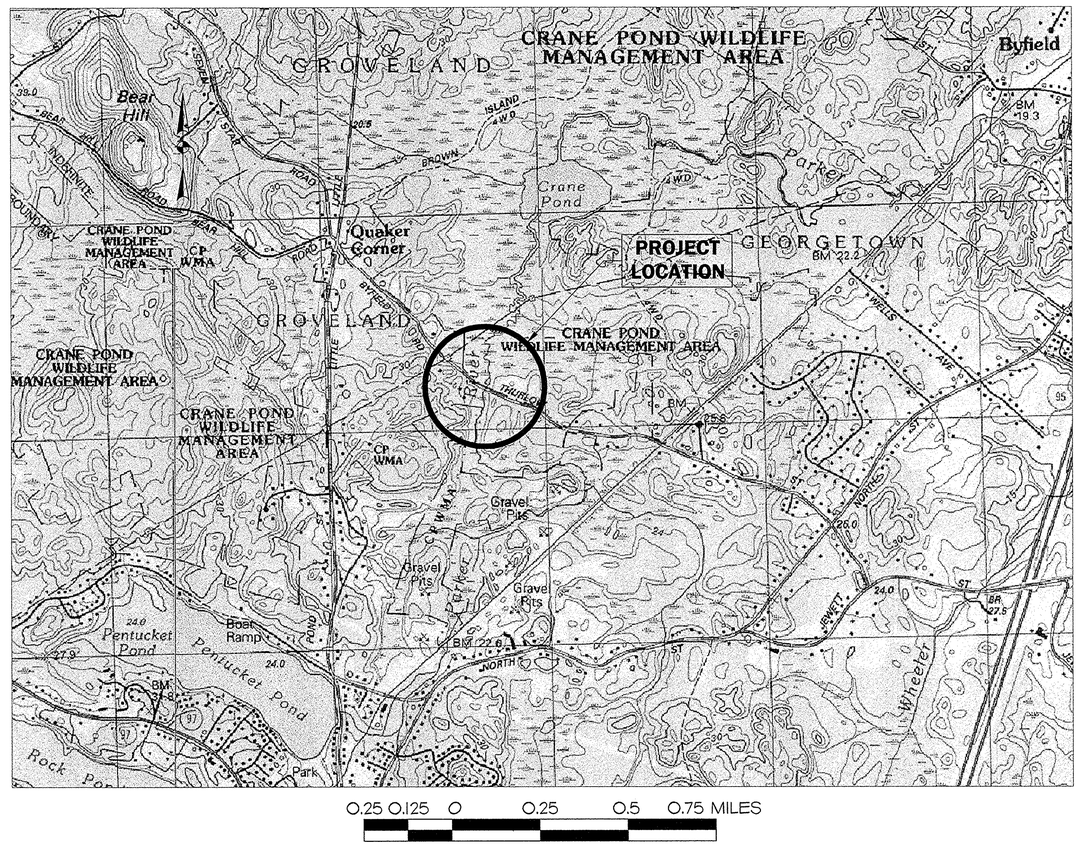
TOWN OF GEORGETOWN, MASSACHUSETTS
HIGHWAY DEPARTMENT
CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY (MEMA)
HAZARD MITIGATION GRANT PROGRAM (HMGP 1959-09)

SHEET INDEX

SHEET NO.	DESCRIPTION
1	LEGEND AND GENERAL NOTES
2	TRAFFIC MANAGEMENT PLAN
3	EXISTING CONDITIONS SITE PLAN
4	PROPOSED ROADWAY SITE PLAN
5	EROSION CONTROL PLAN
6	WATER DIVERSION PLAN
7	TYPICAL CROSS SECTION AND ROADWAY DETAILS
8	BOX CULVERT LAYOUT AND DETAILS
9	THURLOW STREET CROSS SECTION STA. 1+00 TO STA. 2+50
10	THURLOW STREET CROSS SECTION STA. 3+00 TO STA. 3+50



MAY 2015

BOARD OF SELECTMEN
STUART EGENBERG, CHAIRMAN
GARY C. FOWLER
STEPHEN SMITH
C. DAVID SURFACE
PHILIP TRAPANI

TOWN ADMINISTRATOR
MICHAEL FARRELL

HIGHWAY DEPARTMENT SUPERVISOR
PETER DURKEE

Prepared by:

COUGHLIN ENVIRONMENTAL SERVICES, LLC

DANIEL J. COUGHLIN CIVIL No. 33339 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS
5/1/15

CONSULTING ENGINEERS AND PLANNERS

62 Montvale Avenue, Suite H
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

LEGEND

# 203	HOUSE NUMBER
2/31	ASSESSORS MAP/LOT NUMBER
WCS	WATER CURB STOP
UP	UTILITY POLE W/ OVERHEAD WIRE & GUY
B11 B12	WETLAND FLAGGING
W	WATER GATE
G	GAS GATE
24" P	TREE DESIGNATION (24" DIAMETER PINE)
	HYDRANT
	SIGN
	STREET LINE (⅊) / PROPERTY LINE (ℙ)
D	DRAIN LINE
E	ELECTRIC LINE
T	TELEPHONE LINE
CTV	CABLE TELEVISION LINE
W	WATER LINE
G	GAS LINE
	SILTATION BARRIER
	100 YEAR FLOOD PLAIN BOUNDARY
	MA D.E.P. WATER SUPPLY PROTECTION ZONE
	50' BUFFER ZONE TO RESOURCE AREA
	75' BUFFER ZONE TO RESOURCE AREA
	100' BUFFER ZONE TO RESOURCE AREA
	BORDERING VEGETATED WETLAND
	WETLAND
SPK IN POLE 116.21	BENCHMARKS (NGVD 1929)
90	EXISTING MAJOR CONTOUR
89	EXISTING MINOR CONTOUR
91	PROPOSED CONTOUR

ABBREVIATIONS

A.C.	ASBESTOS CONCRETE
ALUM.	ALUMINUM
C.B.	CATCH BASIN
C.B.C.I.	CATCH BASIN CURB INLET
C.I.	CAST IRON PIPE
C.I.C.L.	CAST IRON PIPE, CEMENT LINED
C.L.D.I./D.I.C.L.	CEMENT LINED DUCTILE IRON/ DUCTILE IRON CEMENT LINED
C.M.P.	CORRUGATED METAL PIPE
CONC.	CONCRETE
D	DIAMETER
D.I.	DUCTILE IRON
DIAM.	DIAMETER
D.M.H.	DRAINAGE MANHOLE
D.W.C.H.D.P.E.	DOUBLE WALL CORRUGATED HIGH DENSITY POLYETHYLENE
E.P.	EDGE OF PAVEMENT
E.W.	EACH WAY
EXIST.	EXISTING
F.M.	FORCE MAIN
G.G.	GAS GATE
G.V.	GATE VALVE
GPM	GALLONS PER MINUTE
HMA	HOT MIX ASPHALT
H.H.	HANDHOLE
HYD.	HYDRANT
LBS.	POUNDS
LPS	LOW PRESSURE SEWER
M.B.	MAILBOX
MAX.	MAXIMUM
MIN.	MINIMUM
NPT	NATIONAL PIPE THREAD
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
PC200	200 PSI CLASS PIPE
ℙ	PROPERTY LINE
PROP.	PROPOSED
P.S.	PRESSURE SEWER
P.S.I.	POUNDS PER SQUARE INCH
P.V.C.	POLYVINYL CHLORIDE
R.C.P.	REINFORCE CONCRETE PIPE
R.O.W.	RIGHT OF WAY
REQ.	REQUIRED
⅊	STREET LINE
S.B.	STONE BOUND
S.S.	STAINLESS STEEL
STL	STEEL
T.M.H.	TELEPHONE MANHOLE
T.S.&V.	TAPPING SLEEVE AND VALVE
T.W.	TEMPORARY WATER MAIN
TYP.	TYPICAL
U.L.P.	UTILITY LIGHT POLE
U.P.	UTILITY POLE
V.C.	VITRIFIED CLAY PIPE
W/	WITH
W.G.	WATER GATE
W.M./M.P.	WATER METER PIT
Ø	DIAMETER

NOTES

1. UNDERGROUND UTILITY INFORMATION SHOWN ON THESE PLANS WAS OBTAINED FROM:
   NATIONAL GRID
   GEORGETOWN MUNICIPAL LIGHT DEPARTMENT
   VERIZON
   FIELD OBSERVATIONS
   TOWN OF GEORGETOWN WATER DEPARTMENT
2. DIG SAFE SHALL BE NOTIFIED PRIOR TO THE COMMENCEMENT OF CONSTRUCTION AND THE CONTRACTOR SHALL ALSO OBTAIN A MARK OUT BY THE GEORGETOWN WATER DEPARTMENT TO DETERMINE THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES.
3. THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL COSTS FOR DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.
4. THE CONTRACTOR SHALL NOTIFY ALL PUBLIC AND PRIVATE UTILITIES REQUIRED AND VERIFY THE LOCATION OF ALL EXISTING SUBSURFACE UTILITIES PRIOR TO PERFORMING ANY WORK. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY DISCREPANCIES BETWEEN CONDITIONS SHOWN ON THE PLANS AND ACTUAL FIELD CONDITIONS.
5. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR THROUGH TEST PITTING OPERATION, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT. EXTRA WORK AND/OR DELAY CLAIMS SHALL NOT BE CONSIDERED BY THE OWNER AS A RESULT OF THE CONTRACTOR NOT ADEQUATELY VERIFYING EXISTING UTILITY DATA IN ADVANCE OF CULVERT FABRICATION, DELIVERY AND CONSTRUCTION.
6. ALL EXISTING UTILITIES SHALL BE MAINTAINED IN PLACE AND KEPT OPERATIONAL DURING CONSTRUCTION EXCEPT AS NOTED ON THE CONTRACT DRAWINGS OR SPECIFICATIONS. ANY UNSPECIFIED DISRUPTION TO OR ABANDONMENT OF EXISTING UTILITIES SHALL BE SUBJECT TO THE WRITTEN APPROVAL OF THE ENGINEER.
7. ALTHOUGH NOT ANTICIPATED, ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATIONS TO THE WORK CALLED FOR UNDER THIS CONTRACT. THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH FIELD CONDITIONS WITH PRIOR WRITTEN APPROVAL OF THE ENGINEER.
8. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
9. PLANS SHOWN WERE DEVELOPED FROM BEST AVAILABLE INFORMATION SUPPLIED BY THE TOWN, INCLUDING TOWN ASSESSORS MAPS. FIELD SURVEY VERIFICATION WAS MADE UTILIZING INSTRUMENT SURVEY AND/OR MEASURING WHEEL. ALL PROPERTY LINES ARE SHOWN IN APPROXIMATE FASHION AND SHOULD BE VERIFIED WITH PROPERTY OWNERS PRIOR TO COMMENCING WORK.
10. ALL BLASTING OPERATIONS IF REQUIRED SHALL BE PERFORMED IN STRICT CONFORMANCE WITH THE STATE OF MASSACHUSETTS BOARD OF FIRE PREVENTION REGULATION 527 CMR SECTION 13.00 AND ALL LOCAL REGULATIONS.
11. HAY BALES, SILT FENCE, WATTLES, OR GEOTEXTILE WRAP ARE TO BE INSTALLED AROUND WORK SITE AND OTHER ADJACENT AREAS TO PROTECT WETLANDS ADJACENT TO THE WORK, AS NOTED ON THE PLANS, AS SPECIFIED IN THE WETLAND PERMITTING DOCUMENTS, AND/OR AS DIRECTED BY THE ENGINEER. EROSION CONTROL MEASURES ARE TO BE REMOVED AFTER PAVING IS COMPLETED AND AFTER RECEIVING APPROVAL FROM THE GEORGETOWN CONSERVATION AGENT, ALL IMPACTED AREAS SHALL BE LOAMED AND HYDROSEEDED TO ESTABLISH A STABLE STAND OF COVER.
12. THE TERM "NEW" OR "PROPOSED" MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS.
13. VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM (NGVD) 1929.
14. PRIOR TO BIDDING, CONTRACTOR SHALL VISIT PROJECT LOCATIONS TO BECOME COMPLETELY FAMILIAR WITH EXISTING CONDITIONS.
15. WETLAND INFORMATION WAS OBTAINED FROM MASS GIS DATABASE AND AS OBSERVED IN THE FIELD. DELINEATION FLAGGING AND LOCATION WAS PROVIDED BY GEORGETOWN CONSERVATION AGENT.
16. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF ALL ORDER OF CONDITIONS AND SUPERCEDING ORDERS ESTABLISHED FOR THIS PROJECT.
17. PROPOSED UTILITY LOCATIONS ARE SUBJECT TO BE CHANGED BASED ON SITE CONDITIONS ENCOUNTERED AND ACTUAL PROPERTY LINE LOCATIONS ESTABLISHED DURING CONSTRUCTION, WITH THE APPROVAL OF THE ENGINEER.
18. A PLASTIC DEBRIS COLLECTION FENCE SHALL BE INSTALLED DOWN STREAM OF WORK AREA TO CATCH ANY FLOATING CONSTRUCTION DEBRIS DURING PROJECT FIELD CONSTRUCTION EFFORTS.

CIVIL:

REV.	DESCRIPTION	DATE

DRW: AAS DSG: AAS CHK: DJC

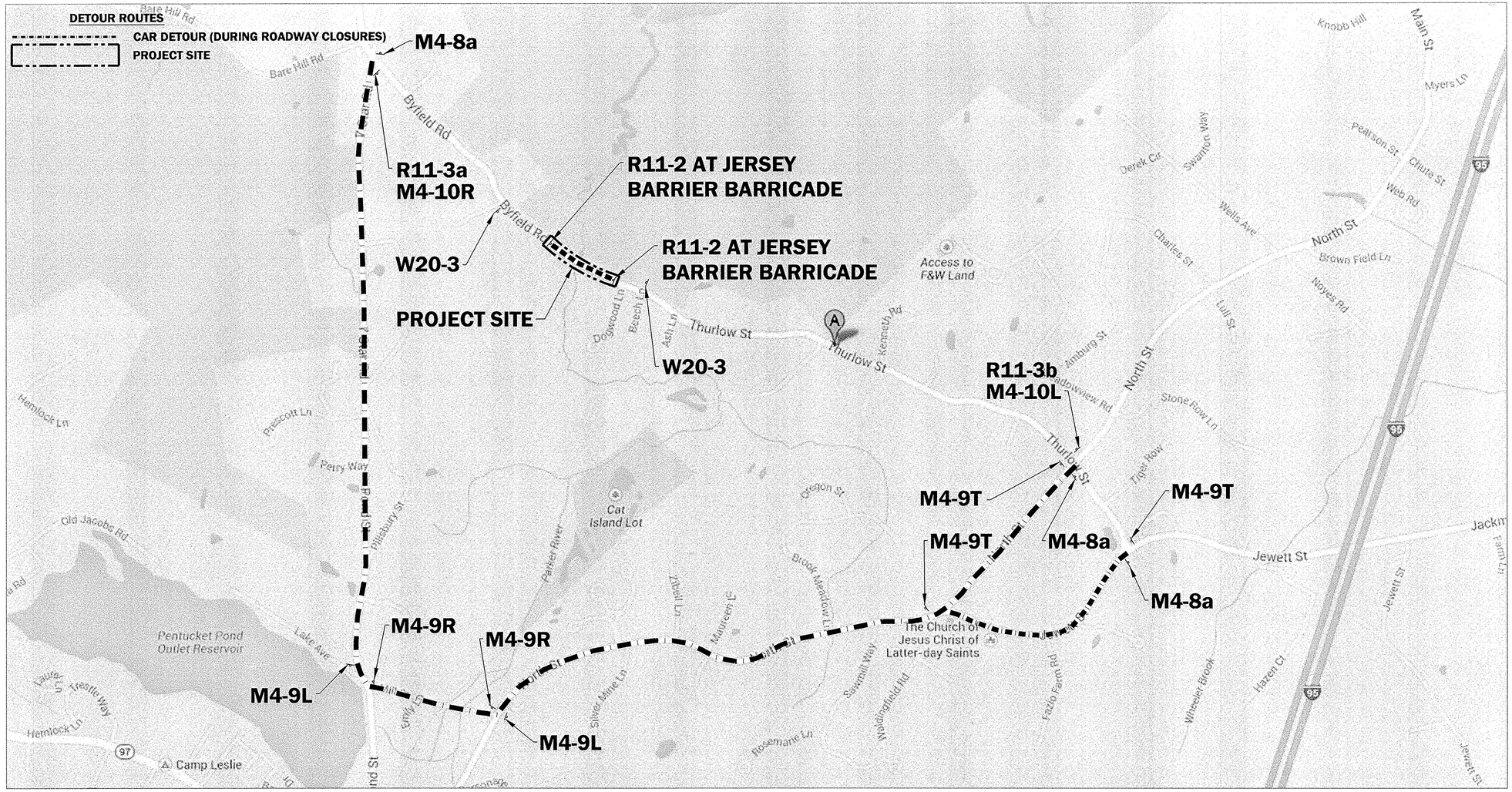
LEGEND AND GENERAL NOTES

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM HMGP 1959-09
Prepared For
TOWN OF GEORGETOWN GEORGETOWN, MASSACHUSETTS

COUGHLIN ENVIRONMENTAL SERVICES, LLC
CONSULTING ENGINEERS AND PLANNERS
62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03 Thurlow Street Culvert\CAD\legend.dwg
CES NO.: 2510-03 SCALE: N.T.S.

© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC



NOTES:
1. DURING CONSTRUCTION HOURS, CONTRACTOR SHALL MAINTAIN ONE-LANE, TWO-WAY TRAFFIC CONTROL WITH THE USE OF TWO POLICE DETAILS.
2. FULL ROADWAY CLOSURES WILL BE PERMITTED ONLY DURING THE INSTALLATION OF THE CULVERT AND NO LONGER THAN A FOUR (4) WEEK DURATION.
3. DURING NON-CONSTRUCTION HOURS, BOTH LANES SHALL BE OPEN TO TRAFFIC WITH ADEQUATE WARNING DEVICES (TO BE APPROVED BY THE ENGINEER) IN PLACE TO ALERT MOTORISTS OF ANY HAZARDS.
4. SIGNS ARE TO BECOME THE PROPERTY OF THE TOWN UPON COMPLETION OF CONSTRUCTION.
5. TEMPORARY TRAFFIC SIGNS SHALL BE NEW .080 INCH THICK FLAT ALUMINUM REFLECTIVE SHEETING APPLIED OVER THE SURFACE. THE LETTERING AND BACKGROUND ARE BOTH TO BE REFLECTIVE.
6. JERSEY BARRIERS SHALL BE UTILIZED DURING PERIODS OF FULL ROADWAY CLOSURE AT THE PROJECT SITE LIMITS.

TRAFFIC SIGN SUMMARY

MUTCD #	SIGN	QUAN.	DIM.	MUTCD #	SIGN	QUAN.	DIM.
M4-8a	END THURLOW ST. DETOUR	3	48"x30"	M4-10R	DETOUR	1	48"x18"
M4-9L	THURLOW ST. DETOUR	2	48"x30"	R11-2	ROAD CLOSED	2	48"x30"
M4-9T	THURLOW ST. DETOUR	3	48"x30"	R11-3a	ROAD CLOSED 1/2 MILE AHEAD LOCAL TRAFFIC ONLY	1	60"x30"
M4-9R	THURLOW ST. DETOUR	2	48"x30"	R11-3b	ROAD CLOSED 1 MILE AHEAD LOCAL TRAFFIC ONLY	1	60"x30"
M4-10L	DETOUR	1	48"x18"	W20-3	ROAD CLOSED 500 FT.	2	36"x36"

REV.	DESCRIPTION	DATE
DRW: AAS	DSG: AAS	CHK: DJC

CIVIL: DANIEL J. COUGHLIN CIVIL No. 23303 REGISTERED PROFESSIONAL ENGINEER 5/1/15

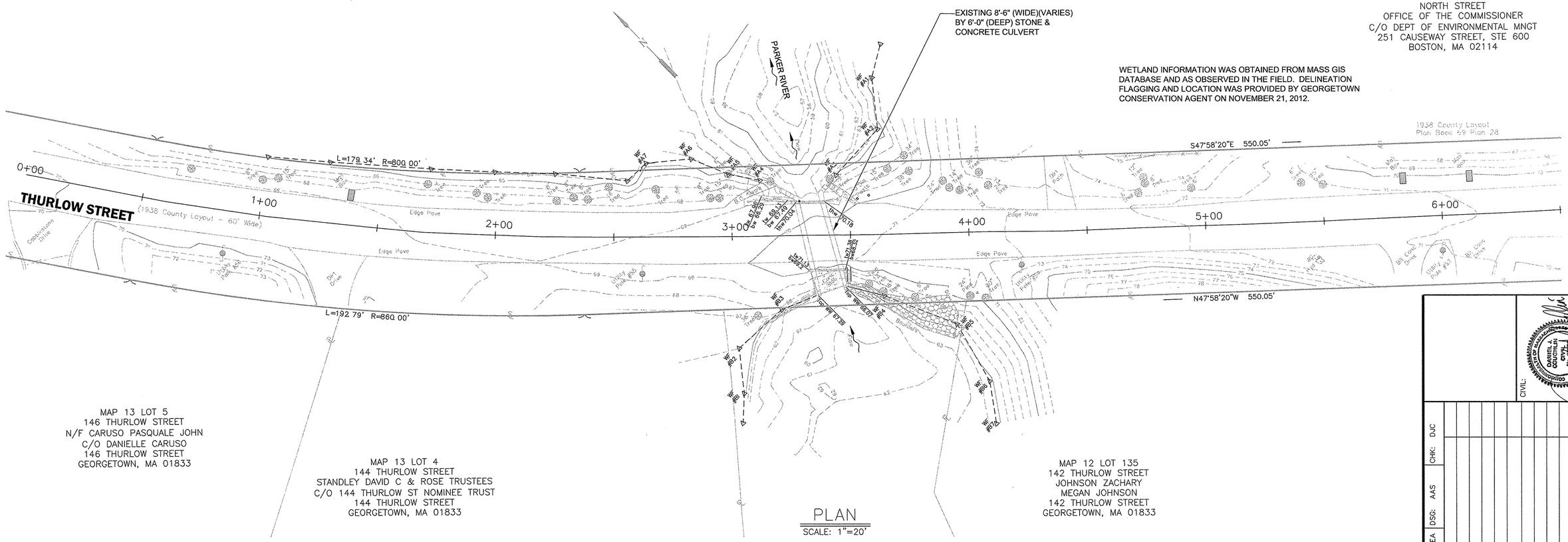
TRAFFIC MANAGEMENT PLAN

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM
HMGP 1959-09
Prepared For
TOWN OF GEORGETOWN
GEORGETOWN, MASSACHUSETTS

COUGHLIN ENVIRONMENTAL SERVICES, LLC
CONSULTING ENGINEERS AND PLANNERS
62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03\CAD\TMP.dwg
CES NO.: 2510-03 SCALE: N.T.S.

© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC



PLAN
SCALE: 1"=20'

REV.	DESCRIPTION	DATE

DRW: AAS/EA DSG: AAS CHK: DJC

CIVIL: DANIEL J. COUGHLIN CIVIL No. 37338 REGISTERED PROFESSIONAL ENGINEER

EXISTING CONDITIONS SITE PLAN

CULVERT AND ROADWAY UPGRADE AT
PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY
MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM
HMGP 1959-09

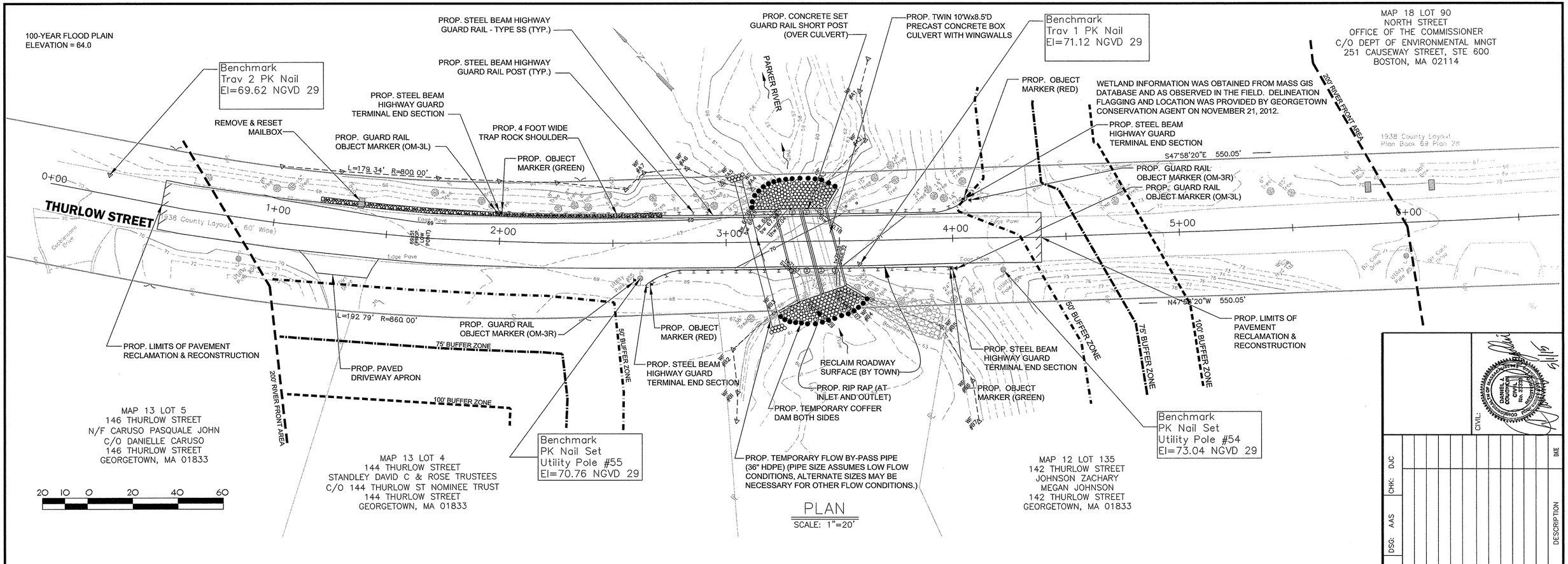
Prepared For

TOWN OF GEORGETOWN
GEORGETOWN, MASSACHUSETTS

COUGHLIN ENVIRONMENTAL SERVICES, LLC
CONSULTING ENGINEERS AND PLANNERS
62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

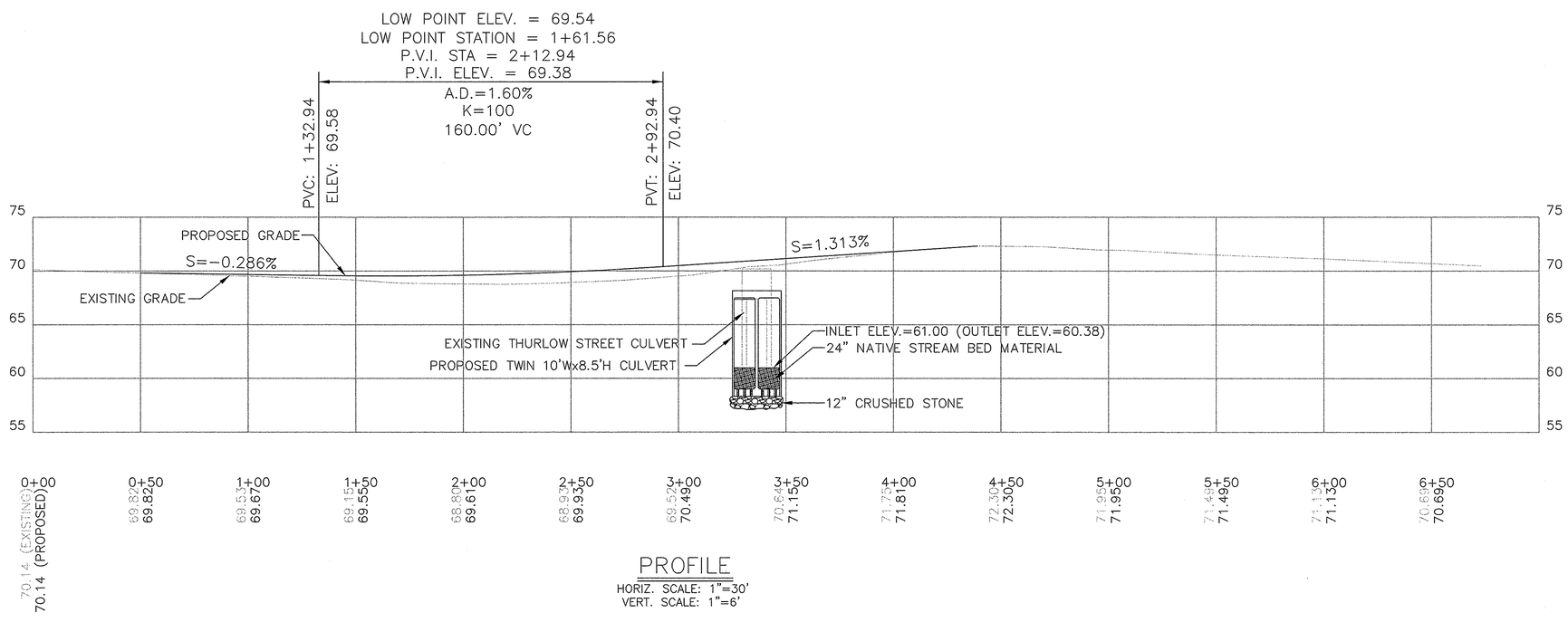
DATE: MAY 2015
Q:\Projects\2510-03 Thurlow Street Culvert\CAD\BASE.dwg
CES NO.: 2510-03 | SCALE: AS NOTED

© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC



PLAN

SCALE: 1"=20'



PROFILE

HORIZ. SCALE: 1"=30'
VERT. SCALE: 1"=6'

REV.	DESCRIPTION	DATE

DRW: AAS DSG: AAS CHK: DJC

CIVIL: DANIEL J. COUGHLIN COMMONWEALTH OF MASSACHUSETTS No. 23351 PROFESSIONAL ENGINEER

PROPOSED ROADWAY SITE PLAN

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM
HMGP 1959-09

Prepared For

TOWN OF GEORGETOWN
GEORGETOWN, MASSACHUSETTS

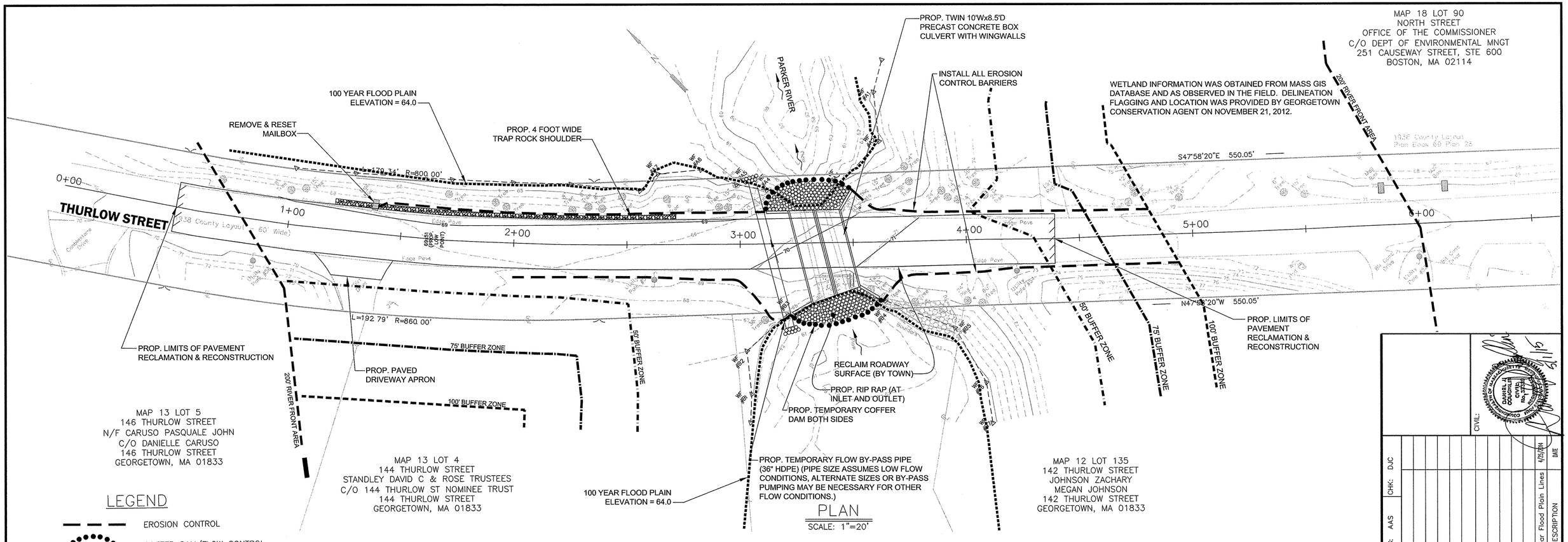
COUGHLIN ENVIRONMENTAL SERVICES, LLC

CONSULTING ENGINEERS AND PLANNERS

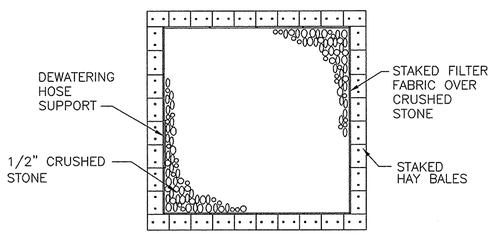
62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03 Thurlow Street Culvert\CAD\base.dwg
CES NO.: 2510-03 SCALE: AS NOTED

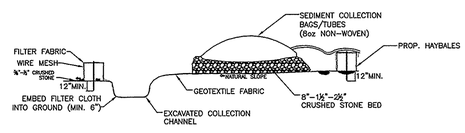
© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC



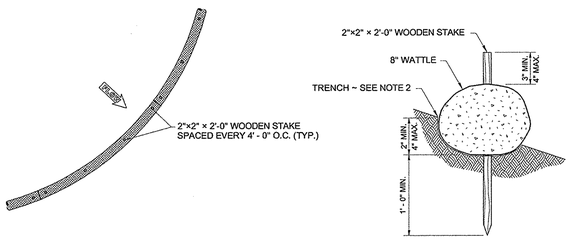
PLAN
SCALE: 1"=20'



DEWATERING BASIN
N.T.S.

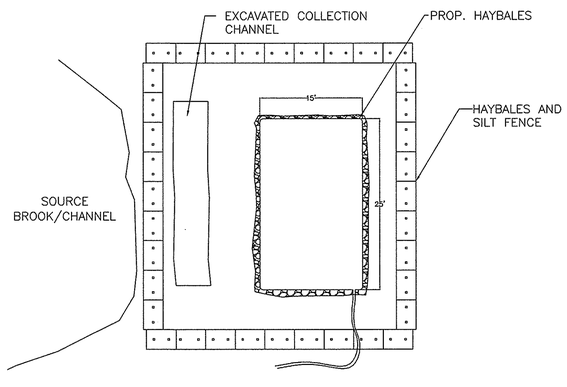


DEWATERING BAG DETAIL - ELEVATION
N.T.S.

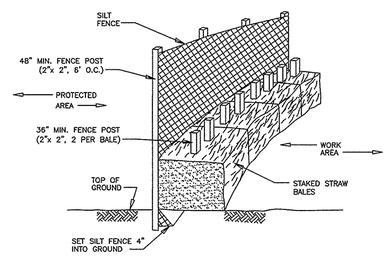


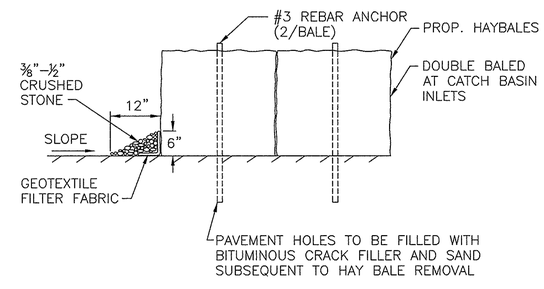
STRAW WATTLE EROSION CONTROL DETAILS
N.T.S.

NOTES:
1. INSTALL WATTLES ALONG CONTOURS. KNOT EACH END OF THE WATTLES TOGETHER BEFORE STAKING.
2. WATTLES TO BE BACKFILLED OR DUG-IN TO REDUCE RISK OF FLOW UNDER BARRIER.



DEWATERING BAG DETAIL - PLAN VIEW
N.T.S.





HAYBALE DETAIL
N.T.S.

DRW: AAS/EA	DSG: AAS	CHK: DJC

REV.	DESCRIPTION	DATE
1	Added 100-Year Flood Plain Lines	4/13/2016

CIVIL:

EROSION CONTROL PLAN

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM
HMGP 1959-09

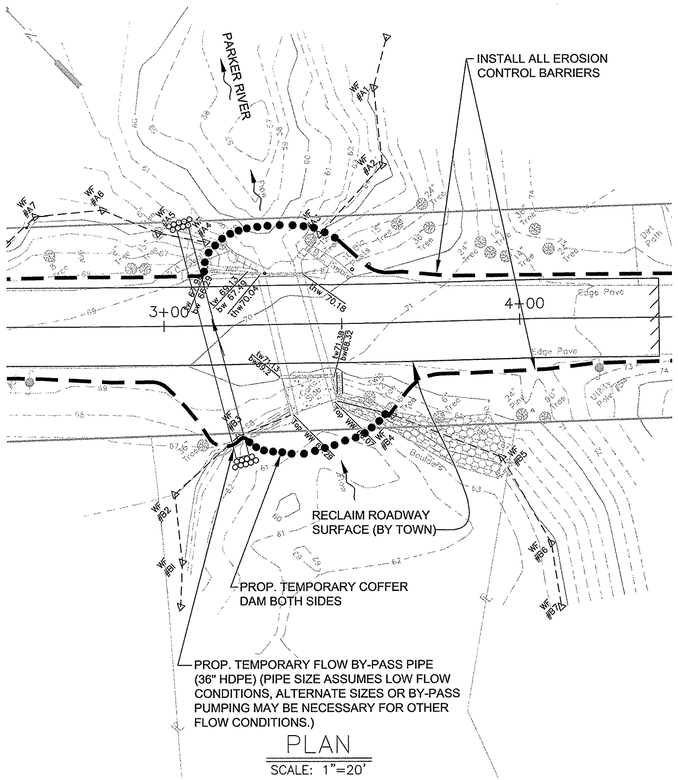
Prepared For

TOWN OF GEORGETOWN
GEORGETOWN, MASSACHUSETTS

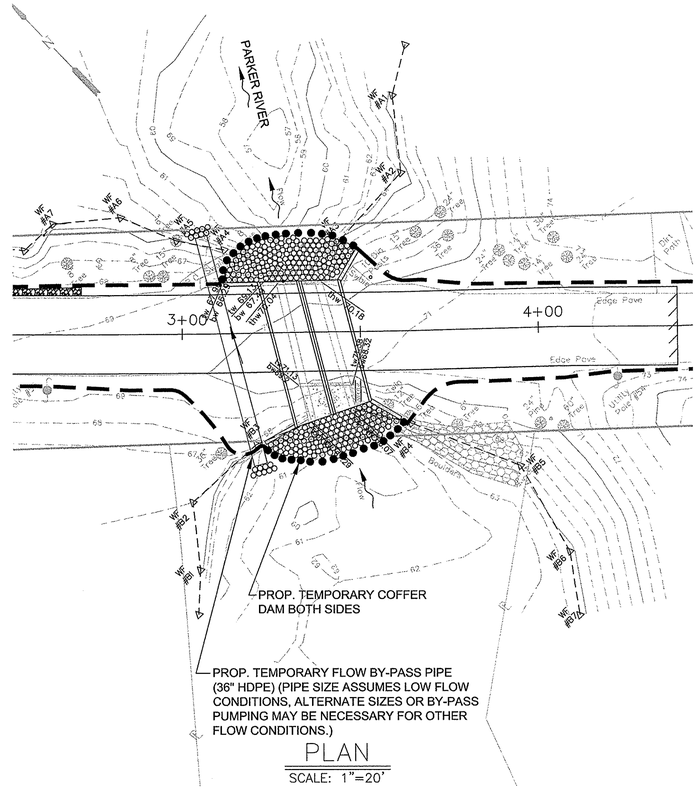
COUGHLIN ENVIRONMENTAL SERVICES, LLC
CONSULTING ENGINEERS AND PLANNERS
62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03 Thurlow Street Culvert\CAD\base.dwg
CES NO.: 2510-03 | SCALE: AS NOTED

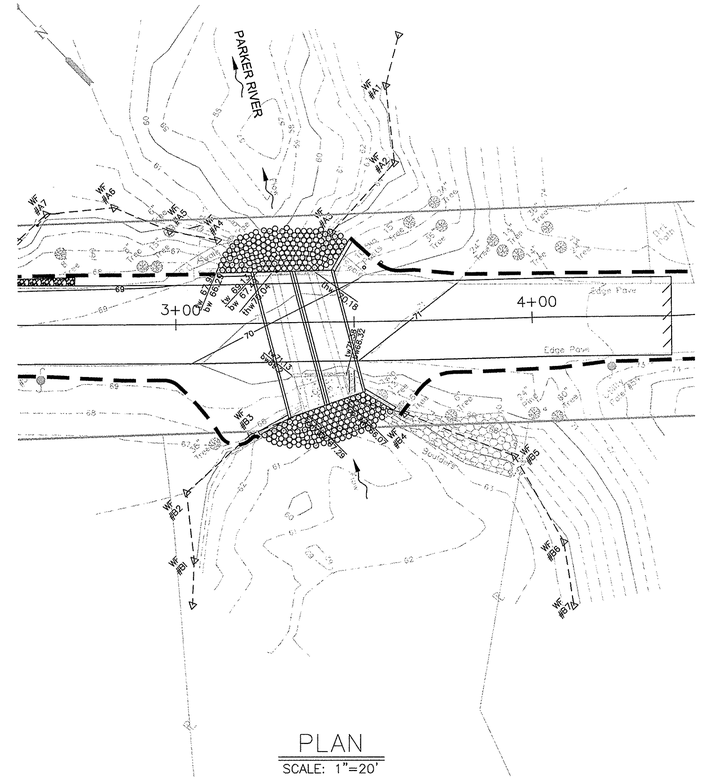
© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC



1. SETUP FLOW DIVERSION AT CULVERT CROSSING



2. CULVERT REPLACEMENT AT CULVERT CROSSING



3. REMOVE DIVERSION/RE-ESTABLISH FLOW AND COMPLETE SITE WORK, GUARD RAIL & PAVING

PROPOSED FLOW CONTROL SEQUENCE

1.) INSTALL FLOW CONTROL FOR CULVERT
2.) ESTABLISH NECESSARY DEWATERING AND SILTATION CONTROL MEASURES.
3.) CONSTRUCT CULVERT.
4.) STABILIZE INLET, OUTLET STREAM BED AND BANKS.
5.) RESTORE FLOW.

© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC

CIVIL:

REV.	DESCRIPTION	DATE
1	REVISED NOTES	4/17/2015

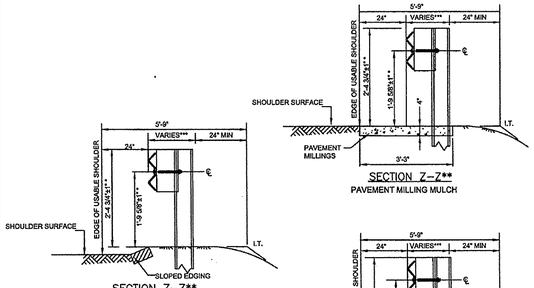
DRW: AAS DSG: AAS CHK: DJC

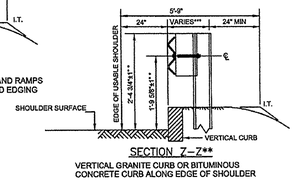
WATER DIVERSION PLAN

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM HMGP 1959-09
Prepared For
TOWN OF GEORGETOWN GEORGETOWN, MASSACHUSETTS

COUGHLIN ENVIRONMENTAL SERVICES, LLC
CONSULTING ENGINEERS AND PLANNERS
62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03 Thurlow Street Culvert\CAD\base.dwg
CES NO.: 2510-03 | SCALE: AS NOTED

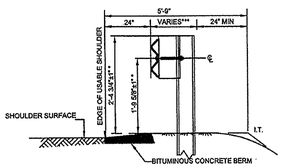


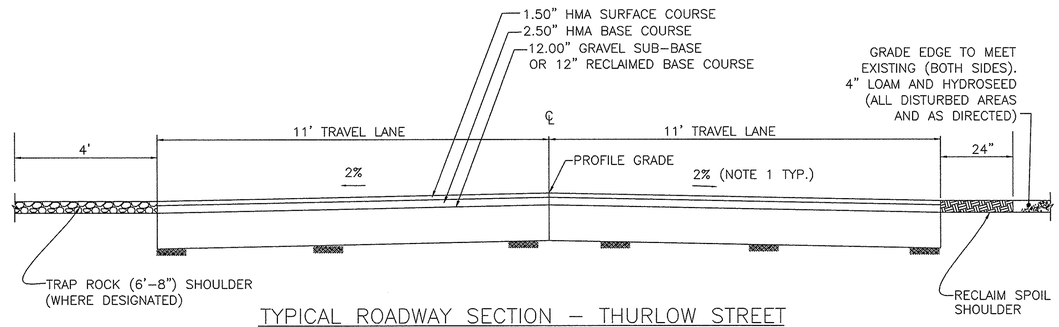


* WHEN PLACED IN MEDIAN, CHANGE TO THRIE BEAM AND HEIGHT TO 2'-8 1/2"±1". (NOTE ℄ HEIGHT OF RAIL IS ALWAYS 1'-9 5/8"±1")

** SEE E 401.1.0 FOR SECTION Z-Z LOCATION

*** VARIES ACCORDING TO POST MATERIAL





TYPICAL ROADWAY SECTION – THURLOW STREET

SCALE: 1" = 2'

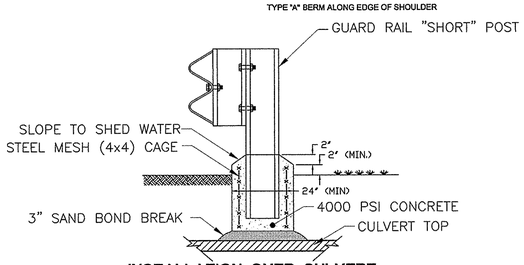
PAVEMENT DESIGN (TYP.)

PAVEMENT
1.50" HMA SURFACE COURSE
2.50" HMA BASE COURSE

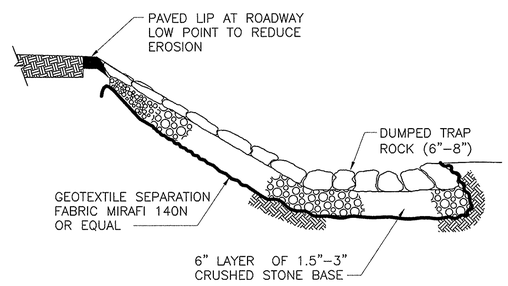
SUB-BASE
12" GRAVEL OR 12" RECLAIMED BASE COUSE

PAVEMENT NOTES

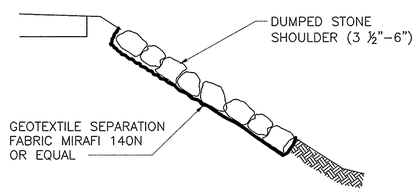
1. NORMAL CROSS SLOPE IS 2% BUT MAY VARY AS DEFINED ON THE PLANS.
2. WHERE THERE IS INSUFFICIENT RECLAIMED PAVEMENT, PROVIDE GRAVEL BORROW (TYPE b) TO BE BLENDED WITH THE PULVERIZED MATERIAL IN QUANTITIES TO PRODUCE A UNIFORM BLEND SUITABLE FOR USE AS BASE COURSE (MIX IN PLACE).
3. UNSUITABLE MATERIAL IN THE SUBGRADE SHALL BE REMOVED TO THE LINES AND DEPTHS ESTABLISHED BY THE ENGINEER AND REPLACED WITH GRAVEL BORROW OR RECLAIMED BASE COURSE.
4. GUARDRAIL LOCATIONS DEPICTED ON PLAN.



INSTALLATION OVER CULVERT



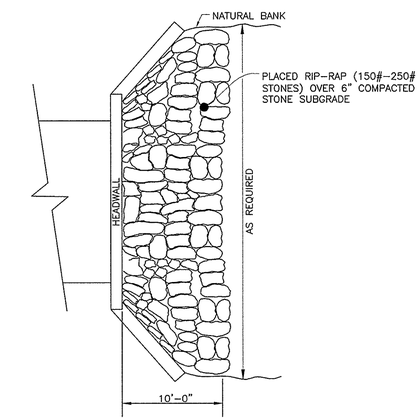
TYPICAL ROADWAY SIDE (SLOPE >2:1)



TYPICAL ROADWAY SIDE (SLOPE < 2:1)

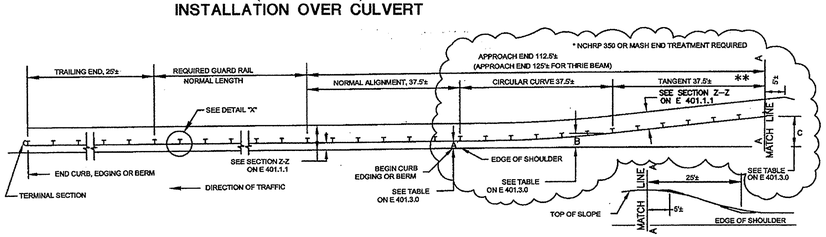
NOT TO SCALE

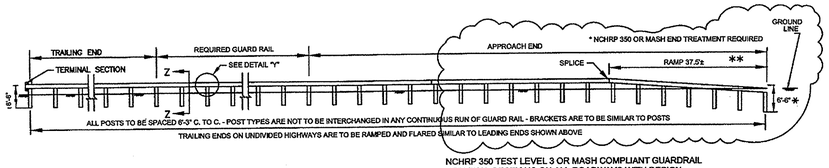
SIDE SLOPE STABILIZATION METHODS (ADJACENT TO ALL WINGSWALL AND AS DIRECTED)



RIP RAP DETAIL

NOT TO SCALE

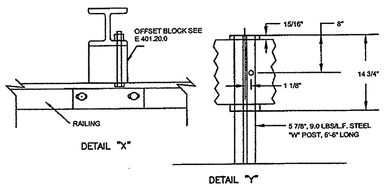




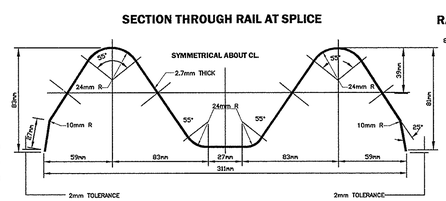
NCHRP 350 TEST LEVEL 3 OR MASH COMPLIANT GUARDRAIL TERMINAL SECTIONS ON ALL ROADWAYS WITH DESIGN SPEED OF 50 MPH OR GREATER.
BURIED ENDS ONLY FOR ROADWAYS WITH SPEEDS LESS THAN 50 MPH.

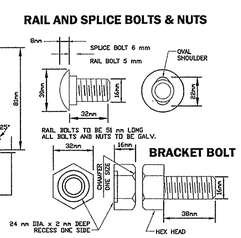
* STANDARD LENGTH POST TO BE USED IN RAMPED SECTIONS.

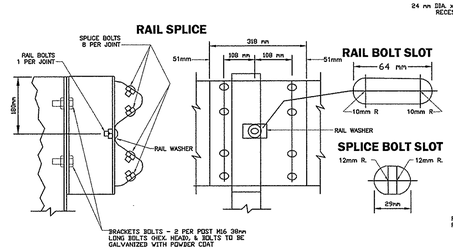
** 50' FOR THRIE BEAM.

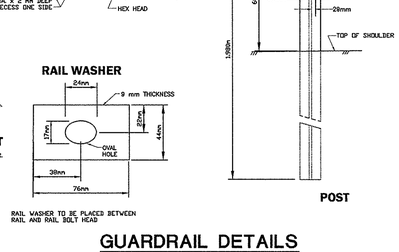


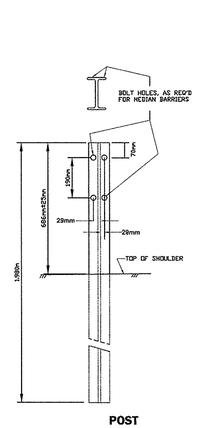
NOTES:
1. THIS METHOD OF INSTALLATION IS APPLICABLE WHEN THE EMBANKMENT SLOPE ADJACENT TO THE ROADWAY IS 1V:2H OR STEEPER.
2. WHEN PLACED IN MEDIAN, CHANGE TO THRIE BEAM AND HEIGHT 2'-8 1/2"±1". FOR SECTION Z-Z, (NOTE ℄ HEIGHT IS ALWAYS 21 1/2")
3. LENGTHS OF HIGHWAY GUARD SHOWN ARE MEASUREMENTS ALONG THE FACE OF THE RAILING.
4. OTHER DETAILS ARE SHOWN ON E 401.5.0 - E 401.10.0
5. FOR DESCRIPTION, MATERIALS AND CONSTRUCTION METHODS SEE STANDARD SPECIFICATIONS.
6. DETAILS SHOWN HERE ALSO APPLY TO THRIE BEAM GUARD RAIL EXCEPT AS OTHERWISE NOTED.

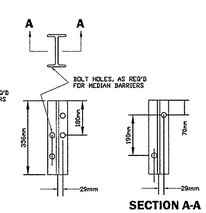


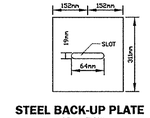




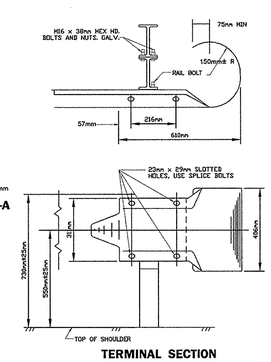








STEEL BACK-UP PLATE
2.7 mm THICK



TERMINAL SECTION

1. POST AND OFFSET BRACKETS TO BE FABRICATED FROM W150 x 13S
2. POST AND BRACKETS BOLTS HOLES TO BE 19mm DIA.
3. BACK UP PLATE TO BE USED ON POSTS WHERE NO SPLICE OCCURS.
4. FABRICATION DIMENSIONS ALSO APPLY TO 'C' POSTS AND BRACKETS.

GUARDRAIL DETAILS

NOT TO SCALE

1. REFER TO MHD CONSTRUCTION STANDARD DETAILS 401.1.0R, 401.7.0 AND 401.8.0 FOR STEEL BEAM HIGHWAY GUARD RAIL, TYPE SS.
2. GUARD RAIL SHALL HAVE BOLT-ON TRAPEZOIDAL WHITEW REFLECTORS INSTALLED AT A 50' MAXIMUM SPACING.
3. GUARD RAIL (NEW & RE-SET LENGTH) SHALL HAVE RED REFLECTORIZED OBJECT MARKERS INSTALLED AT THE BEGINNING OF THE GUARDRAIL AS VEHICLES APPROACH AND A GREEN REFLECTORIZED OBJECT MARKER AT THE TERMINAL END. GUARD RAIL APPROACH END SHALL ALSO HAVE OM-3R OBJECT MARKERS INSTALLED.

CIVIL:

DRW:	AAS/EA	DSG:	AAS	CHK:	DJC
REV.	DESCRIPTION				DATE
1	REVISED NOTES				4/27/2015

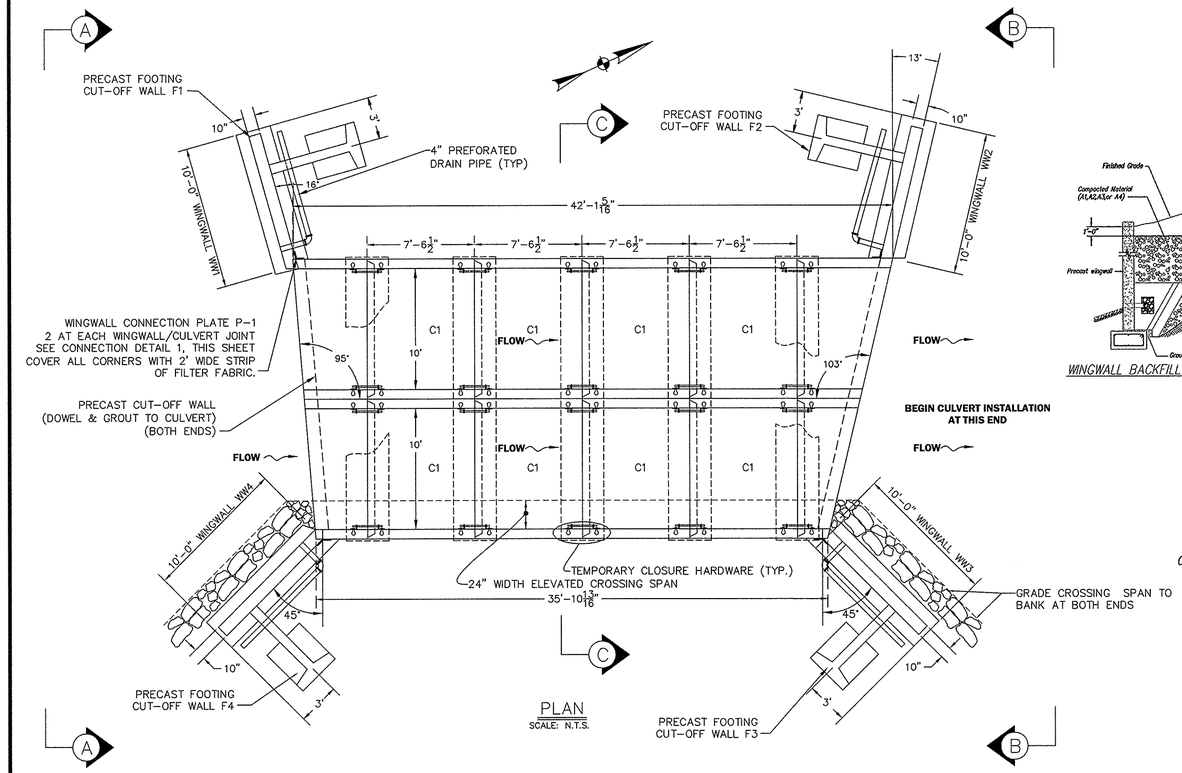
TYPICAL CROSS SECTION AND ROADWAY DETAILS

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM
HMGP 1959-09
Prepared For
TOWN OF GEORGETOWN
GEORGETOWN, MASSACHUSETTS

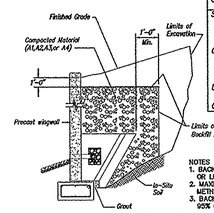
COUGHLIN ENVIRONMENTAL SERVICES, LLC
CONSULTING ENGINEERS AND PLANNERS
62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03\CAD\TYP-XSEC.dwg
CES NO.: 2510-03 | SCALE: 1" = 2'

© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC



PLAN
SCALE: N.T.S.



WINGWALL BACKFILL REQUIREMENTS

BACKFILL DESCRIPTION									
Group Classification	A-1		A-3	A-2					A-4
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7		
Sieve Analysis, Percent Passing									
No. 10	50 max.								
No. 40	30 max.	50 max.	51 min.						
No. 200	15 max.	25 max.	10 max.	35 max.	35 max.	35 max.	35 max.		36 min.
Characteristics of Fraction Passing									
No. 40									
Liquid Limit				40 max.	41 min.	40 max.	41 min.		40 max.
Plasticity Index	6 max.		N.P.	10 max.	10 max.	11 min.	11 min.		10 max.
Usual Types of Significant Constituent Materials	Stone Fragments, Gravel & Sand		Fine Sand	Silty or Clayey Gravel and Sand					Silty Soils
General Rating as Subgrade	Excellent to Good								Fair to Poor

NOTES
1. BACKFILLING OPERATIONS WITHIN THE C.B.Z. SHALL BE PERFORMED IN LIFTS OF 8" OR LESS (LOOSE DEPTH).
2. MAXIMUM DRY DENSITY SHALL BE DETERMINED BY AASHTO T-99 OR OTHER APPROVED METHODS.
3. BACKFILL SHALL BE COMPACTED IN LAYERS UNTIL THE DENSITY IS NOT LESS THAN 90% OF THE MAXIMUM DRY DENSITY.

GENERAL NOTES

1. REFERENCE STANDRADS:
   AASHTO "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES"
   ASTM C1433
2. DESIGN PARAMETERS:
   LIVE LOAD: AASHTO HS25
   EARTH COVER: ASSUME 1.5 FEET FOR LOADING DESIGN
   CONCRETE: DESIGN STENGTH F'C = 5,000 PSI (MIN)
   UNIT WEIGHT = 150 PCF
   REINFORCING: ASTM A615 (REBAR), GRADE 60
   ASTM A185 (WWF) FY = 65 KSI
   SOIL: UNIT WEIGHT = 120 PCF
   MINIMUM LATERAL PRESSURE COEFFICIENT .25
   MAXIMUM LATERAL PRESSURE COEFFICIENT .50
   COVER TO REINFORCING: 1 1/2" U.N.O.
3. DIMENSIONS INCLUDE A JOINT CAP. ACTUAL CULVERT PIECE LENGTH ½" SHORTER (i.e. C2 = 7'-6").
4. NO DAMPPROOFING SUPPLIED BY CSI.
5. DBS ARE DOWEL BAR SPLICERS AND DI ARE DOWEL INS.
6. PRECAST HEADWALLS NOT DESIGNED FOR IMPACT LOAD.
7. FILL 1' GAP BETWEEN BOX CULVERTS AND AT ALL PRECAST JOINNING AREAS WITH NON-SHRINK GROUT.

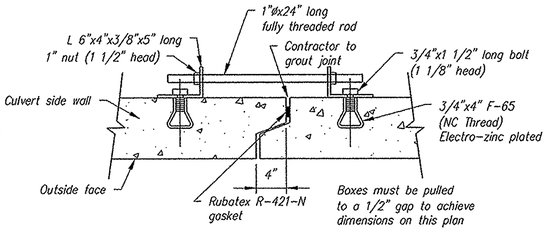
WINGWALL NOTES

GENERAL NOTES:

1. THE WINGWALLS HAVE BEEN DESIGNED FOR GENERAL SITE CONDITIONS. THE END OF WINGWALL SHALL BE NO HIGHER THAN 12" ABOVE SLOPE GRADE OF UP HILL SIDE. ALL WINGWALLS SHALL BE GROUTED IN PLACE.
2. PRIOR TO CONSTRUCTION, CONTRACTOR MUST VERIFY ALL ELEVATIONS SHOWN THROUGH THE ENGINEER.

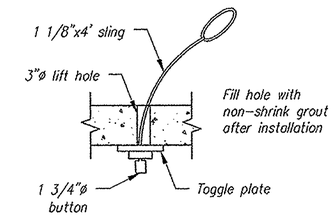
DESIGN DATA

DESIGN METHOD: LOAD FACTOR PER AASHTO SPECIFICATION WINGWALLS DESIGNED FOR EARTH PRESSURE ASSUMED ALLOWABLE SOIL BEARING: 3,000 PSF

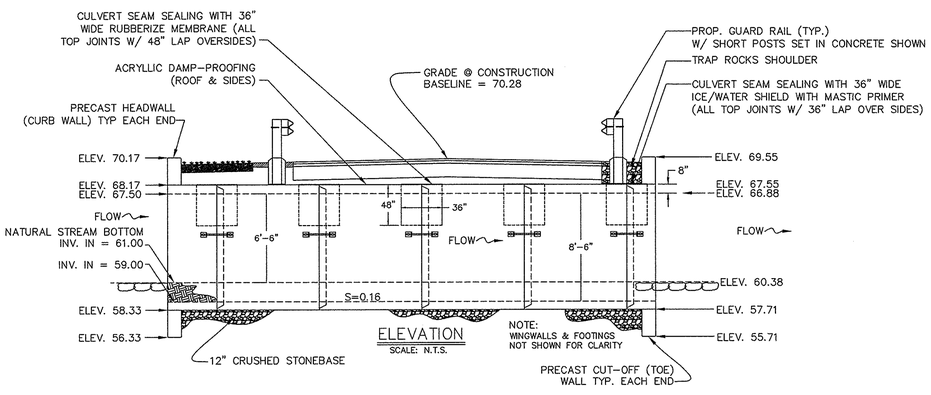


Closure hardware is temporary and is to be removed after installation

JOINT DETAIL



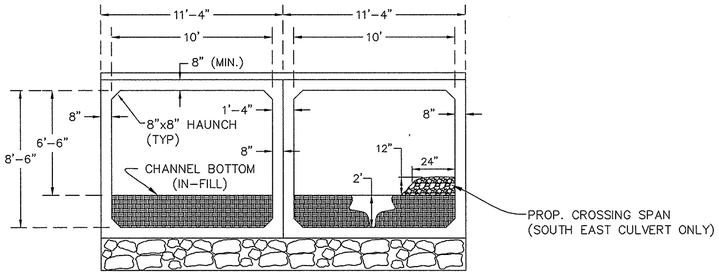
CULVERT LIFTING DETAIL



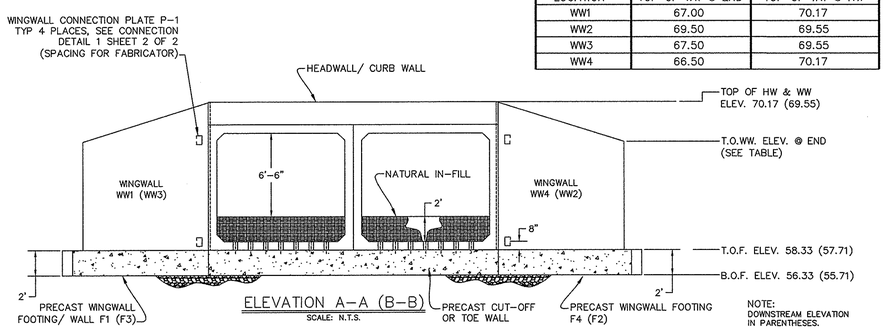
ELEVATION
SCALE: N.T.S.

NOTE:
WINGWALLS & FOOTINGS NOT SHOWN FOR CLARITY

WINGWALL ELEVATION TABLE		
LOCATION	TOP OF WW @ END	TOP OF WW @ HW
WW1	67.00	70.17
WW2	69.50	69.55
WW3	67.50	69.55
WW4	66.50	70.17

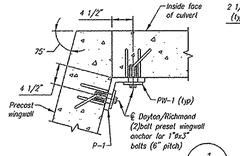


TYP. CULVERT SECTION C-C
SCALE: N.T.S.

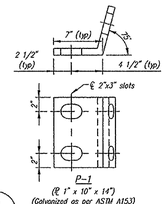


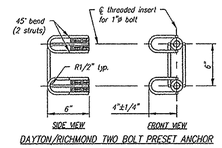
ELEVATION A-A (B-B)
SCALE: N.T.S.

NOTE:
DOWNSTREAM ELEVATION IN PARENTHESES.

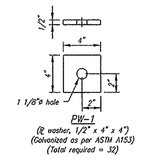


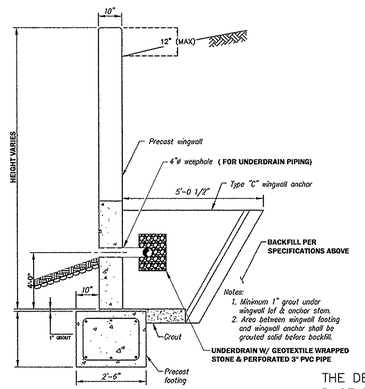
CONNECTION DETAIL (1 1of1)



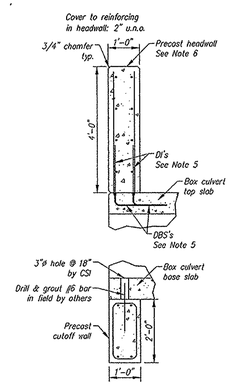


DAYTON/RICHMOND TWO BOLT PRESET ANCHOR





TYPICAL WINGWALL SECTION



SECTION A

Concrete Systems Inc.
9 Commercial St., Hudson, NH 03051
Phone 603-889-4163
Fax 603-889-2417

THE DESIGN ASPECTS AND DETAILS PRESENTED ON THIS PLAN HAVE UTILITIZED BASE DRAWING PREPARED FOR CES BY CONCRETE SYSTEMS INC. (CSI) FINAL SHOP DRAWING MAY VARY SUBJECT TO ENGINEER APPROVAL. THIS PLAN SHEET IS PRESENTED FOR REFERENCE ONLY. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS AND ELEVATIONS PRIOR TO FABRICATION.

CIVIL: DANIEL J. COUGHLIN CIVIL No. 23262 COMMONWEALTH OF MASSACHUSETTS

DRW: AAS/EA	DSG: AAS	CHK: DJC		REV.	DESCRIPTION	DATE

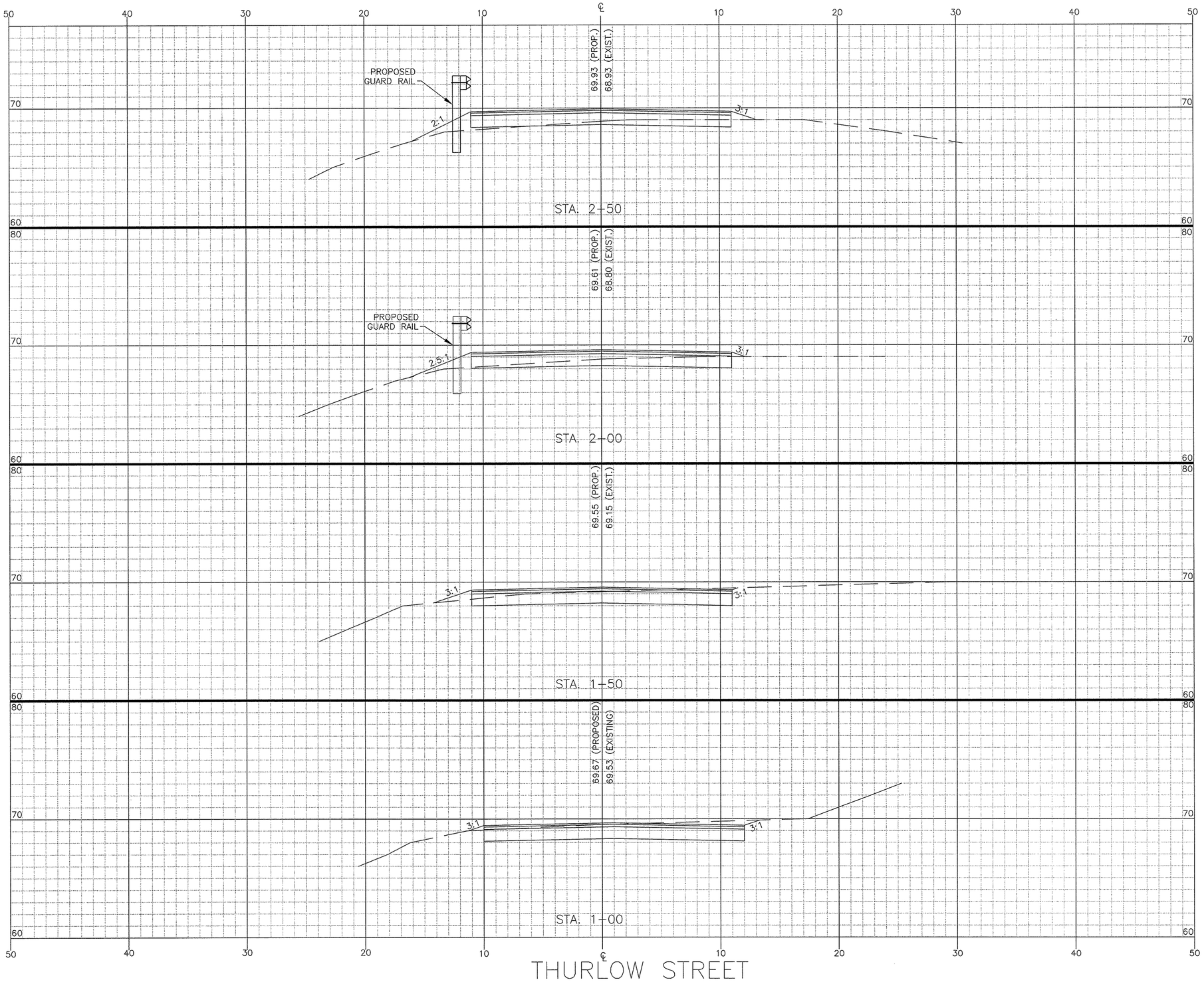
BOX CULVERT LAYOUT AND DETAILS

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM
HMGP 1959-09
Prepared For
TOWN OF GEORGETOWN
GEORGETOWN, MASSACHUSETTS

COUGHLIN ENVIRONMENTAL SERVICES, LLC
CONSULTING ENGINEERS AND PLANNERS
62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03 Thurlow Street Culvert\CAD\DETAILS.dwg
CES NO.: 2510-03 SCALE: N.T.S.

© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC



DRW: AAS	DSG: AAS	CHK: DJC	
REV.	DESCRIPTION		DATE

CIVIL:

THURLOW STREET
CROSS SECTIONS
STA. 1+00 TO STA. 2+50

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM
HMGP 1959-09

Prepared For

TOWN OF GEORGETOWN
GEORGETOWN, MASSACHUSETTS

COUGHLIN ENVIRONMENTAL SERVICES, LLC

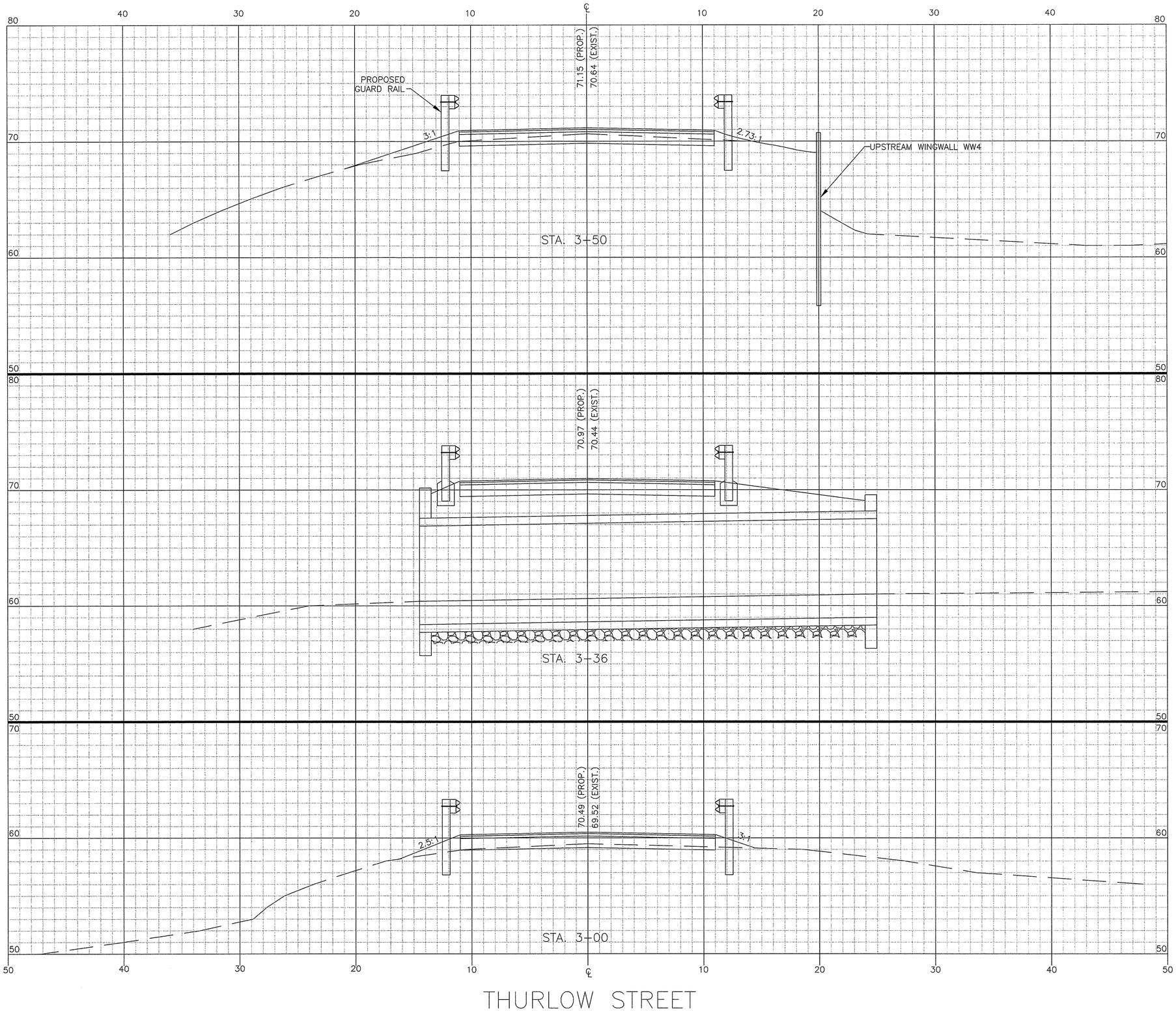
CONSULTING ENGINEERS AND PLANNERS

62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03\CAD\Cross Sections.dwg
CES NO.: 2510-03 | SCALE: 1" = 4'

SHEET 9 OF 10

© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC



REV.	DESCRIPTION	DATE

DRW: AAS DSG: AAS CHK: DJC

CIVIL:

THURLOW STREET
CROSS SECTIONS
STA. 3+00 TO STA. 3+50

CULVERT AND ROADWAY UPGRADE AT PARKER RIVER AT THURLOW STREET
MASSACHUSETTS EMERGENCY MANAGEMENT AGENCY
HAZARD MITIGATION GRANT PROGRAM
HMGP 1959-09

Prepared For

TOWN OF GEORGETOWN
GEORGETOWN, MASSACHUSETTS

COUGHLIN ENVIRONMENTAL SERVICES, LLC

CONSULTING ENGINEERS AND PLANNERS

62 Montvale Avenue
Stoneham, MA 02180-3637
Phone: (781) 832-1002
Fax: (781) 438-9654
Email: mail@coughlinenvironmental.com

DATE: MAY 2015
Q:\Projects\2510-03\CAD\Cross Sections.dwg
CES NO.: 2510-03 SCALE: 1" = 4'

SHEET 10 OF 10

© 2014 COUGHLIN ENVIRONMENTAL SERVICES, LLC