYPE II

NOTES

- ADDITIONAL ADVANCE WARNING MAY BE NECESSARY.
- CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN. VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE.
- STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.
- IF THE WORK ZONE DOES NOT PERMIT PEDESTRIANS TO TRAVEL ADJACENT TO IT AS SHOWN IN PEDESTRIAN BYPASS TYPE I, TEMPORARY CROSSWALKS WITH APPROPRIATE SIGNS SHOULD BE INSTALLED TO CROSS PEDESTRIANS TO THE OPPOSITE SIDE OF THE STREET AS SHOWN IN PEDESTRIAN BYPASS TYPE II, AND AS DIRECTED BY THE ENGINEER. TEMPORARY CURB RAMPS WILL BE REQUIRED AT ALL TEMPORARY CROSSWALK LOCATIONS.
- BYPASS IS TO BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DIRECTED BY THE ENGINEER.
- THE TEMPORARY SIDEWALK SHOULD BE A MINIMUM OF 4 FEET WIDE. IF THIS WALKWAY EXCEEDS 200 FEET THEN A 5 FOOT X 5 FOOT PASSING ZONE.



- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, temporary facilities shall be provided and they shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
- A pedestrian channelizing device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
- When used, temporary ramps shall comply with Americans with Disabilities Act (see Figures Ped-1 & Ped-2).
- The alternate pathway should have a smooth continuous hard surface for the entire length of the temporary pedestrian facility.
- The protective requirements of a TTC situation have priority in determining the need for temporary traffic barriers and their use in this situation should be based on engineering judgment.
- Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.

AUDIBLE DEVICES

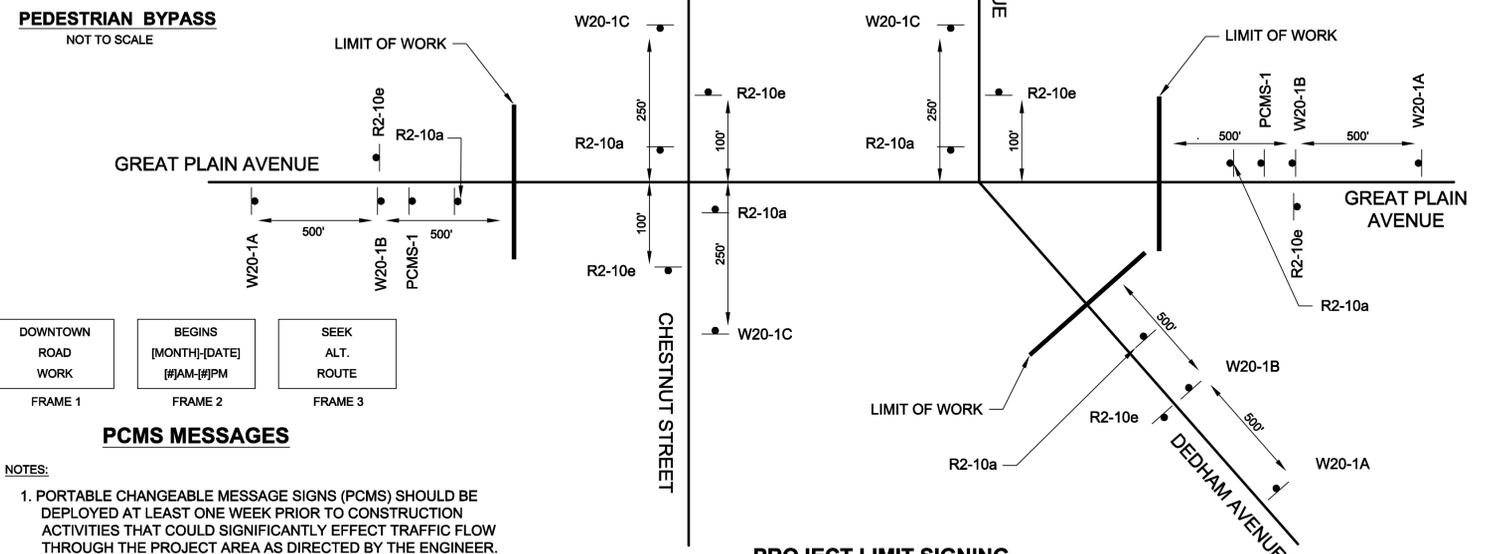
For long term sidewalk closures (at a minimum overnight) a form of speech messaging for pedestrians with visual disabilities shall be provided. Audible information devices such as detectable barriers or barricades and other passive pedestrian activation (motion activated) devices should be considered for these cases. These audible devices can be mountable or stand alone.

PEDESTRIAN DETAILS

NOT TO SCALE

PEDESTRIAN BYPASS

NOT TO SCALE

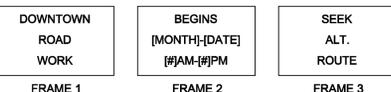


PROJECT LIMIT SIGNING

NOT TO SCALE

NOTES:

- PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHOULD BE DEPLOYED AT LEAST ONE WEEK PRIOR TO CONSTRUCTION ACTIVITIES THAT COULD SIGNIFICANTLY EFFECT TRAFFIC FLOW THROUGH THE PROJECT AREA AS DIRECTED BY THE ENGINEER.



PCMS MESSAGES

C:\100a\5126 - Needham - Downtown Streetscape Phase 1\Drawing Files\Plan Set\5126 TTCP.dwg

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DESIGNED BY: MWW	
CHECKED BY: DJ	

PREPARED BY:

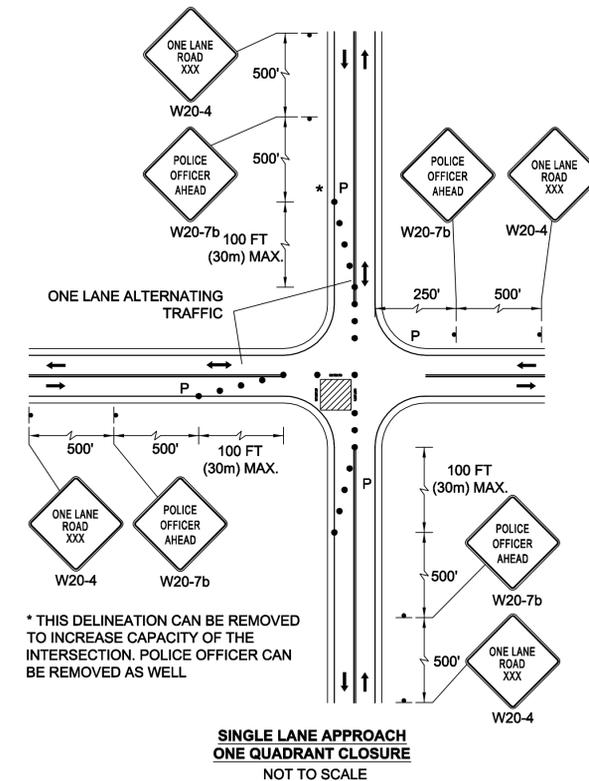
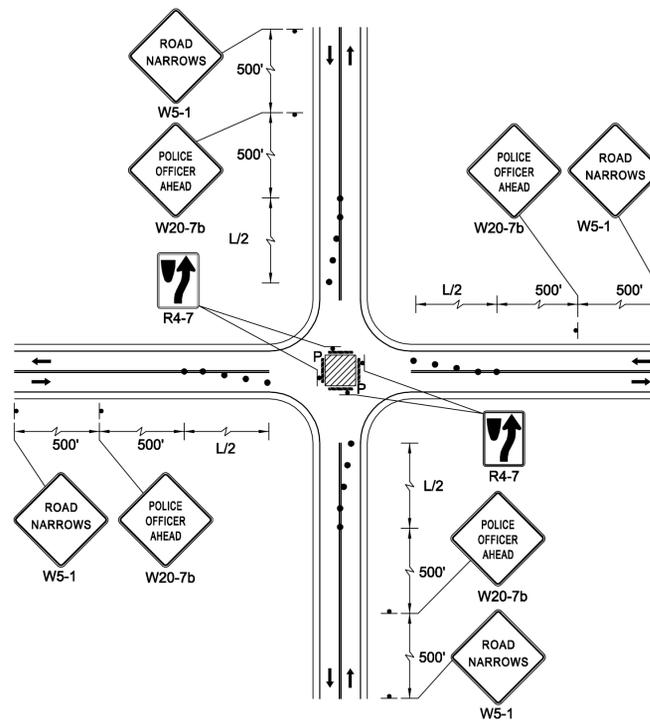
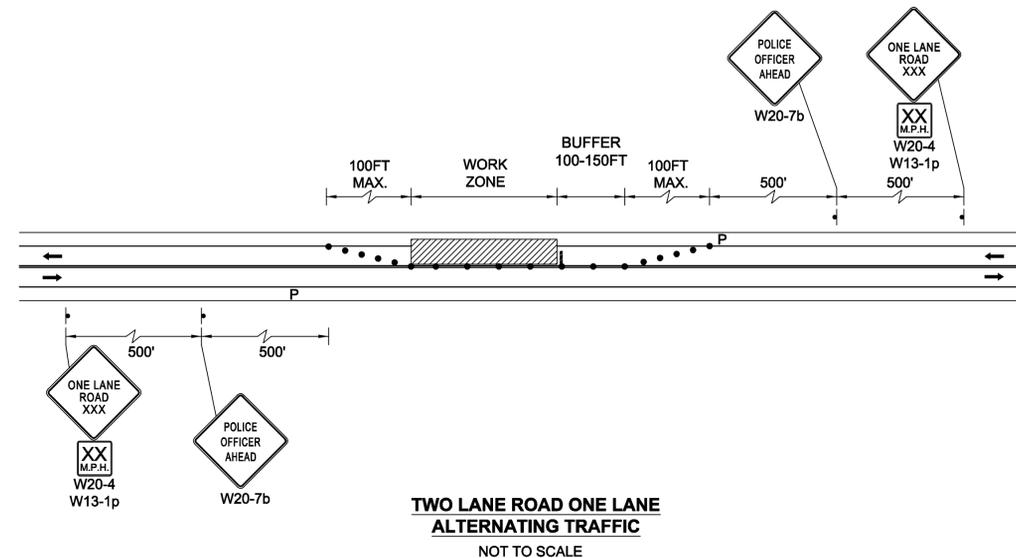
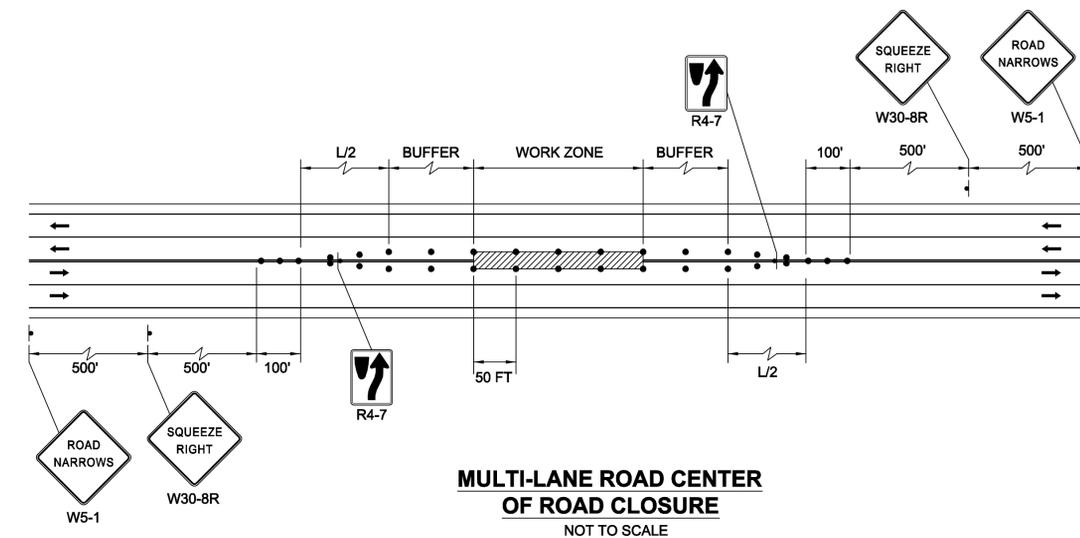
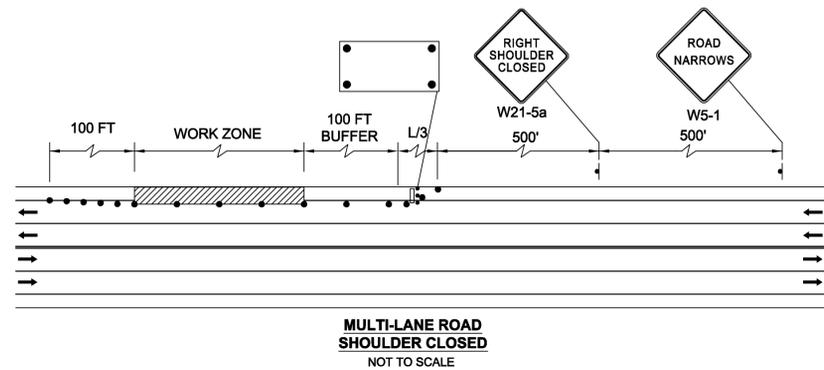
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SCALE: NOT TO SCALE

**TOWN CENTER
PHASE-I IMPROVEMENTS
TEMPORARY TRAFFIC CONTROL PLAN
NEEDHAM, MASSACHUSETTS**

BETA JOB No. 5126
PLOT DATE: 2/11/2016 4:40 PM
ISSUE DATE: 12/10/2015
SHEET No. 24 OF 42
File: 5126 TTCP.dwg

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WORK ZONE
SPEEDING FINES DOUBLED

R2-10a
48" X 36"
NOTE:
"WORK ZONE"
BLACK ON ORANGE;
"SPEEDING FINES DOUBLED"
BLACK ON WHITE



END ROAD WORK
DOUBLE FINES END

R2-10e
36" X 48"
NOTE:
"END ROAD WORK"
BLACK ON ORANGE;
"DOUBLE FINES END"
BLACK ON WHITE



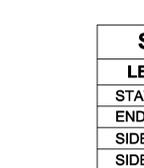
RIGHT SHOULDER CLOSED



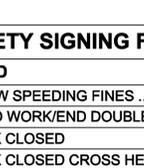
POLICE OFFICER AHEAD



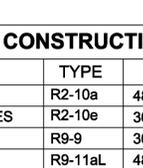
ROAD WORK 1000 FT.



ROAD WORK 500 FT.



ROAD WORK AHEAD



SIDEWALK CLOSED
CROSS HERE

R9-11aL
48" X 24"

SIDEWALK CLOSED
CROSS HERE

R9-11aR
48" X 24"

SIDEWALK CLOSED

R9-9
30" X 18"



SAFETY SIGNING FOR CONSTRUCTION OPERATIONS			
LEGEND	TYPE	SIZE	NO. SIGNS *
STATE LAW SPEEDING FINES	R2-10a	48" x 36"	6
END ROAD WORK/END DOUBLE FINES	R2-10e	36" x 48"	6
SIDEWALK CLOSED	R9-9	30" x 18"	4
SIDEWALK CLOSED CROSS HERE	R9-11aL	48" x 24"	2
SIDEWALK CLOSED CROSS HERE	R9-11aR	48" x 24"	2
ROAD NARROWS	W5-1	36" x 36"	4
BUMP	W8-1	36" x 36"	4
PAVEMENT ENDS	W8-3	36" x 36"	4
ROUGH ROAD	W8-8	36" x 36"	4
GRAPHICS	W11-2	36" x 36"	4
ADVISORY SPEED	W13-1	24" x 24"	4
GRAPHICS	W16-7P	24" x 12"	4
ROAD WORK 1000 FT	W20-1A	36" x 36"	3
ROAD WORK 500 FT	W20-1B	36" x 36"	3
ROAD WORK AHEAD	W20-1C	36" x 36"	3
ONE LANE ROAD AHEAD	W20-4	36" x 36"	4
POLICE OFFICER AHEAD	W20-7b	36" x 36"	8
RIGHT SHOULDER CLOSED	W21-5aR	36" x 36"	2

* NO. OF SIGNS ARE ESTIMATED FOR BIDDING PURPOSES ONLY

CONSTRUCTION SIGNING
NOT TO SCALE

NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION
REVISIONS				

DRAWN BY:
JMC

DESIGNED BY:
MWW

CHECKED BY:
DJ

PE STAMP:

PREPARED BY:

BETA

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SCALE:

NOT TO SCALE

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TOWN CENTER
PHASE-I IMPROVEMENTS
TEMPORARY TRAFFIC CONTROL PLAN
NEEDHAM, MASSACHUSETTS

BETA JOB No. 5126

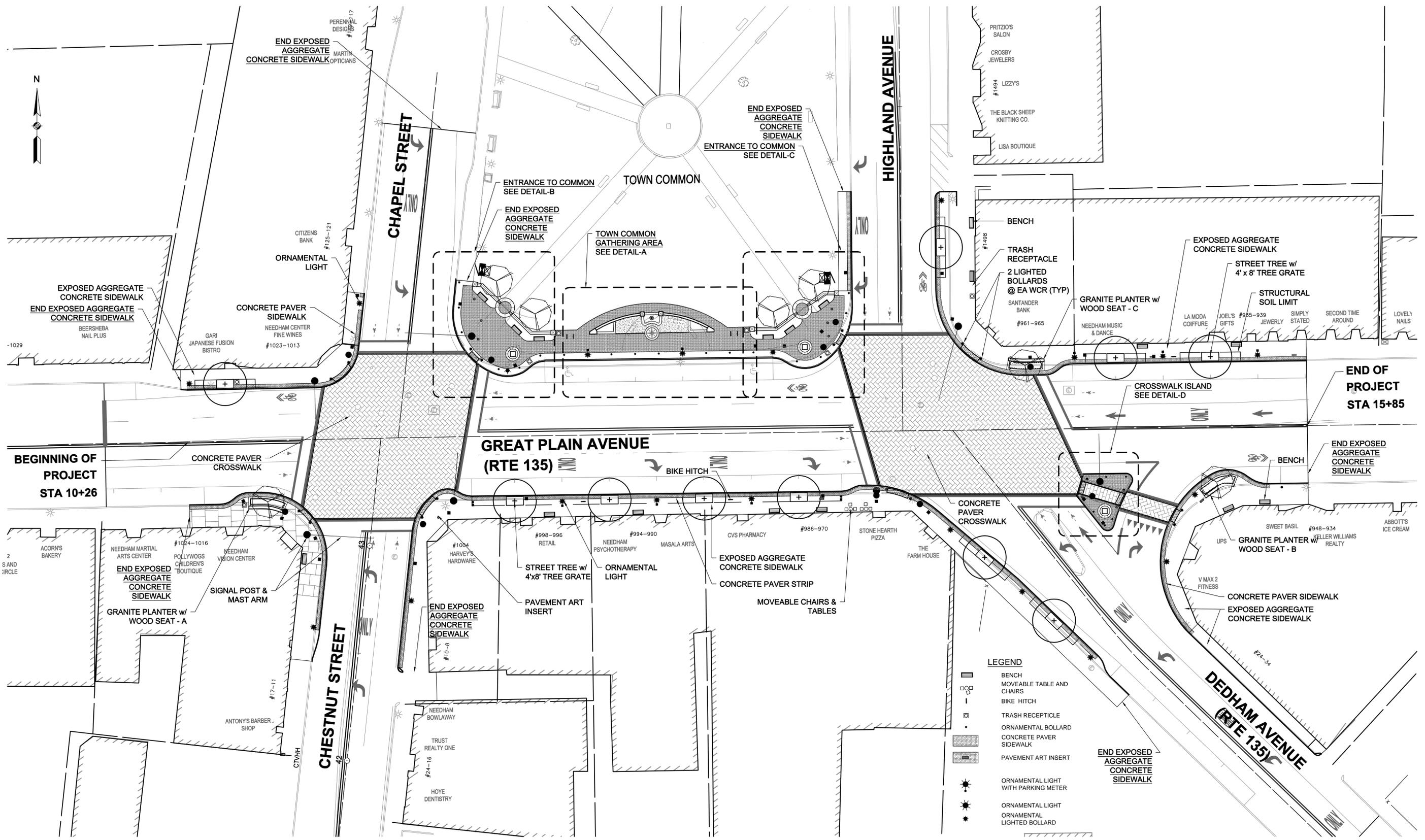
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ISSUE DATE: 12/10/2015

SHEET No. 25 OF 42

File: 5126 TTCP.dwg

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- LEGEND**
- BENCH
 - MOVEABLE TABLE AND CHAIRS
 - BIKE HITCH
 - TRASH RECEPTACLE
 - ORNAMENTAL BOLLARD
 - CONCRETE PAVER SIDEWALK
 - PAVEMENT ART INSERT
 - ORNAMENTAL LIGHT WITH PARKING METER
 - ORNAMENTAL LIGHT
 - ORNAMENTAL LIGHTED BOLLARD

NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION

DRAWN BY: SR
 DESIGNED BY: KC / SR
 CHECKED BY: KC

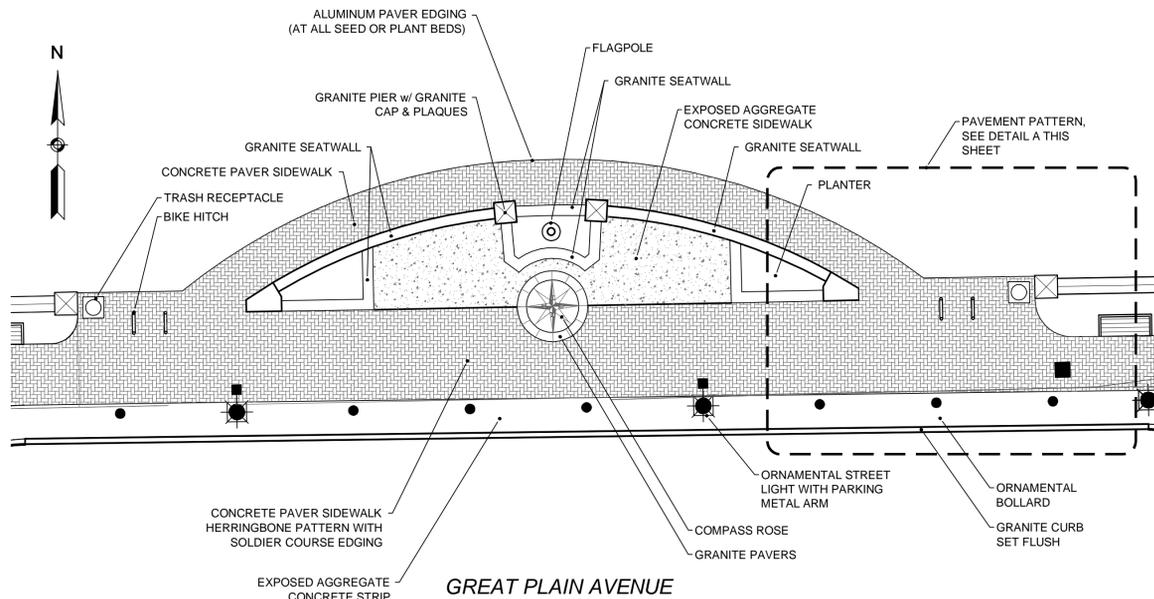
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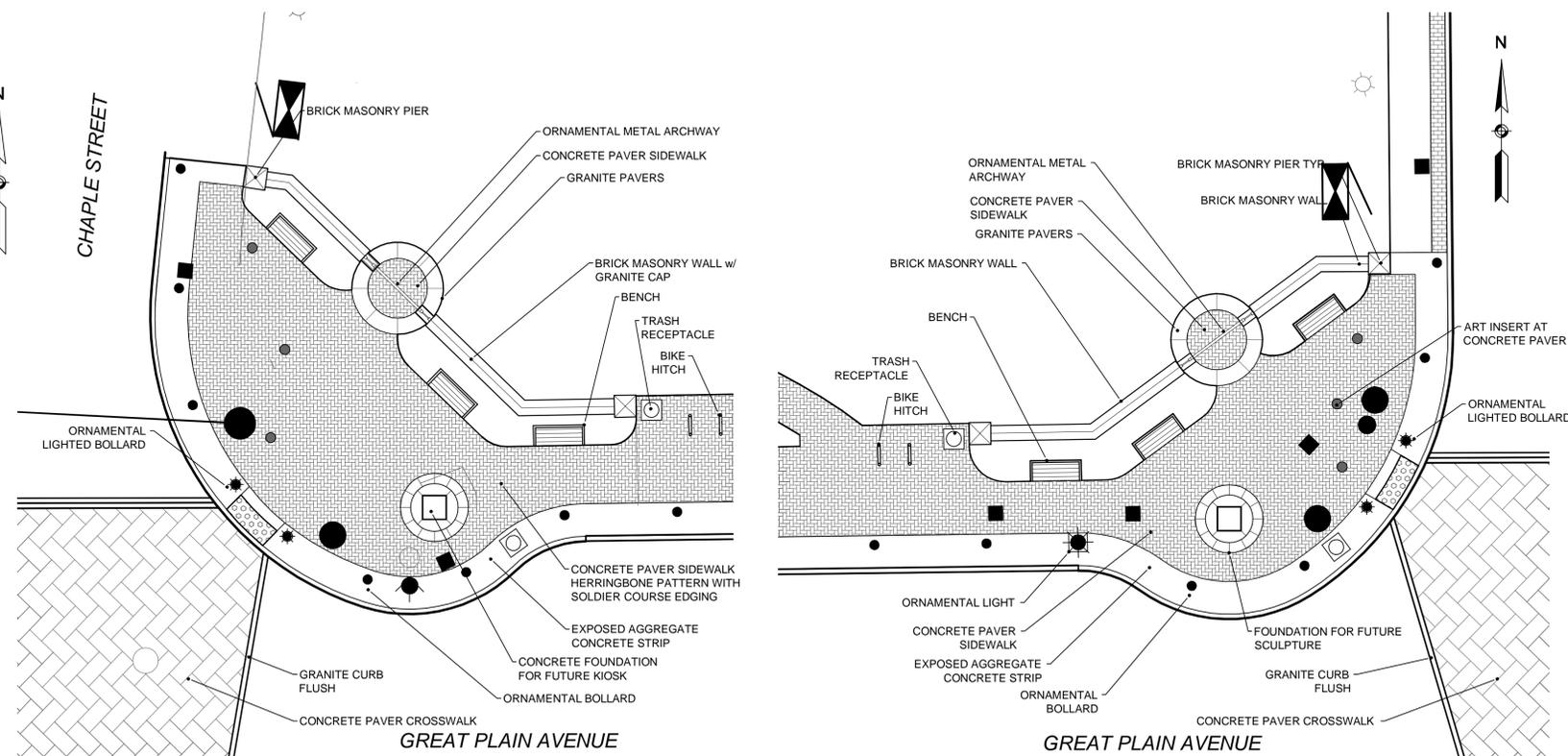
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**TOWN CENTER
 PHASE-I IMPROVEMENTS
 STREETScape PLANS NO. 1
 NEEDHAM, MASSACHUSETTS**

BETA JOB No. 5126
 PLOT DATE: 2/11/2016 4:41 PM
 ISSUE DATE: 12/10/2015
 SHEET No. 26 OF 42
 File: 5126 STREETScape.dwg

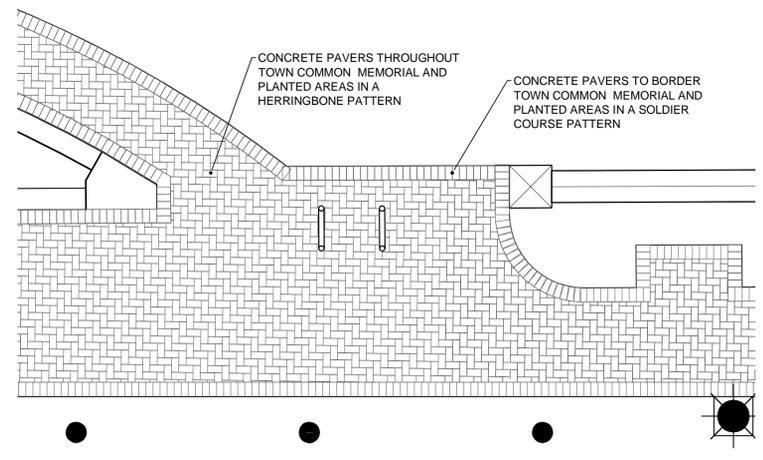


TOWN COMMON GRANITE SEATWALL - DETAIL A
Scale: 1/8" = 1'-0"

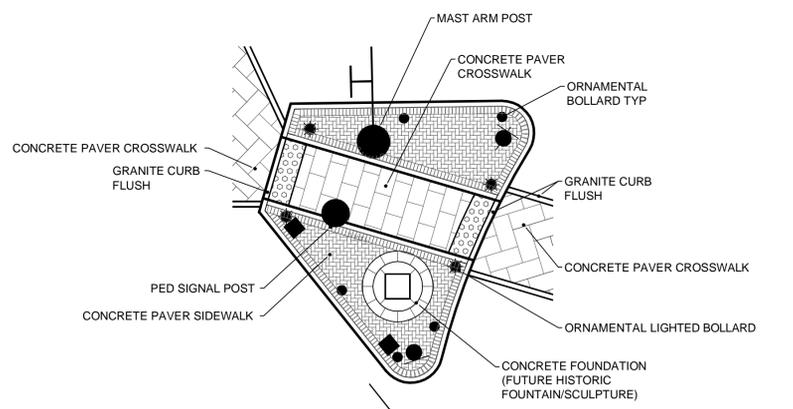


TOWN COMMON ENTRANCE - DETAIL B
Scale: 1/8" = 1'-0"

TOWN COMMON ENTRANCE - DETAIL C
Scale: 1/8" = 1'-0"



TOWN COMMON GATHERING SPACE - DETAIL A
Scale: 1/8" = 1'-0"



CROSSWALK ISLAND - DETAIL D
Scale: 1/8" = 1'-0"

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NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS	DESCRIPTION

DRAWN BY:	SR
DESIGNED BY:	KC / SR
CHECKED BY:	KC

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PREPARED BY:



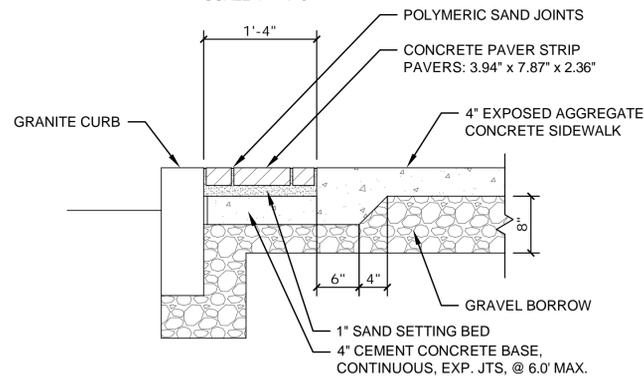
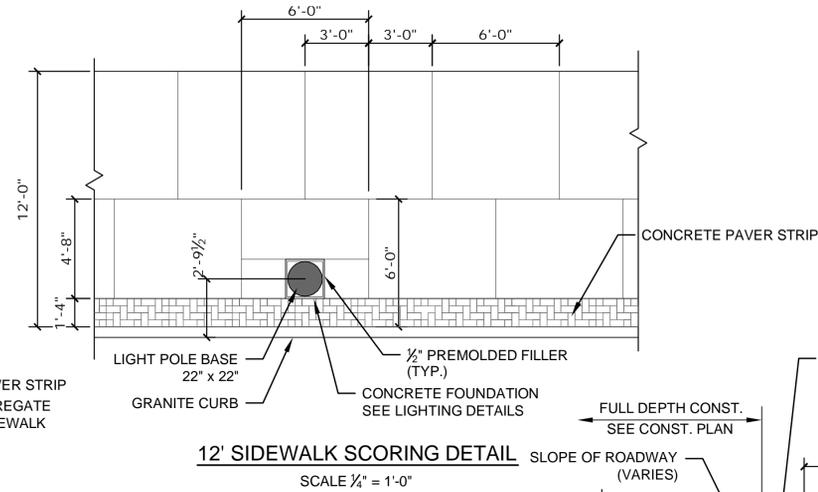
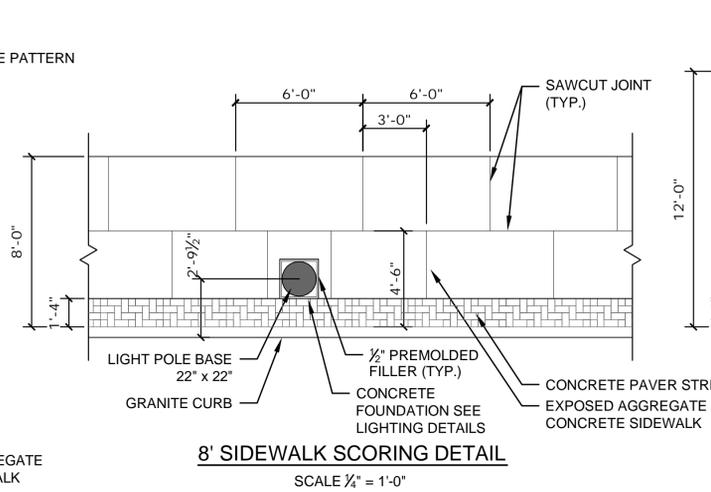
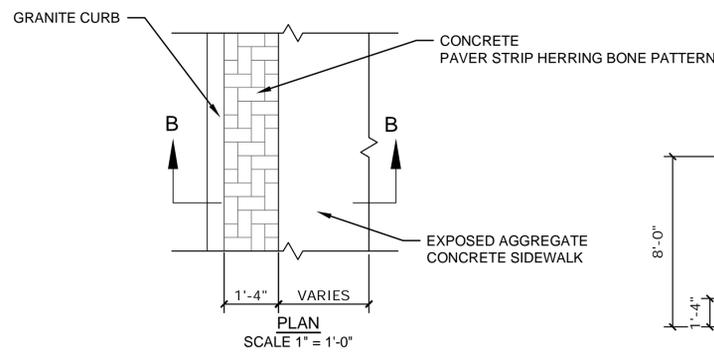
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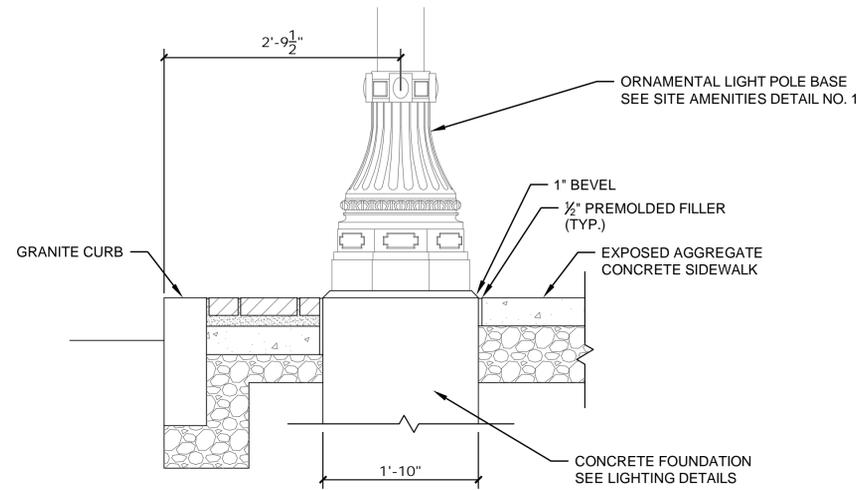
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**TOWN CENTER
PHASE-I IMPROVEMENTS
STREETScape PLANS NO. 2
NEEDHAM, MASSACHUSETTS**

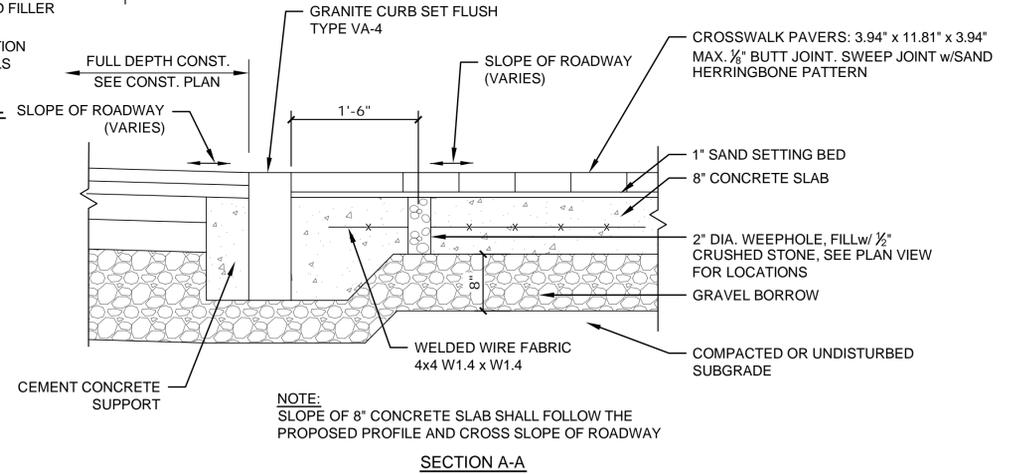
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ISSUE DATE:	12/10/2015
SHEET No.	27 OF 42
File:	5126 STREETScape.dwg



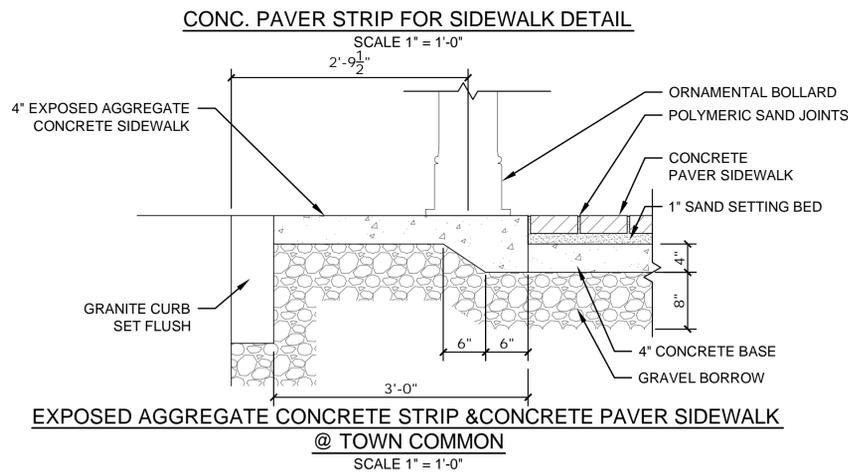
NOTE:
FIELD CUT PAVERS AS NECESSARY TO PROVIDE
SMOOTH CURVES AT CURB RADII.



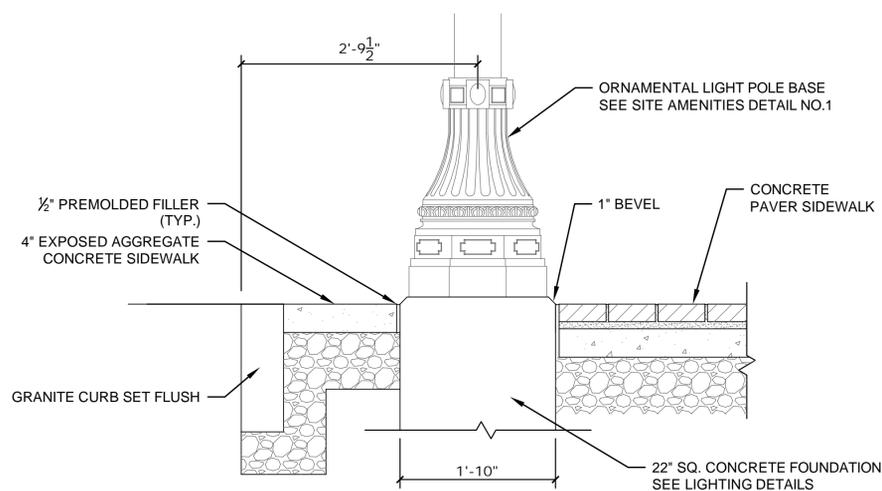
LIGHT POLE BEHIND PAVER STRIP
SCALE 1" = 1'-0"



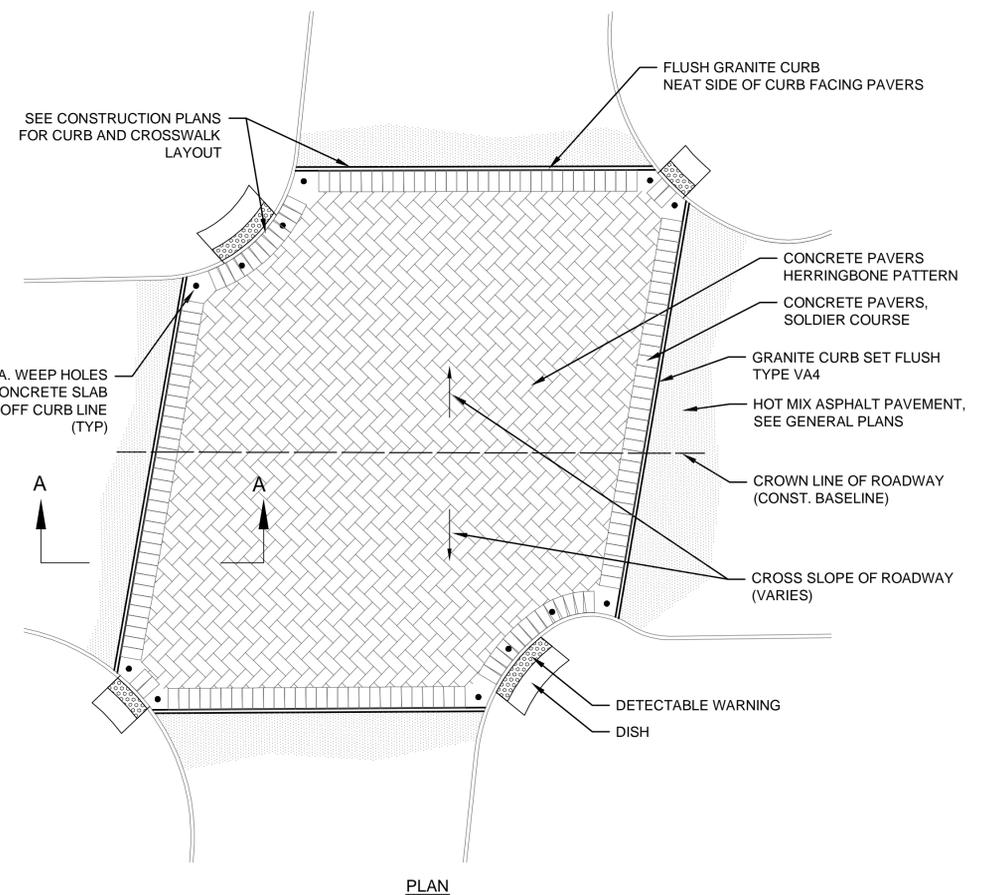
NOTE:
SLOPE OF 8" CONCRETE SLAB SHALL FOLLOW THE
PROPOSED PROFILE AND CROSS SLOPE OF ROADWAY



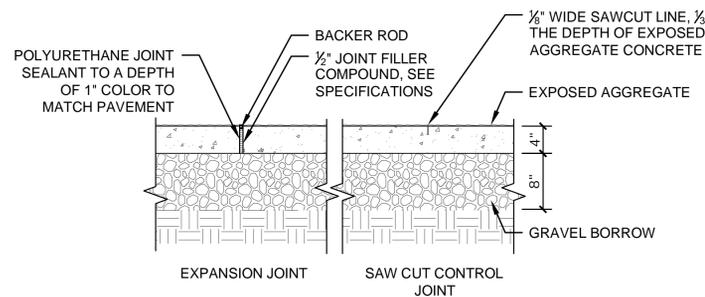
EXPOSED AGGREGATE CONCRETE STRIP & CONCRETE PAVER SIDEWALK
@ TOWN COMMON
SCALE 1" = 1'-0"



LIGHT POLE @
TOWN COMMON
SCALE 1" = 1'-0"



CONCRETE PAVER CROSSWALK
NOT TO SCALE



EXPOSED AGGREGATE CONCRETE SIDEWALK DETAIL
SCALE 1" = 1'-0"

C:\5100a\5126 - Needham - Downtown Streetscape Phase 1\Drawing Files\Plan Set\5126 PAVING DETAILS.dwg

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DESIGNED BY: KC / SR
CHECKED BY: KC

PE STAMP:
N50for
Review Only

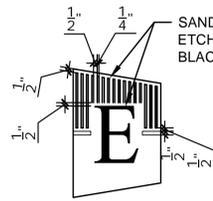
PREPARED BY:
BETA
www.BETA-Inc.com

SCALE:
AS SHOWN

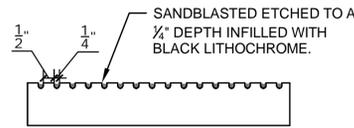
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**TOWN CENTER
PHASE-I IMPROVEMENTS
PAVING DETAILS NO. 1
NEEDHAM, MASSACHUSETTS**

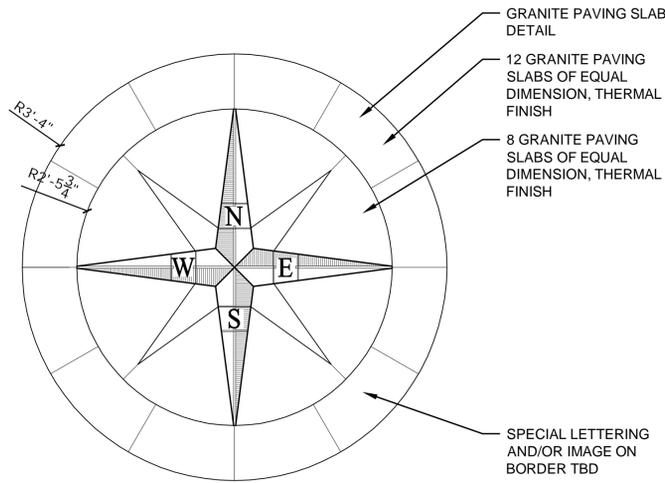
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PLOT DATE: 2/11/2016 4:42 PM
ISSUE DATE: 12/10/2015
SHEET No. **28 OF 42**
File: 5126 PAVING DETAILS.dwg



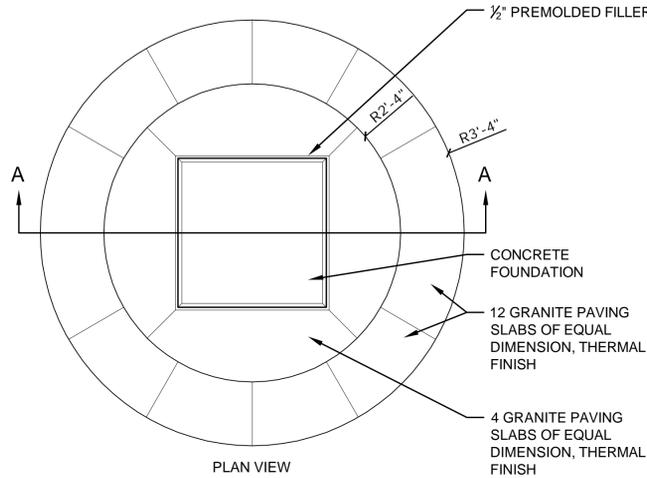
**COMPASS ROSE DETAIL:
SANDBLASTED FINISH PLAN**
SCALE: 1" = 1'-0"



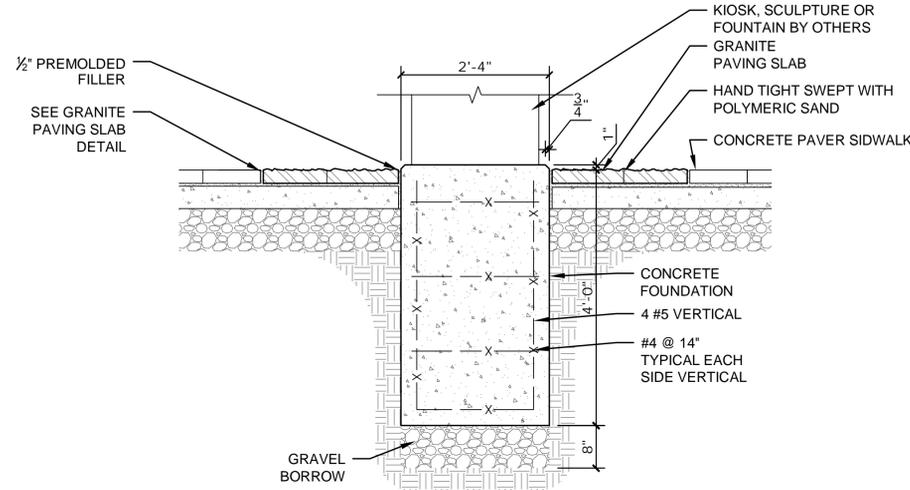
**COMPASS ROSE DETAIL:
SANDBLASTED FINISH SECTION**
SCALE: 1" = 3'-0"



COMPASS ROSE PLAN
SCALE: 3/4" = 1'-0"



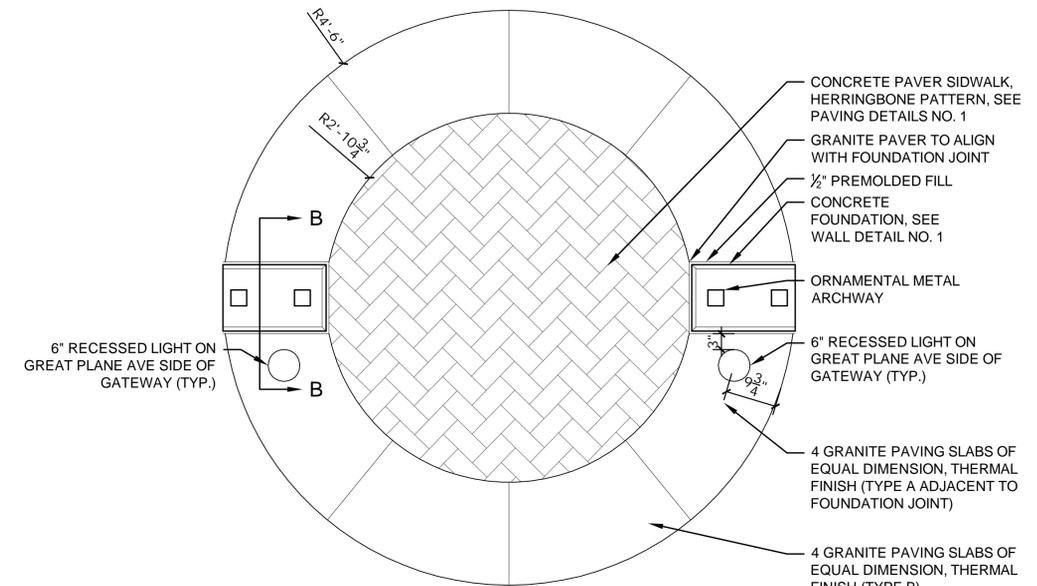
PLAN VIEW



SECTION

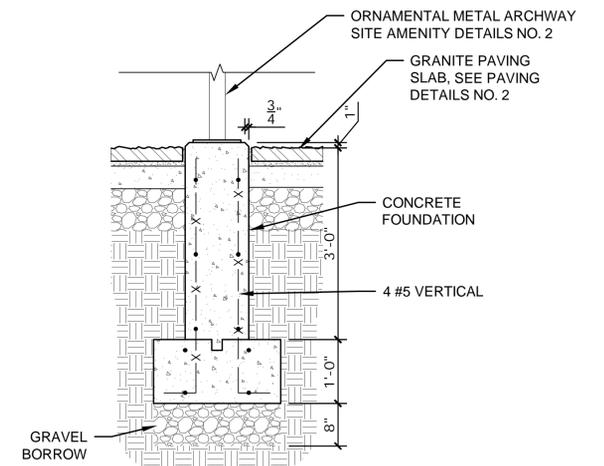
**CONCRETE FOUNDATION FOR FUTURE KIOSK,
SCULPTURE, AND FOUNTAIN**

SCALE: 3/4" = 1'-0"



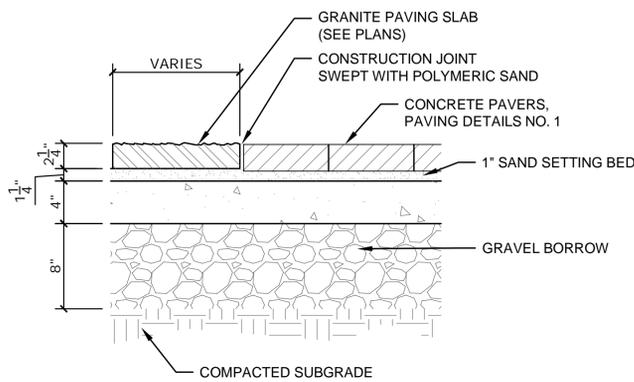
GATEWAY FOUNDATION PLAN

SCALE: 3/4" = 1'-0"



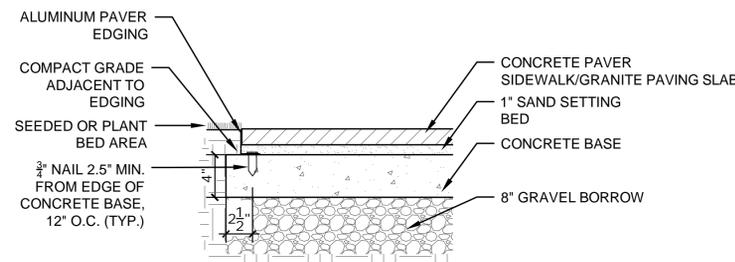
GATEWAY FOUNDATION DETAIL

SCALE: 3/4" = 1'-0"



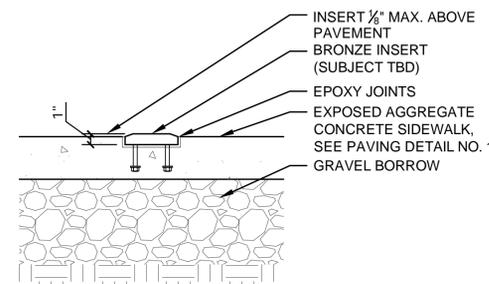
GRANITE PAVING SLAB DETAIL

SCALE: 1-1/2" = 1'-0"



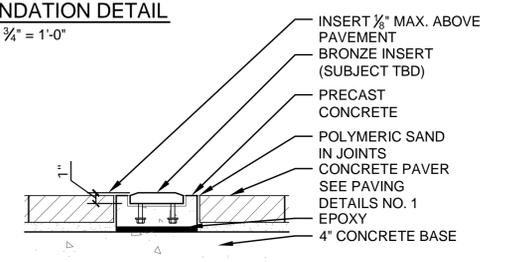
**ALUMINUM PAVER EDGING AT
SEEDD AND PLANT BED AREAS**

SCALE: 1-1/2" = 1'-0"



**ART INSERT IN EXPOSED
AGGREGATE PAVEMENT**

SCALE: 1-1/2" = 1'-0"



**ART INSERT IN CONCRETE
PAVERS**

SCALE: 1-1/2" = 1'-0"

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NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION

DRAWN BY:	DC
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CHECKED BY:	KC

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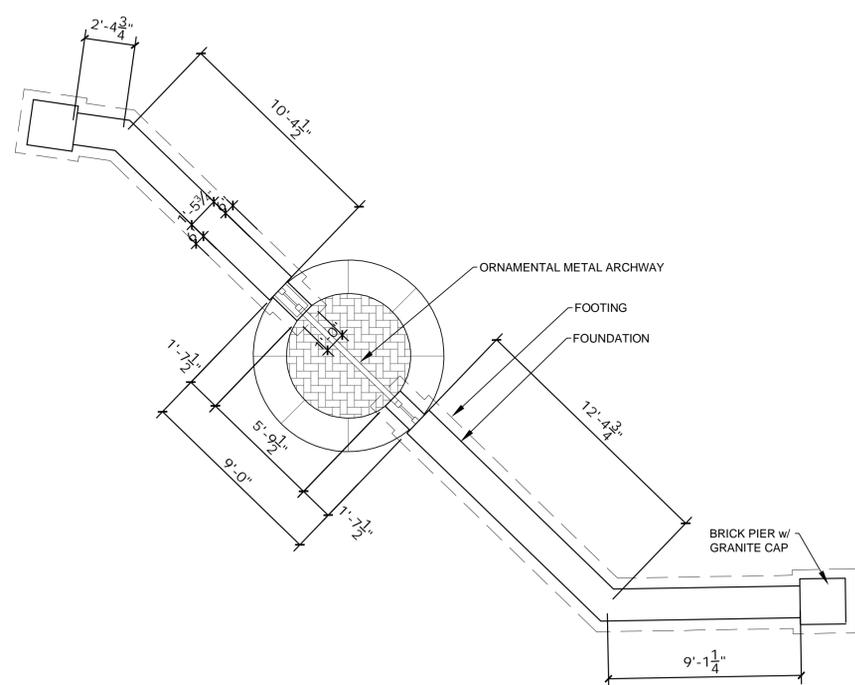
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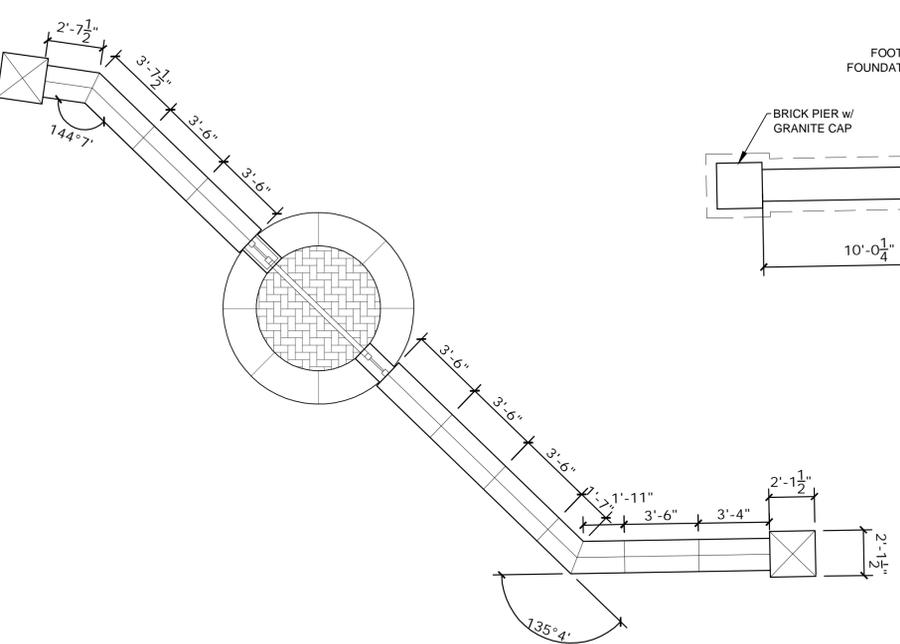
**TOWN CENTER
PHASE-I IMPROVEMENTS
PAVING DETAILS NO. 2
NEEDHAM, MASSACHUSETTS**

BETA JOB No. 5126
PLOT DATE: 2/11/2016 4:42 PM
ISSUE DATE: 12/10/2015
SHEET No. **29 OF 42**
File: 5126 PAVING DETAILS.dwg

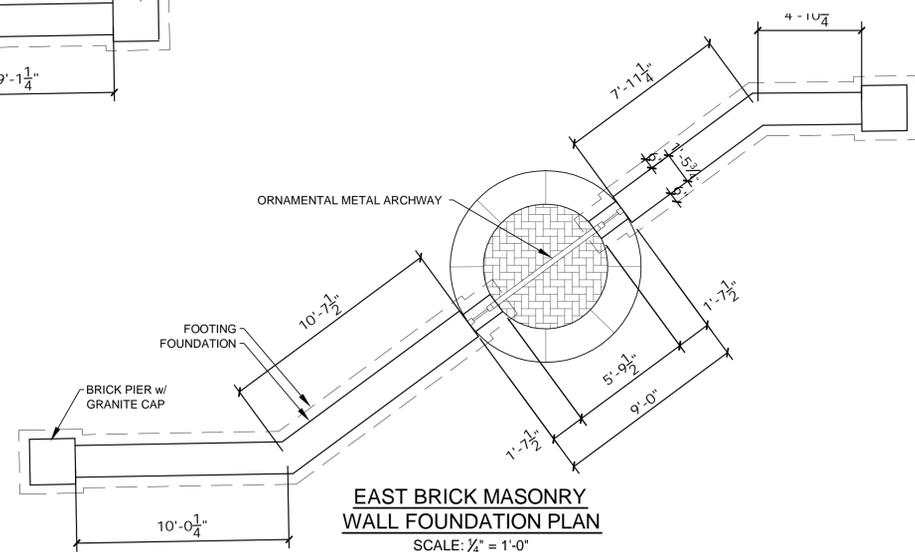
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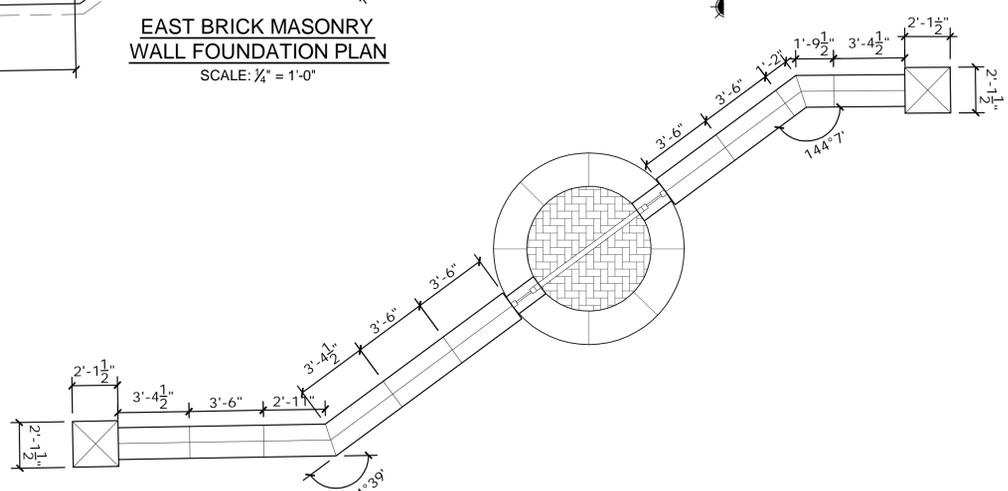
WEST BRICK MASONRY WALL FOUNDATION PLAN
SCALE: 1/4" = 1'-0"



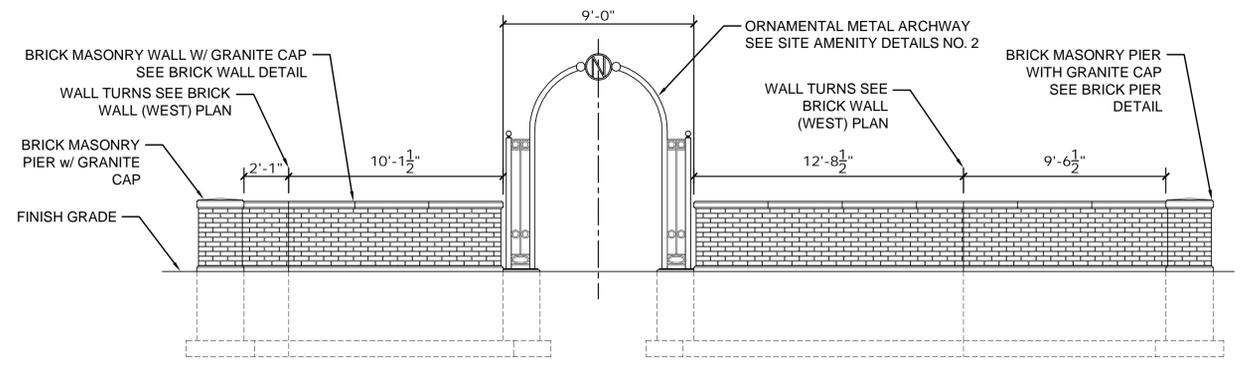
WEST BRICK MASONRY WALL GRANITE CAPSTONE PLAN
SCALE: 1/4" = 1'-0"



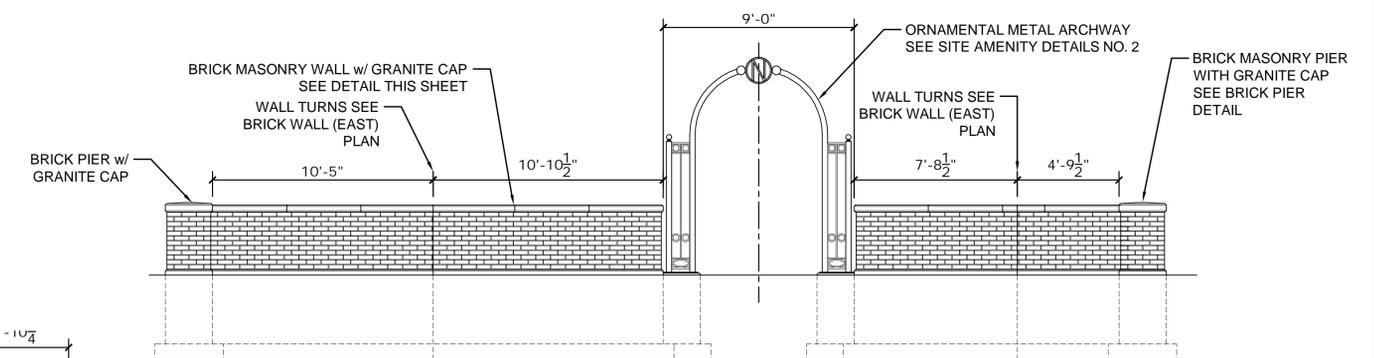
EAST BRICK MASONRY WALL FOUNDATION PLAN
SCALE: 1/4" = 1'-0"



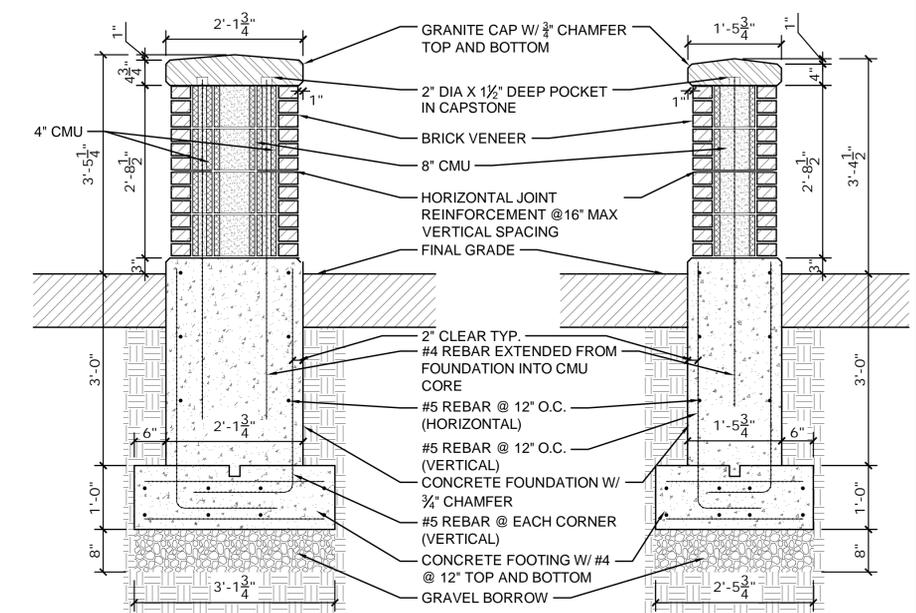
EAST BRICK MASONRY WALL GRANITE CAPSTONE PLAN
SCALE: 1/4" = 1'-0"



**ELEVATION FROM GREAT PLAIN AVENUE
ELEVATION AT WEST BRICK WALL**
SCALE: 1/4" = 1'-0"



**ELEVATION FROM GREAT PLAIN AVENUE
ELEVATION AT EAST BRICK WALL**
SCALE: 1/4" = 1'-0"



BRICK MASONRY PIER DETAIL
SCALE: 3/4" = 1'-0"

BRICK MASONRY WALL DETAIL
SCALE: 3/4" = 1'-0"

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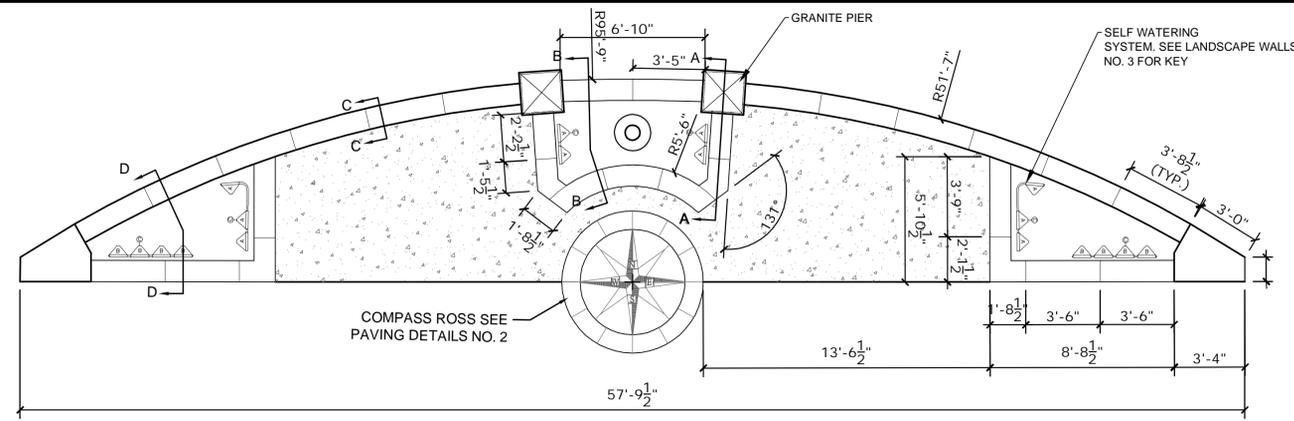
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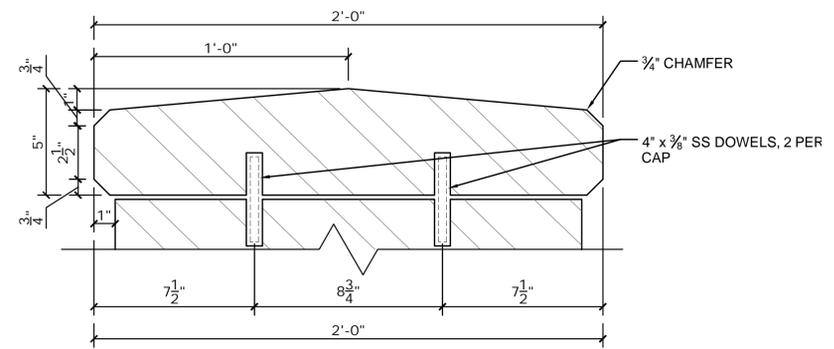
**TOWN CENTER
PHASE-I IMPROVEMENTS
LANDSCAPE WALLS NO. 1
NEEDHAM, MASSACHUSETTS**

BETA JOB No.	5126
PLOT DATE:	2/11/2016 4:43 PM
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GRANITE SEAT WALL DETAIL C @ TOWN COMMON

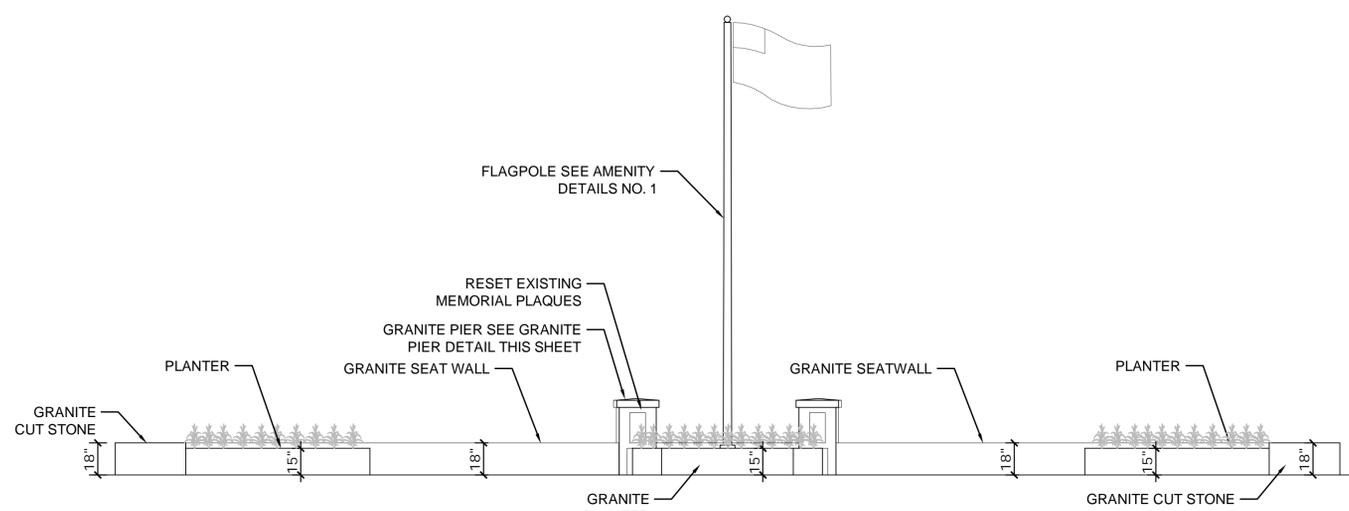
SCALE: 1/4" = 1'-0"



GRANITE PIER CAP

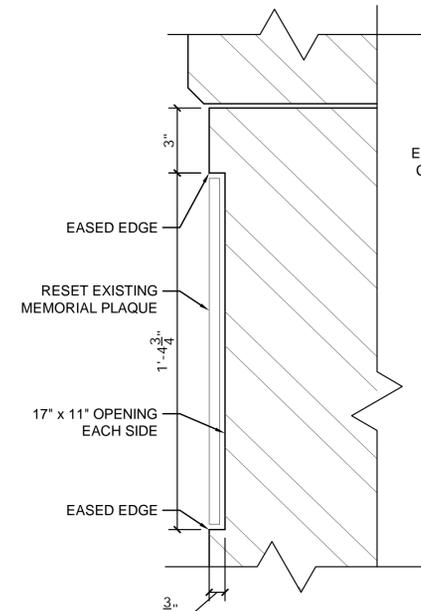
SCALE: 3" = 1'-0"

- NOTE:**
1. ALL GRANITE TO HAVE A THERMAL FINISH ON ALL EXPOSED SIDES AND A SAWCUT FINISH ON ALL UNEXPOSED SIDES
 2. TOWN TO DETERMINE LOCATION OF MEMORIAL PLAQUES ON GRANITE PIER RECESSES
 3. SEE PAVING DETAILS SHEETS



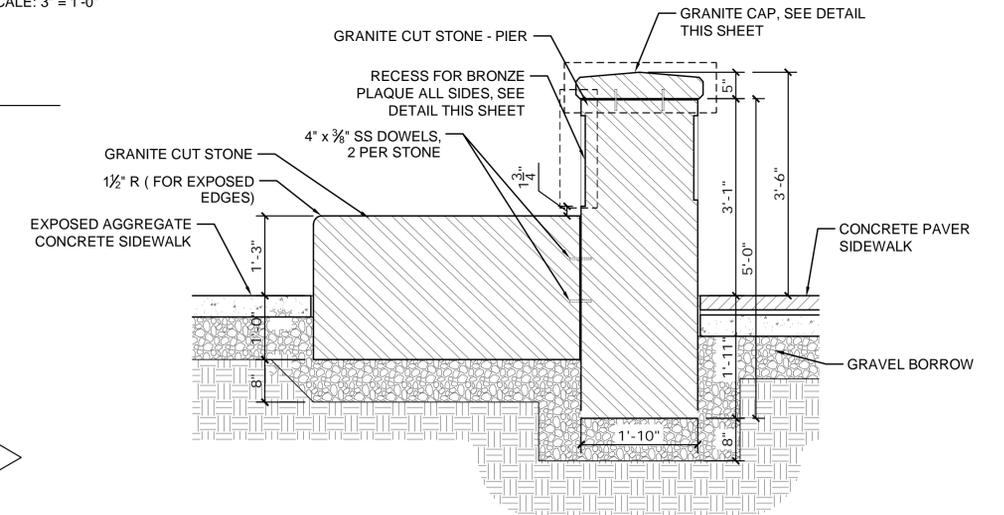
GRANITE SEAT WALL ELEVATION

SCALE: 1/4" = 1'-0"



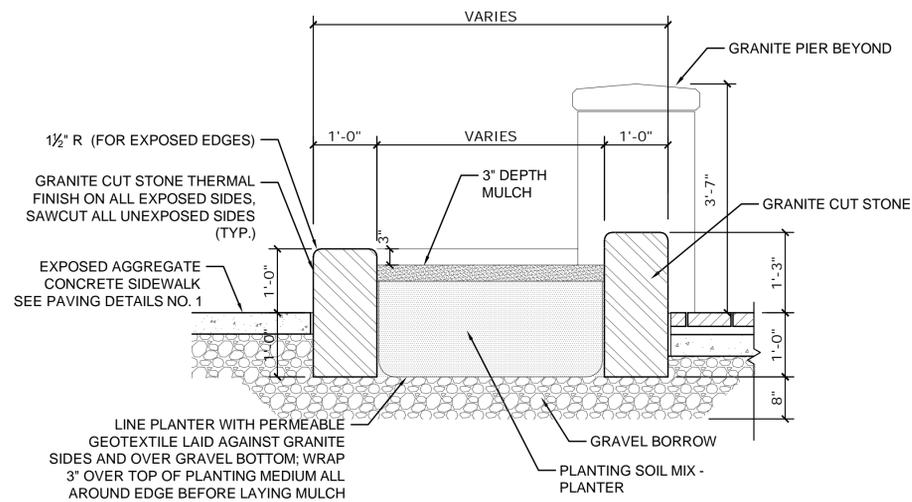
RECESS FOR PLAQUES

SCALE: 3" = 1'-0"



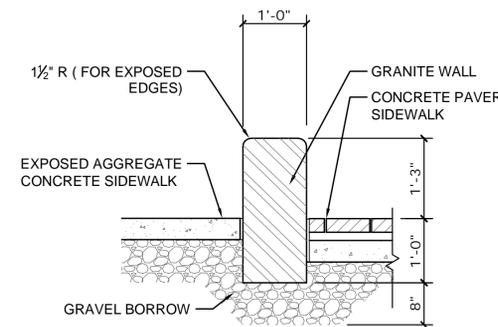
GRANITE PIER SECTION A-A

SCALE: 3/4" = 1'-0"



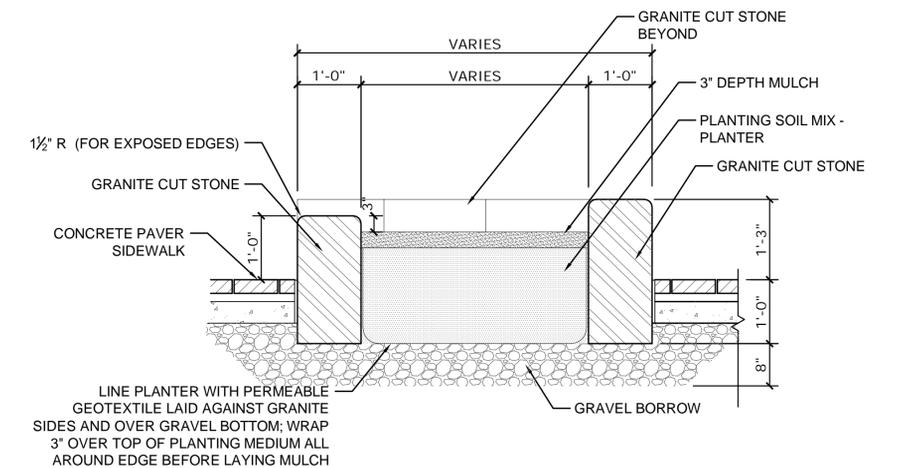
GRANITE SEAT WALL SECTION B-B

SCALE: 3/4" = 1'-0"



GRANITE SEAT WALL SECTION C-C

SCALE: 3/4" = 1'-0"



GRANITE SEAT WALL SECTION D-D

SCALE: 3/4" = 1'-0"

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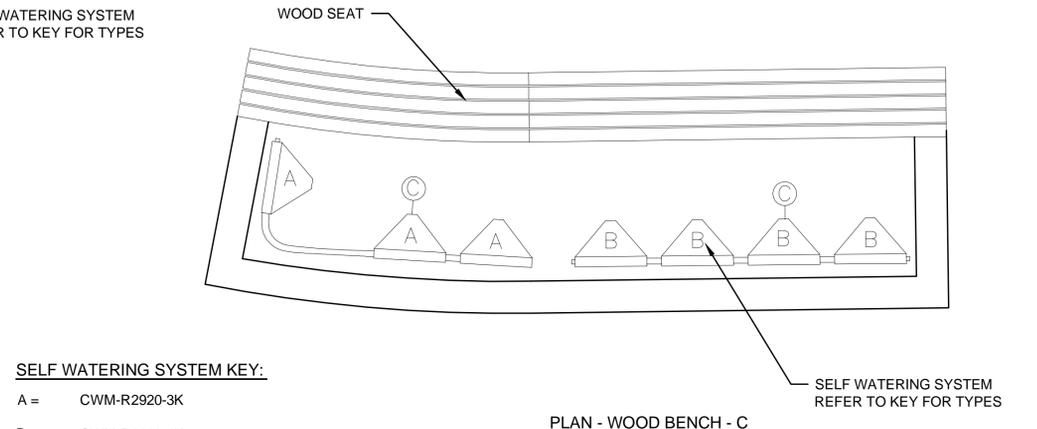
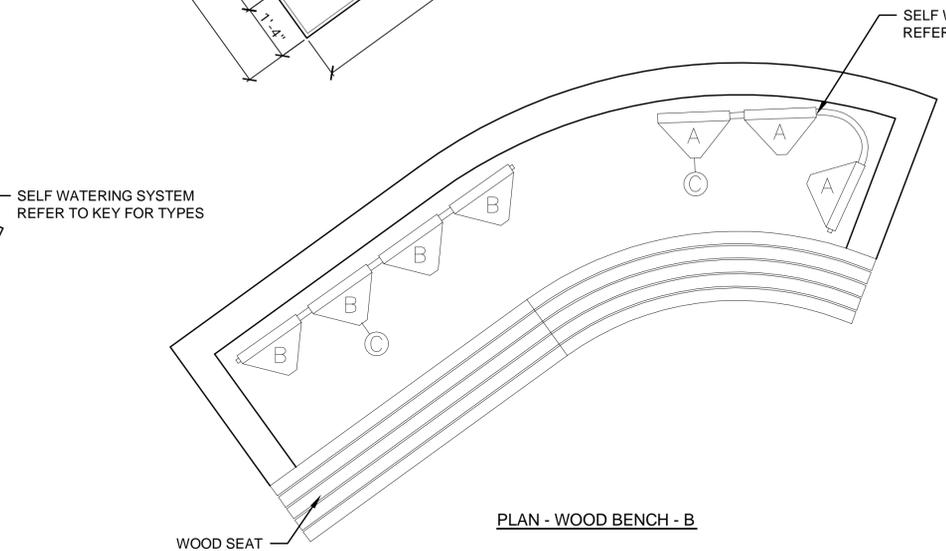
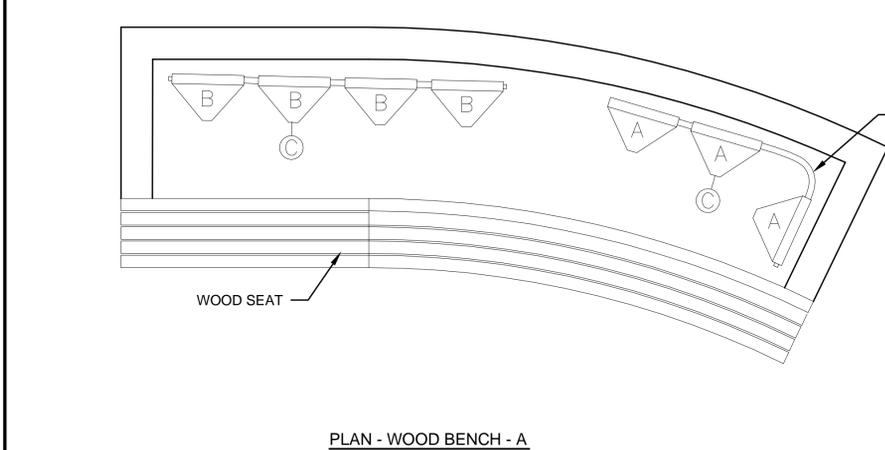
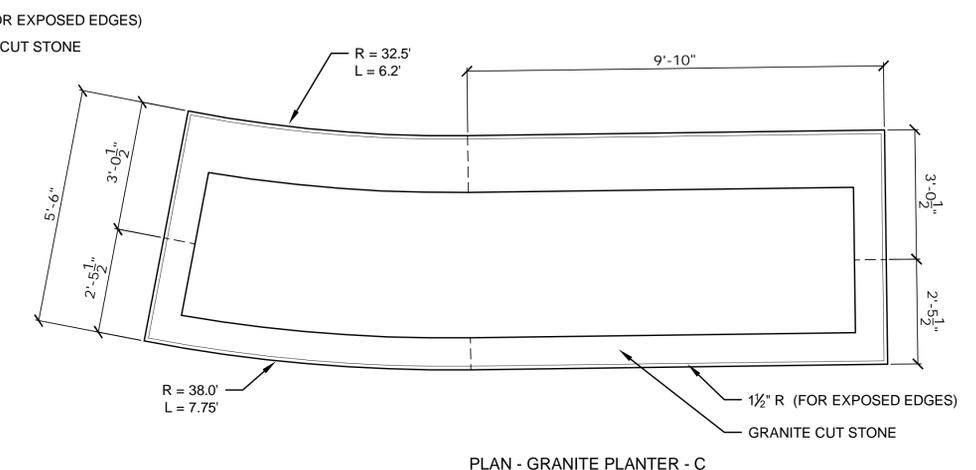
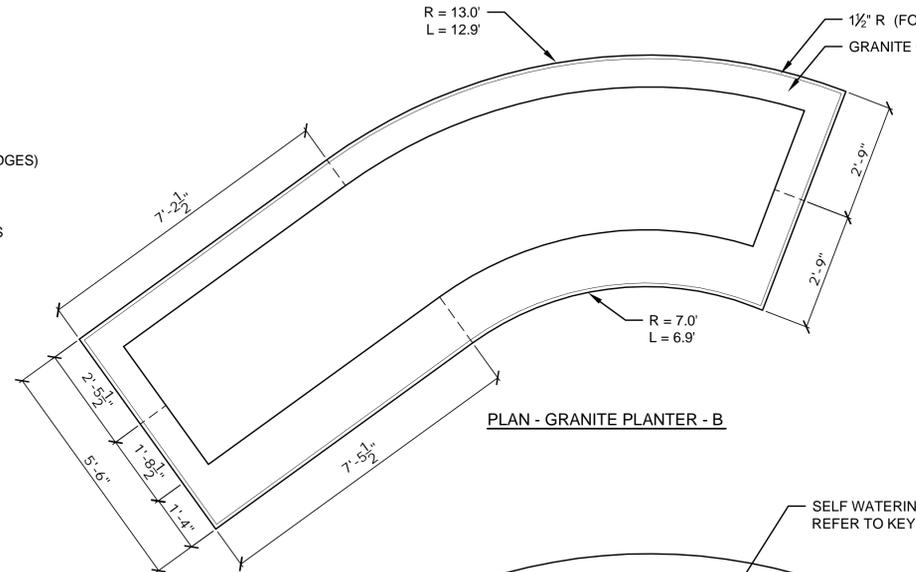
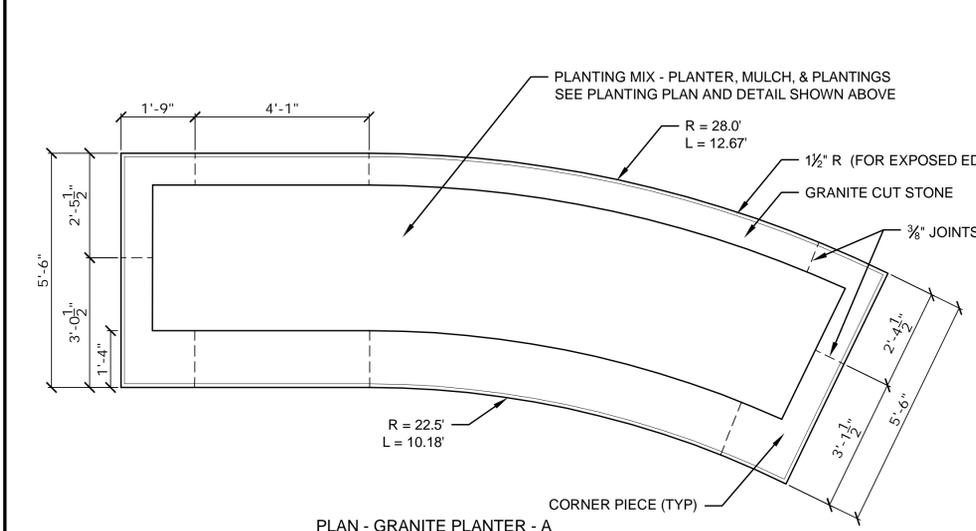
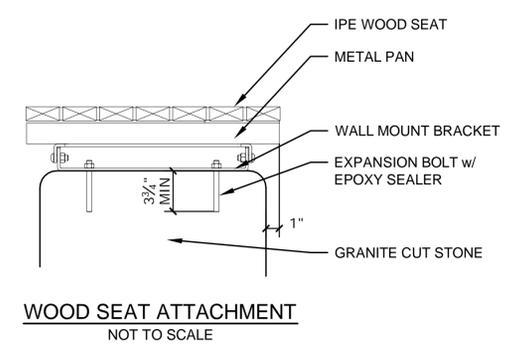
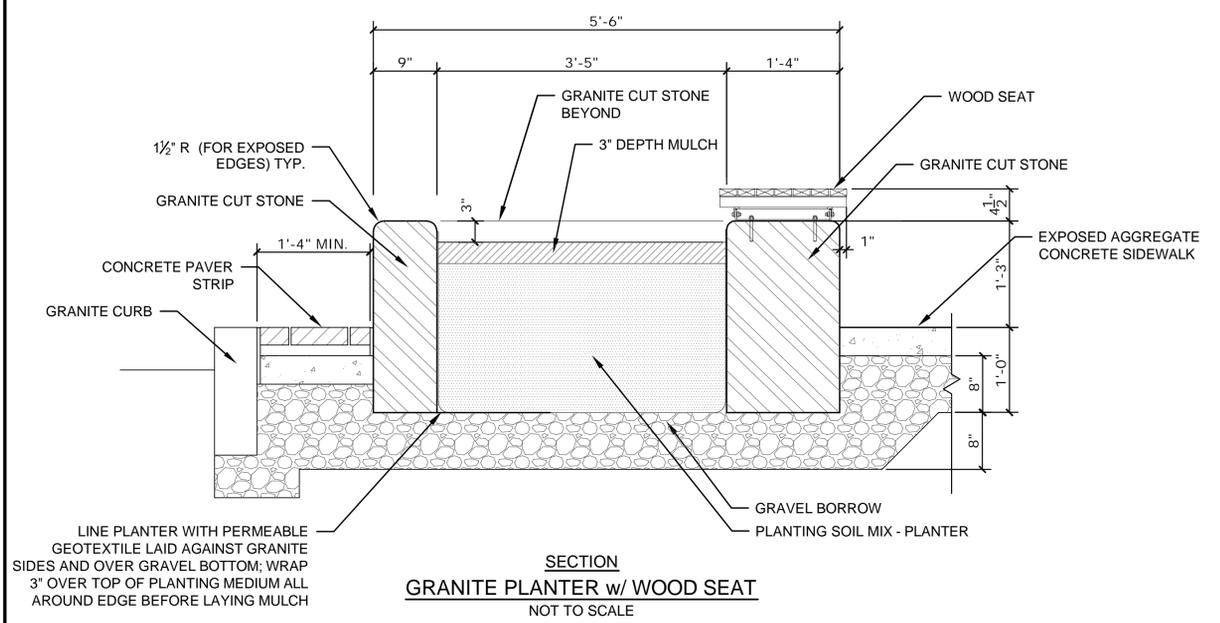
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**TOWN CENTER
PHASE-I IMPROVEMENTS
LANDSCAPE WALLS NO. 2
NEEDHAM, MASSACHUSETTS**

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SHEET No.	29 OF 42
File:	5126 LANDSCAPE WALLS.dwg

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DETAIL FOR GRANITE PLANTER w/ WOOD SEAT
NOT TO SCALE

SELF WATERING SYSTEM KEY:
 A = CWM-R2920-3K
 B = CWM-R2920-4K
 C = CWM-E2400
 NOTE:
 CWM-2400 ATTACHED TO FILL MODULE OF CWM SYSTEM.

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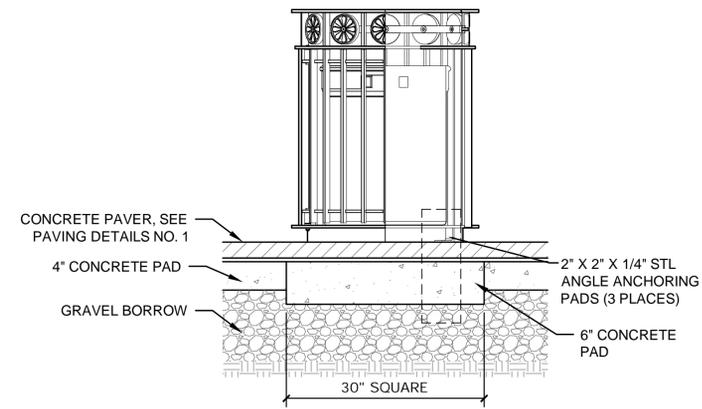
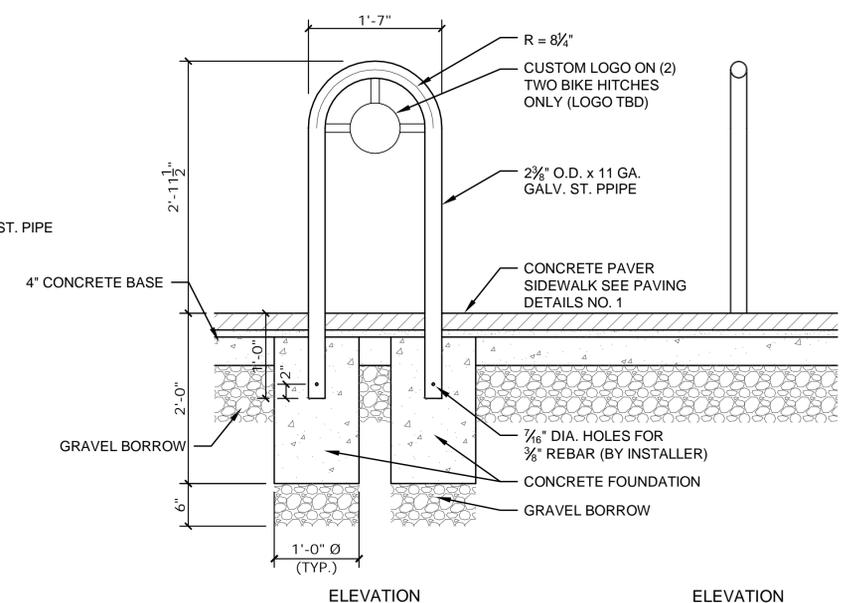
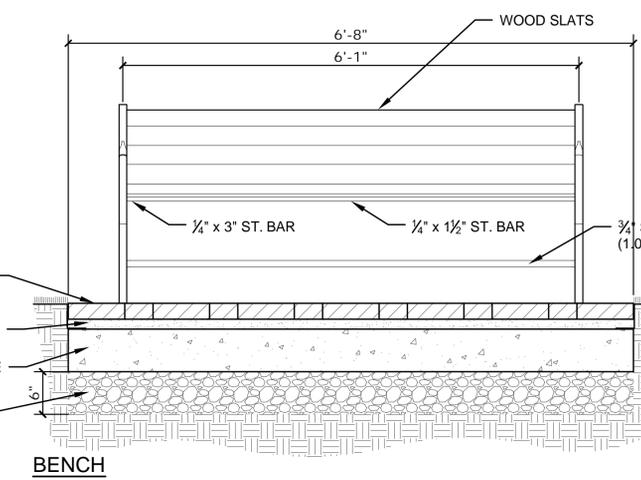
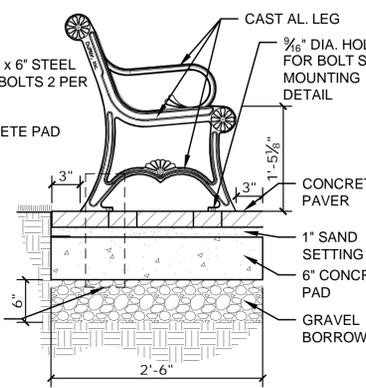
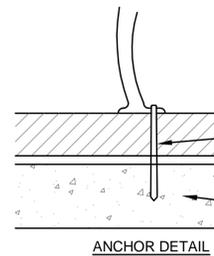
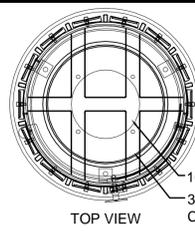
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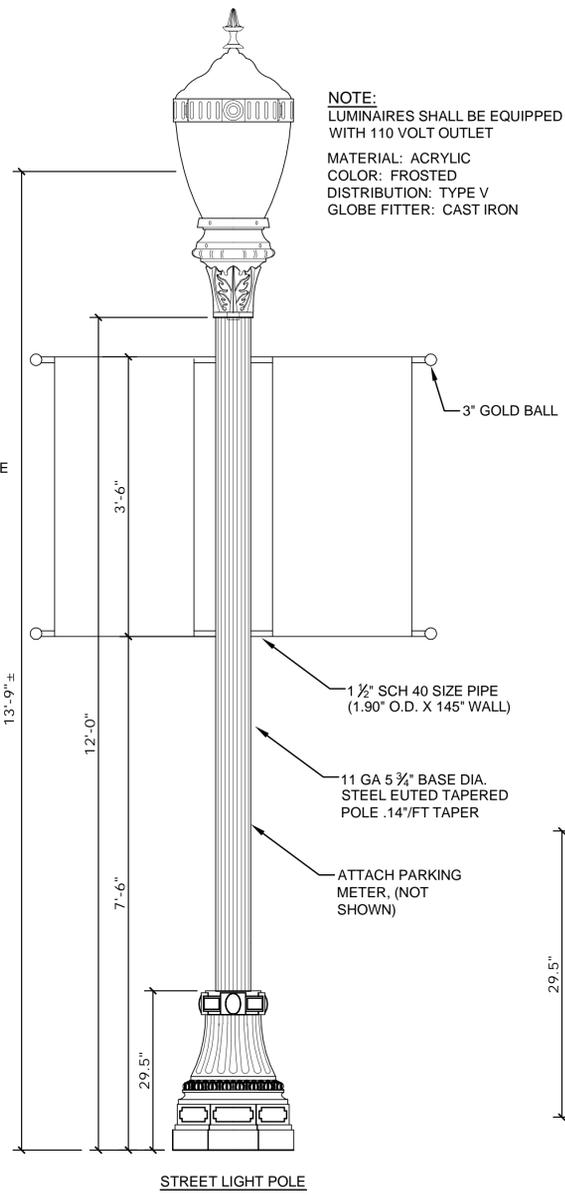
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 PHASE-I IMPROVEMENTS
 LANDSCAPE WALLS NO. 3
 NEEDHAM, MASSACHUSETTS**

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ISSUE DATE:	12/10/2015
SHEET No.	30 OF 42
File:	5126 LANDSCAPE WALLS.dwg

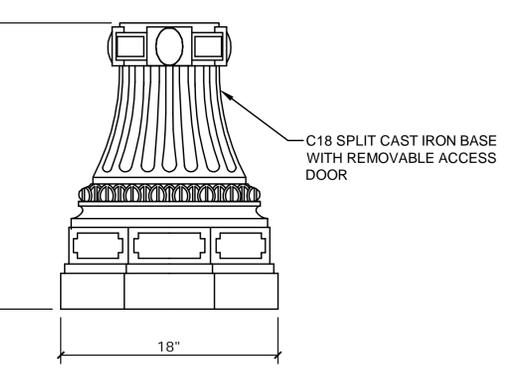
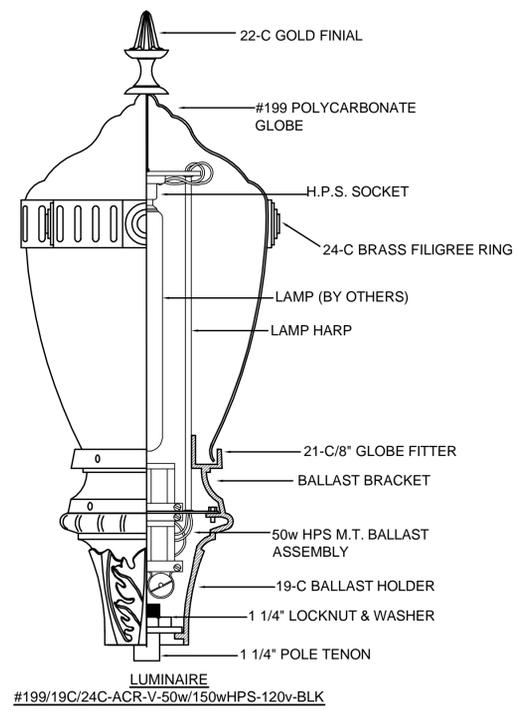


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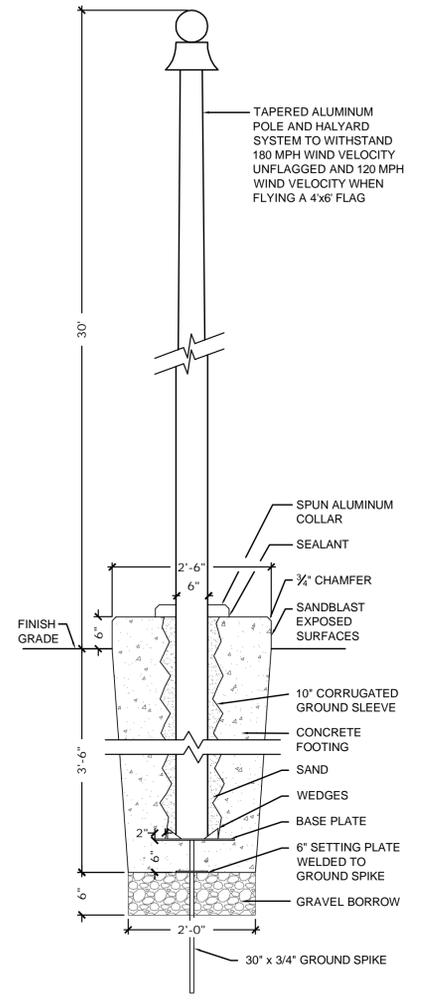
NOTE:
LUMINAIRES SHALL BE EQUIPPED WITH 110 VOLT OUTLET
MATERIAL: ACRYLIC
COLOR: FROSTED
DISTRIBUTION: TYPE V
GLOBE FITTER: CAST IRON



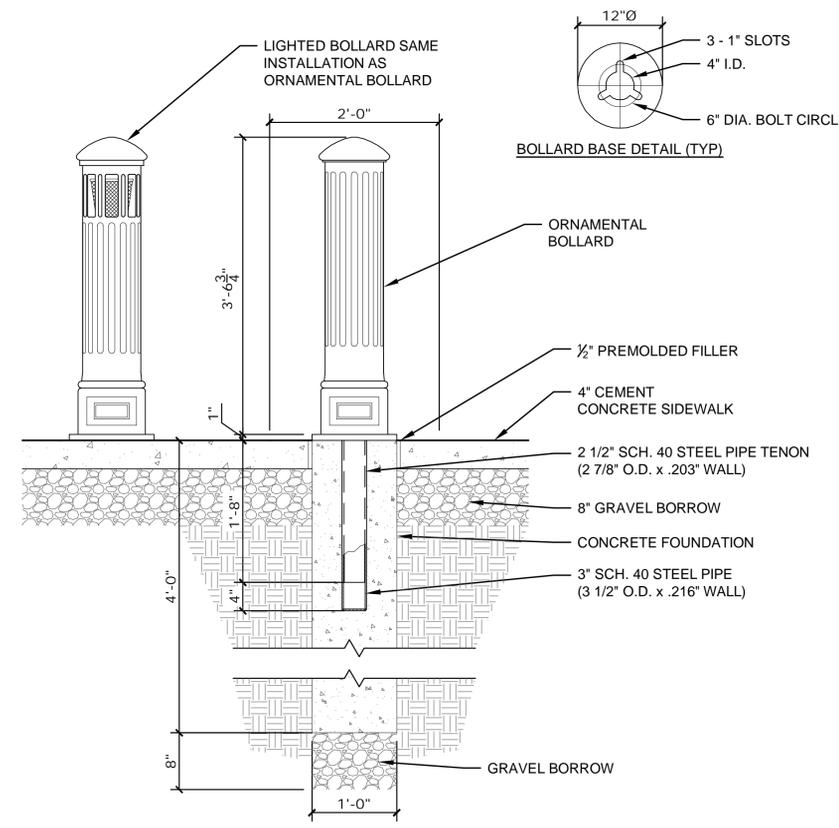
ORNAMENTAL STREET LIGHT
NOT TO SCALE



LIGHT POLE BASE - SERIES C12/32
(CLAM SHELL DESIGN)



FLAGPOLE
NOT TO SCALE



ORNAMENTAL & LIGHTED BOLLARD
NOT TO SCALE

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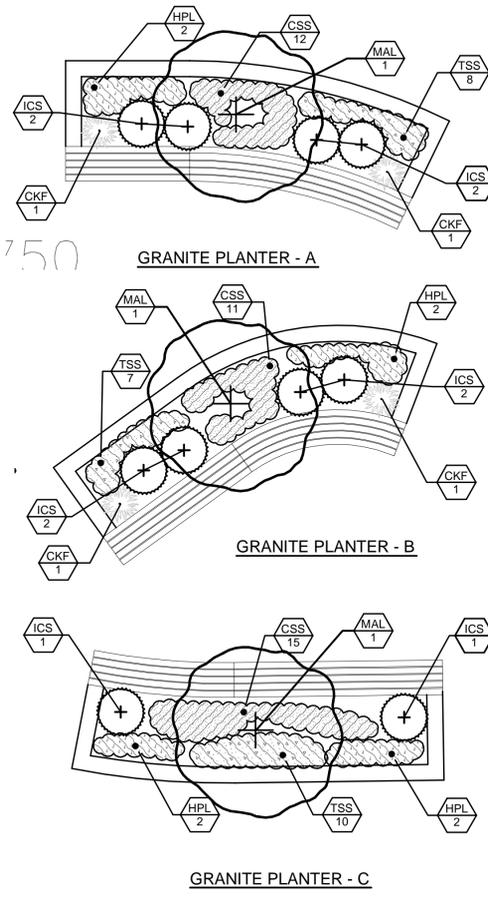
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**TOWN CENTER
PHASE-I IMPROVEMENTS
SITE AMENITY DETAILS NO. 2
NEEDHAM, MASSACHUSETTS**

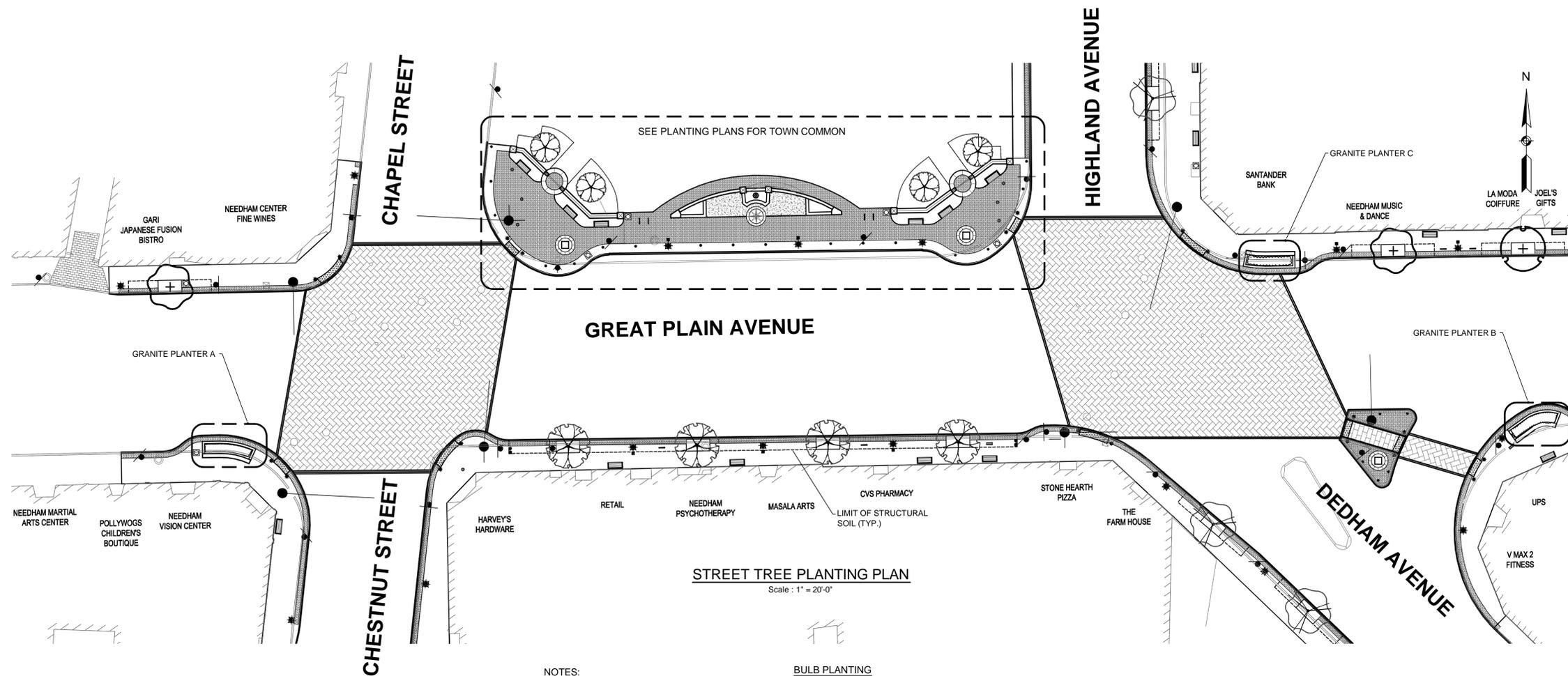
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PLOT DATE: 2/11/2016 4:43 PM
ISSUE DATE: 12/10/2015
SHEET No. **34 OF 42**
File: 5126 PAVING DETAILS.dwg



PLANTING PLAN FOR GRANITE PLANTERS
Scale : 1/4" = 1'-0"

PLANT SCHEDULE

TREES	QTY	BOTANICAL NAME / COMMON NAME	CONT	
MAL	3	Malus sargentii 'Columnaris' / Columnar Sargent Crabapple	7'-8" B&B	
QUE	2	Quercus robur 'Fastigiata' / Pyramidal English Oak	2.5-3" Cal.	
SP	4	Stewartia pseudocamellia / Japanese Stewartia	7'-8" B&B	
SR	1	Syringa reticulata 'Ivory Silk' / Ivory Silk Japanese Tree Lilac	2.5-3" Cal.	
UA	3	Ulmus americana 'Valley Forge' / Valley Forge American Elm	2.5-3" Cal.	
ZEL	4	Zelkova serrata 'Musashino' / Sawleaf Zelkova	2.5-3" Cal.	
SHRUBS AND GRASSES	QTY	BOTANICAL NAME / COMMON NAME	CONT	
CKF	14	Calamagrostis x acutiflora 'Karl Foerster' / Feather Reed Grass	2 Gal.	
ICS	10	Ilex crenata 'Soft Touch' / Soft Touch Japanese Holly	#5 Cont.	
JCP	18	Juniperus conferta 'Blue Pacific' / Coast Juniper	#3 Cont.	
MD	51	Microbiota decussata / Siberian Carpet Cypress	2 Gal.	
SH	18	Sporobolus heterolepis / Prairie Dropseed	2 Gal.	
GROUND COVERS	QTY	BOTANICAL NAME / COMMON NAME	CONT	SPACING
ATH	40	Athyrium filix-femina 'Ghost' / Silver Lady Fern	2 Gal.	18" o.c.
CSS	125	Carex morrowii 'Silver Sceptre' / Silver Japanese Sedge	#1 Cont.	12" o.c.
GR	3	Geranium x 'Rozanne' TM / Hybrid Cranesbill	#1 Cont.	18" o.c.
GWB	10	Gaura lindheimeri 'Whirling Butterflies' / White Gaura	2 Gal.	18" o.c.
HPL	23	Hosta plantaginea / Fragrant Plantain Lily	2 Gal.	24" o.c.
NBW	12	Nepeta x faassenii 'Blue Wonder' / Catmint	2 Gal.	24" o.c.
POL	18	Polygonatum commutatum / Solomon's Seal	2 Gal.	18" o.c.
SA	58	Seasonal Annuals / Seasonal Annuals	4"av pot	12" o.c.
TSS	137	Tiarella x 'Sugar and Spice' / Foamflower	#1 Cont.	12" o.c.



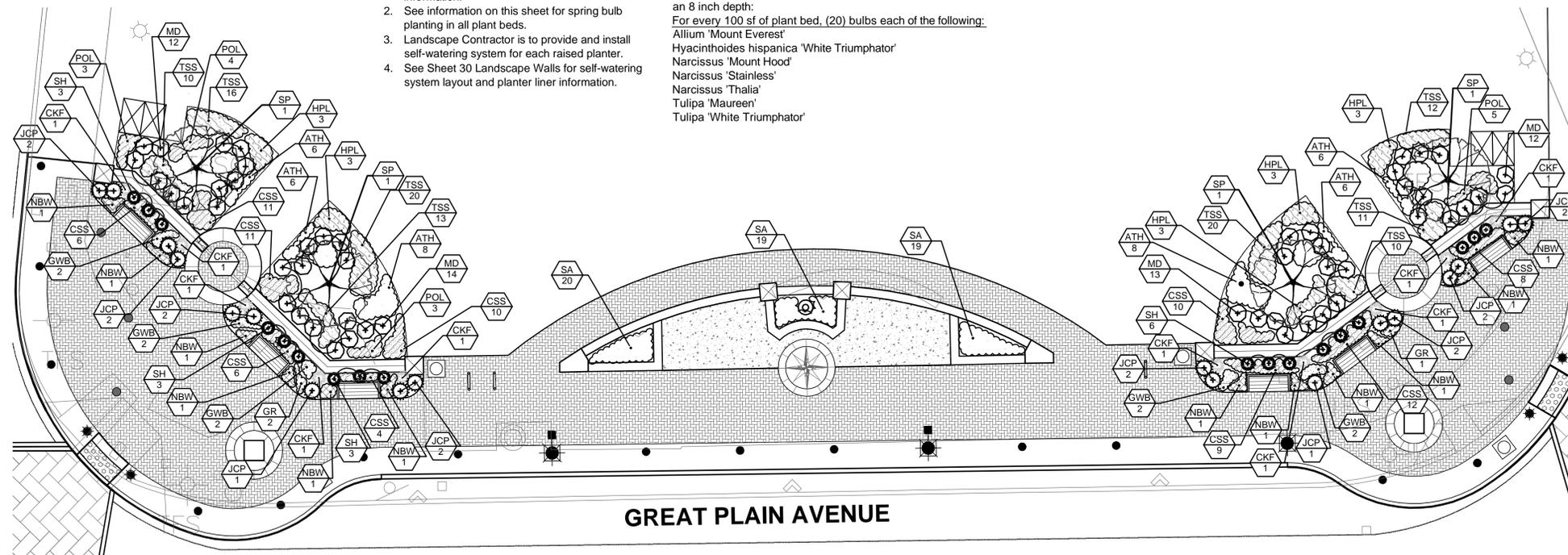
STREET TREE PLANTING PLAN
Scale : 1" = 20'-0"

NOTES:

- See Sheet 35 Planting Details and Sheet 4 General Notes for planting medium and mulch information.
- See information on this sheet for spring bulb planting in all plant beds.
- Landscape Contractor is to provide and install self-watering system for each raised planter.
- See Sheet 30 Landscape Walls for self-watering system layout and planter liner information.

BULB PLANTING

Between Sept 15 and Nov 1, contractor is to plant the following varieties and quantities of spring bulbs among the perennials in pockets of five at an 8 inch depth:
For every 100 sf of plant bed, (20) bulbs each of the following:
Allium 'Mount Everest'
Hyacinthoides hispanica 'White Triumphator'
Narcissus 'Mount Hood'
Narcissus 'Stainless'
Narcissus 'Thalia'
Tulipa 'Maureen'
Tulipa 'White Triumphator'



PLANTING PLAN FOR TOWN COMMON
Scale : 1/8" = 1'-0"

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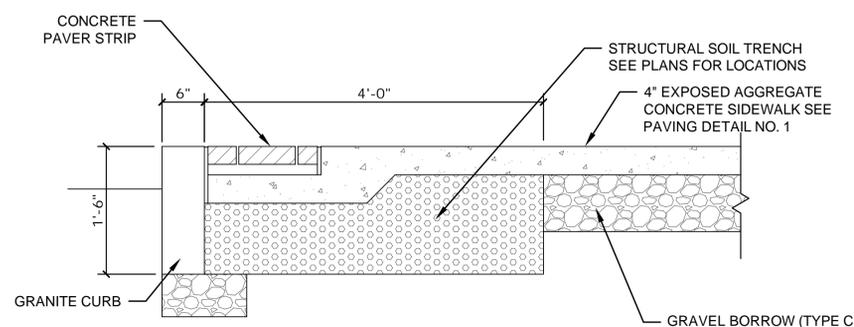
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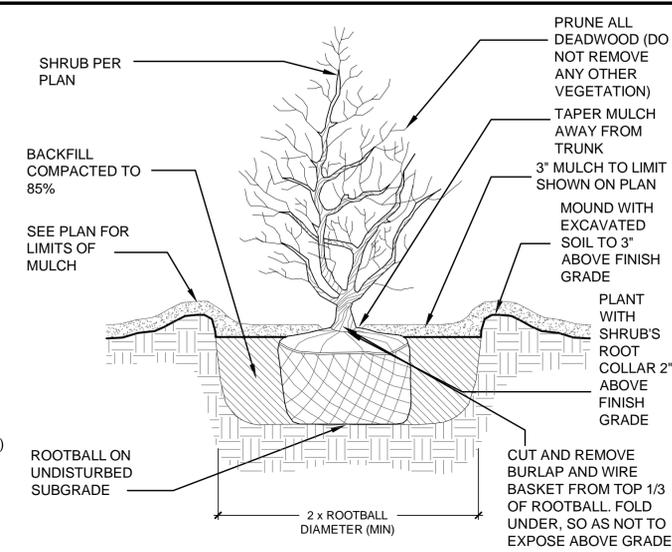
**TOWN CENTER
PHASE-I IMPROVEMENTS
PLANTING PLAN
NEEDHAM, MASSACHUSETTS**

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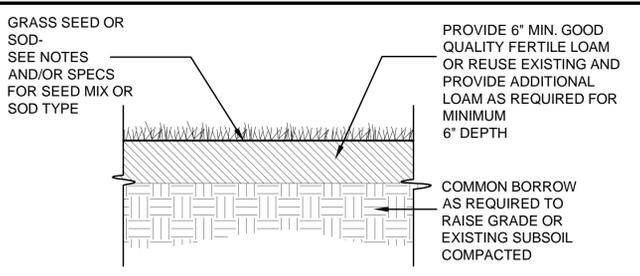
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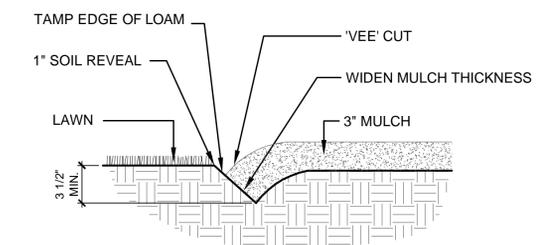
STRUCTURAL SOIL
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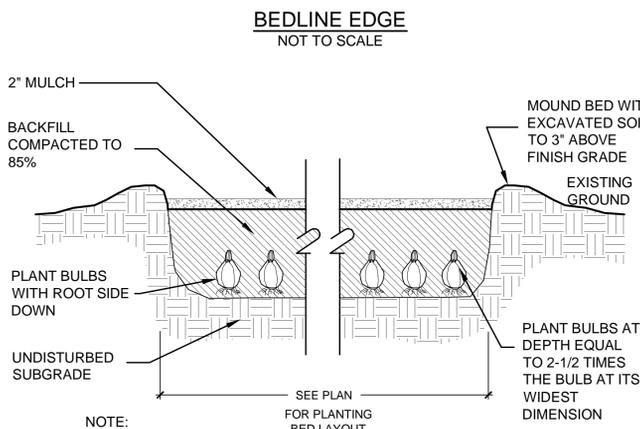
SHRUB PLANTING
NOT TO SCALE



LOAM AND SEED OR LOAM AND SOD
NOT TO SCALE

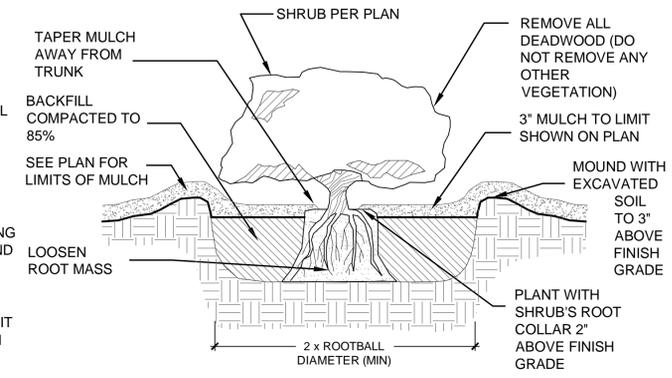


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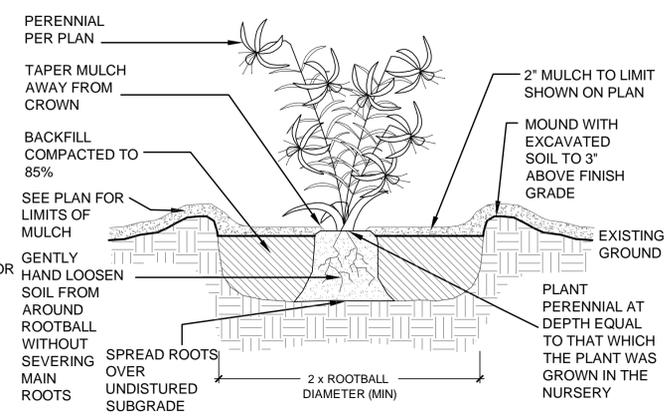


BULB PLANTING
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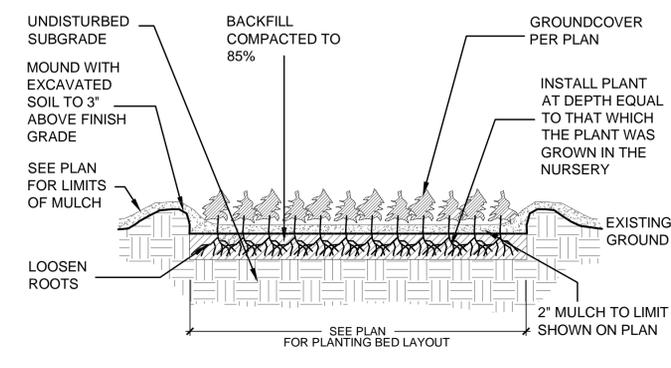
NOTE:
1. BY HAND, SPREAD BONE MEAL OVER ENTIRE PLANTING BED AT A RATE NOT TO EXCEED ONE-HALF (1/2) POUND PER TWENTY-FIVE (25) SQUARE FEET.



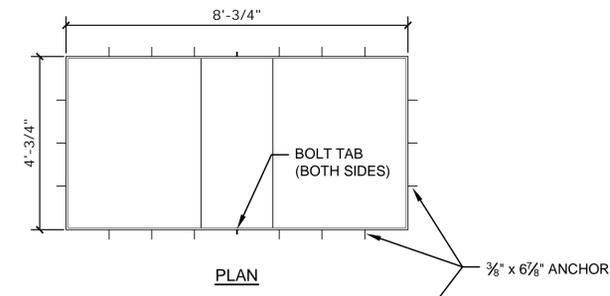
CONTAINER GROWN TREE & SHRUB PLANTING
NOT TO SCALE



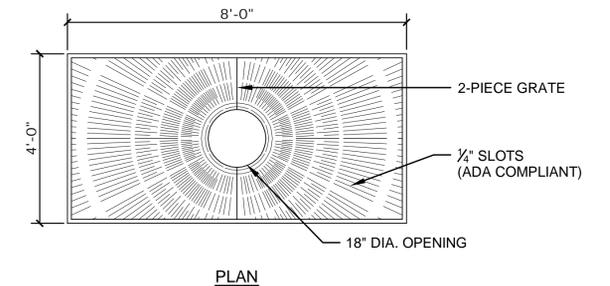
PERENNIALS & GRASSES PLANTING
NOT TO SCALE



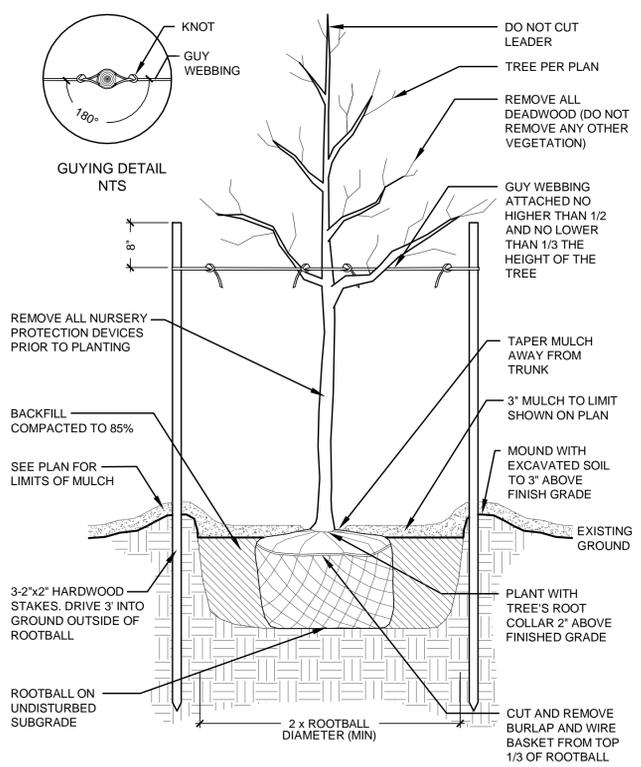
GROUNDCOVER PLANTING
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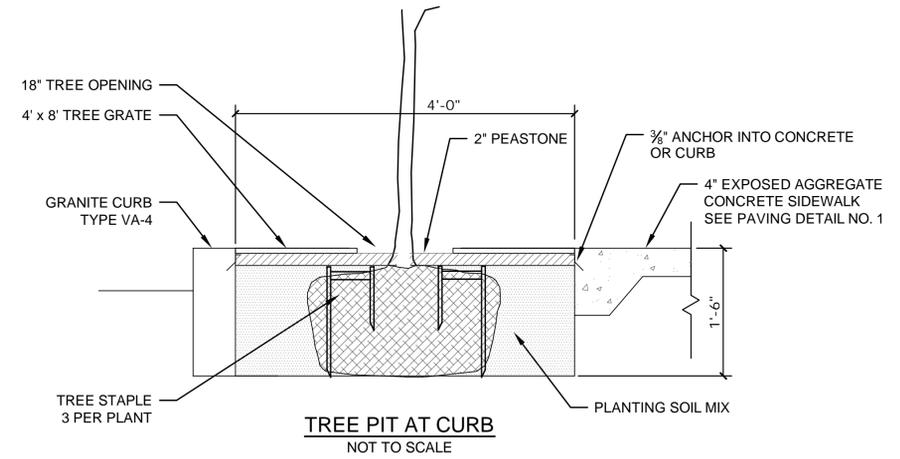
TREE GRATE & FRAME
NOT TO SCALE



TREE GRATE & FRAME
NOT TO SCALE



DECIDUOUS TREE STAKING & PLANTING
NOT TO SCALE



TREE PIT AT CURB
NOT TO SCALE

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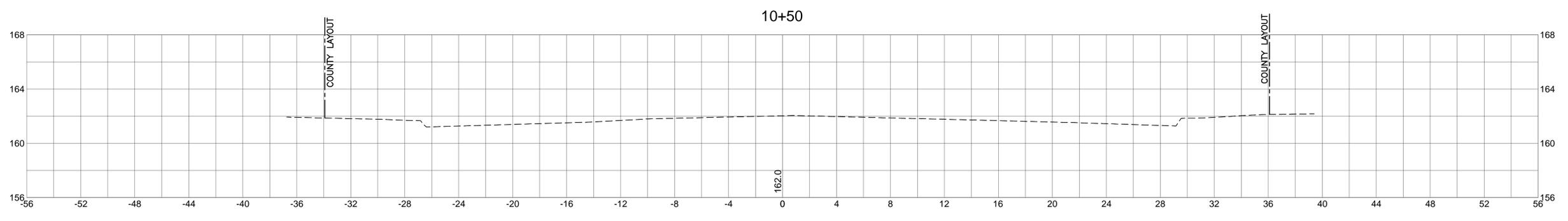
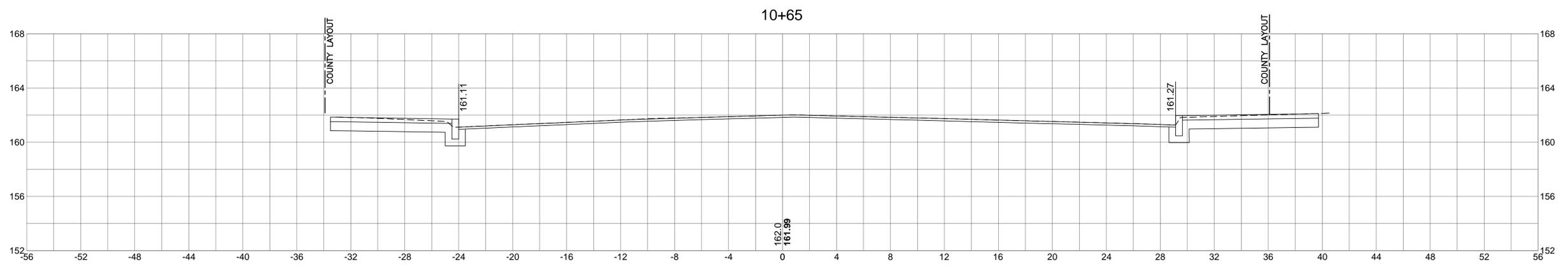
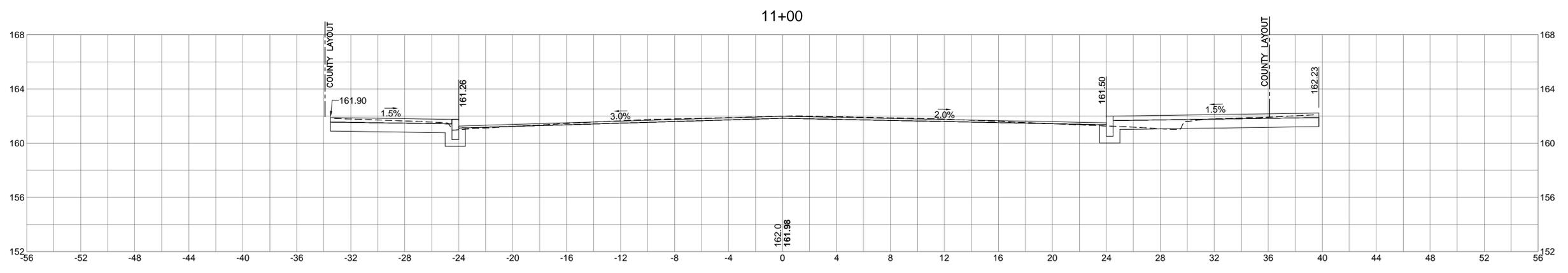
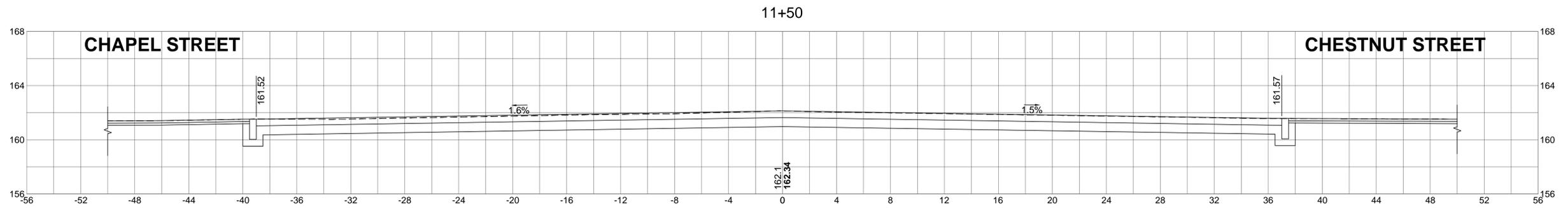
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PLANTING DETAILS
NEEDHAM, MASSACHUSETTS**

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SHEET No. 36 OF 42
File: 5126 PAVING DETAILS.dwg

O:\5100s\5126 - Needham - Downtown Streetscape Phase 1\Drawing Files\Plan Set\5126 XSECTIONS.dwg



NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION
REVISIONS				

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CK

DESIGNED BY:
TJ

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PE STAMP:



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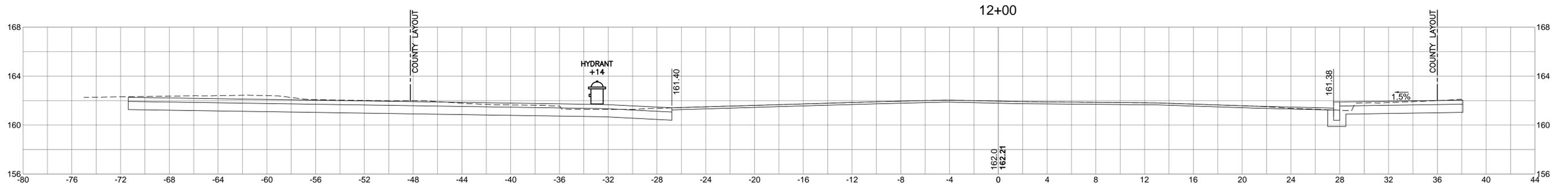
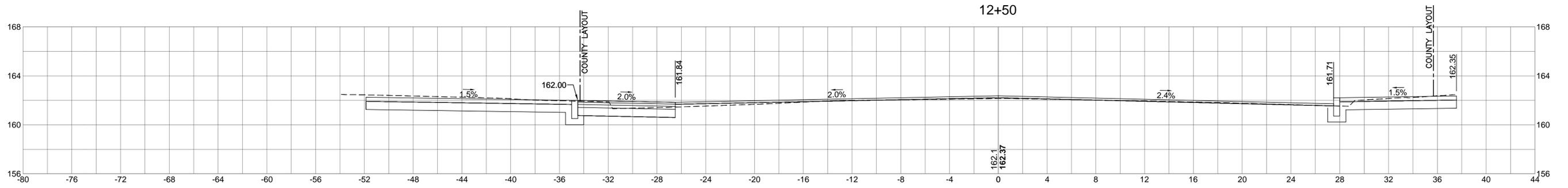
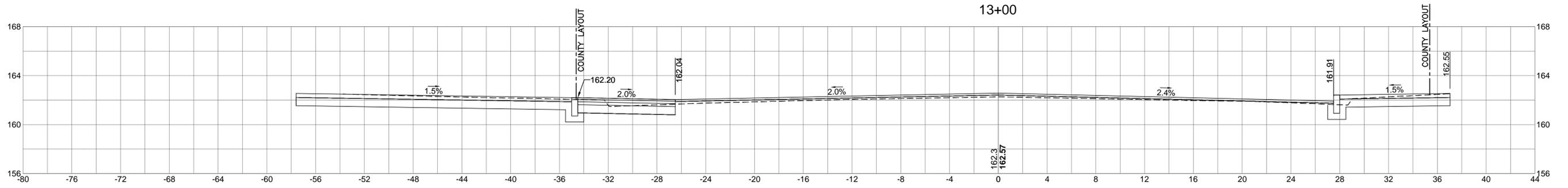
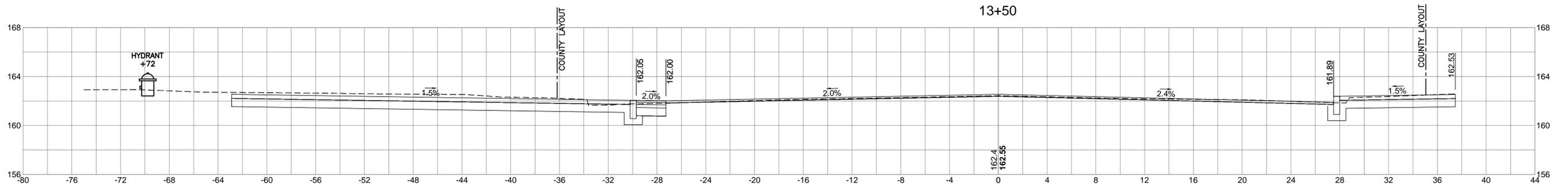
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SHEET No. **39 OF 42**

File: 5126 XSECTIONS.dwg

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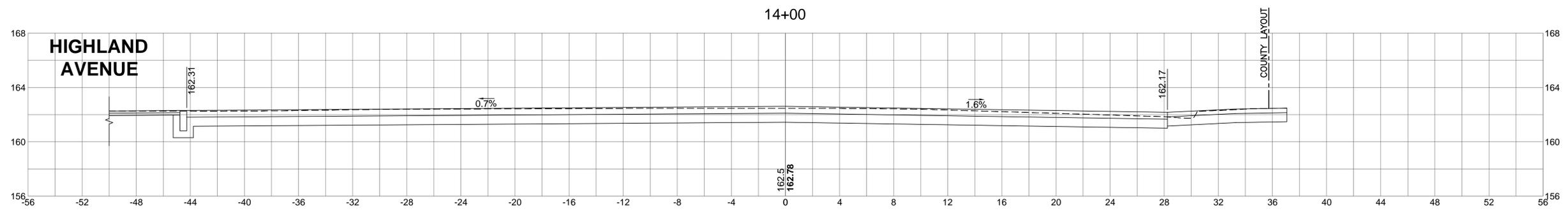
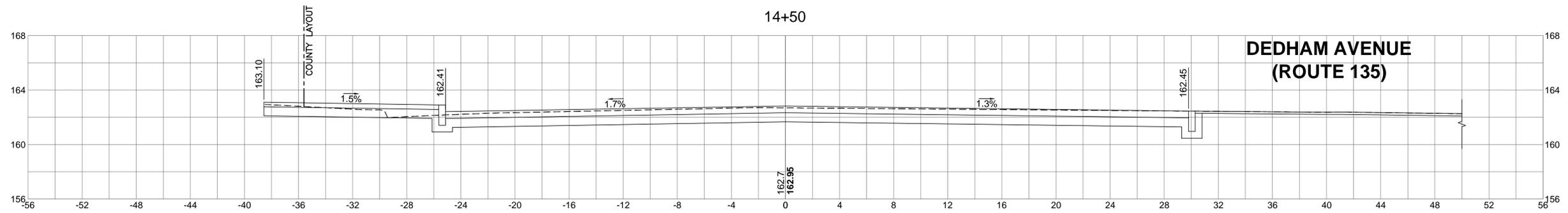
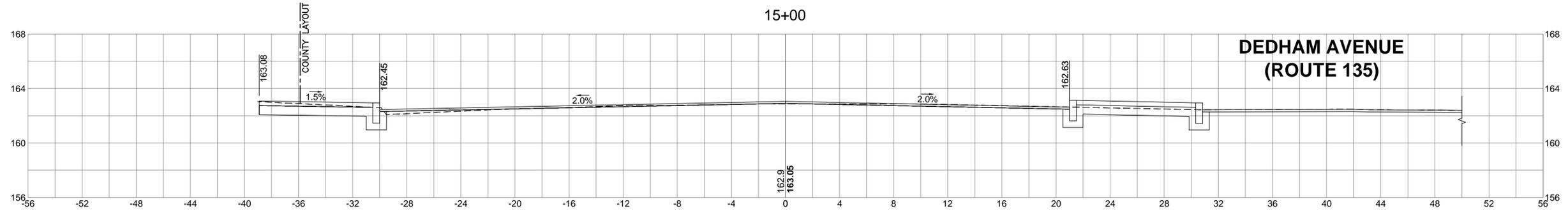
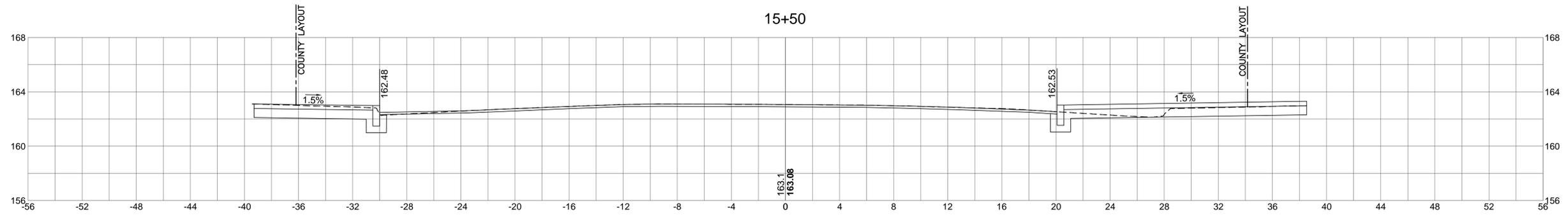
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SHEET No. **40 OF 42**

File: 5126_XSECTIONS.dwg

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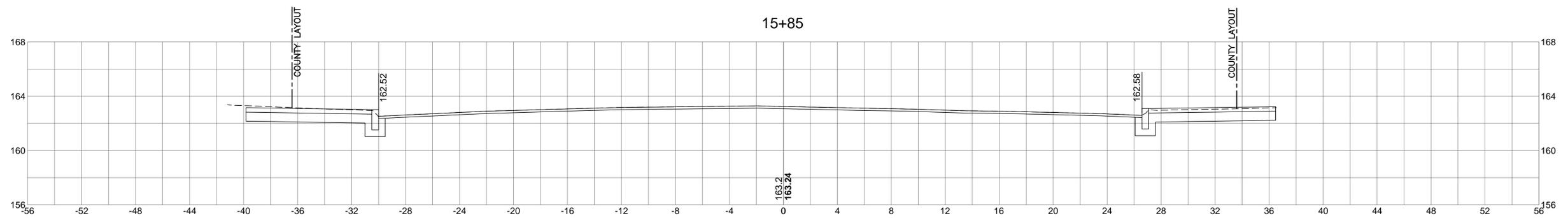
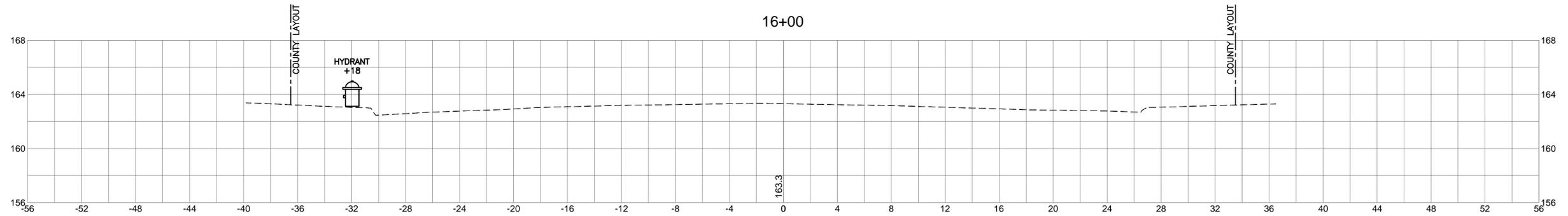
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