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#### Submission information

Form: [Capital Request Form - Non-Vehicle Related](#) <sup>[1]</sup>  
Submitted by Anonymous (not verified)  
September 28, 2021 - 10:17am  
71.126.253.36

**Department Name**  
DPW

**Department Head Name**  
Karen

**Department Head Title**  
Superintendent

**Fiscal Year Requested**  
FY22 (only use for Fall 2021 STM or in year use of funds not requiring Town Meeting action)

**Project Description**  
Replace a rotted culvert in Northborough Road

**Select how your project fits into one or more of the following conditions from the town's Capital Plan**  
Improvement to infrastructure

**Why is the project being requested?**  
The culvert failed several years ago. We were able to put a plate over the broken area and pave over it to lock the plate in place. The culvert has deteriorated more and the plate is sinking and a new sink hole has appeared. We need to address the issue.

**Estimated Useful Life (in years)**  
50

**Amount Requested**  
70,000

**Expected Funding Source**  
General Fund

**What alternate funding sources have you pursued to offset any portion of the amount requested?**  
We looked into some small bridge and culvert replacement money but we have not qualified for any of those to date.

**Describe and quantify any revenue that this project may create for the town or alternatively operating costs that may be reduced (if applicable)**  
None

**Estimated Annual Maintenance Cost of Project**  
5,000

**Provide details of the expected timeline for implementation of this project, upon funding**  
Design and spec still need to be completed. Permits are in place. Could likely bid over the winter. Work will be in spring or summer.

**Please provide any supporting documentation that supports the amount requested including any available vendor quotes.**  
[11-02-2015\\_michie\\_quote.pdf](#) <sup>[2]</sup>

**Please provide any additional files that you believe may be helpful with our review of this request**  
[northborough\\_culvert\\_plan.pdf](#) <sup>[3]</sup>

**Date Submitted**  
September 29, 2021

**Source URL:** <https://www.southboroughtown.com/node/123501/submission/9326>

**Links**  
<sup>[1]</sup> <https://www.southboroughtown.com/capital-planning-committee/webforms/capital-request-form-non-vehicle-related>  
<sup>[2]</sup> [https://www.southboroughtown.com/system/files/webform/11-02-2015\\_michie\\_quote.pdf](https://www.southboroughtown.com/system/files/webform/11-02-2015_michie_quote.pdf)  
<sup>[3]</sup> [https://www.southboroughtown.com/system/files/webform/northborough\\_culvert\\_plan.pdf](https://www.southboroughtown.com/system/files/webform/northborough_culvert_plan.pdf)



Michie Corporation  
173 Buxton Industrial Drive  
Henniker, NH 03242  
Phone: (603) 428-3218  
Fax: (603) 428-7426

Quote Number: 6882

Order Date: 11/2/2015

Customer Copy

<b>Bill to:</b>	C.O.D CLIENTS TOWN OF SOUTHBOROUGH, MA	<b>Delivery to:</b>	SOUTHBOROUGH, MA - CULVERT REPLACEMENT NORTHBOROUGH ROAD SOUTHBOROUGH, MA
<b>Contact:</b>	Bob Sykes	<b>Project Manager:</b>	
<b>Phone :</b>		<b>Phone :</b>	
<b>Fax:</b>		<b>Fax:</b>	
<b>Customer ID:</b>	CASH	<b>PO:</b>	
<b>Terms:</b>	C.O.D.	<b>ShipVia:</b>	
		<b>Sales Rep:</b>	Don A.

Qty	Item	Description	Unit Price	TX	Extension
<b>Structure: BC Precast Box Culvert</b>					
1	280800	Box Culvert: 8' Span x 6' Rise	\$23,740.00	<input checked="" type="checkbox"/>	\$23,740.00

Box Culvert lay length shall be 45'-0", cast in 6 sections, 7'-6" long with sloped end sections.

**PRICE INCLUDES:**

- Designed for AASHTO HL-93 loading requirements for 0' to 2' earth cover.
- Concrete f/c: 5,000 psi @ 28 days. Cement per ASTM C-150.
- Reinforcing: Grade 60 black deformed bar per ASTM A-615.
- Bolt pockets, galvanized 7/8" threaded rods, nuts and washers to secure sections together.
- 1" Neoprene closed cell joint sealant and adhesive.
- Royston 104 AHT, 24" wide joint wrap with adhesive (supply item only, applied by contractor).
- Heaviest section to weigh approximately 13.3 tons (end section with attached curb).

**SPECIFIC EXCLUSIONS:**

- Exterior coatings, membranes and surface sealers.
- Crane rental service and all associated rigging appurtenances supplied by others.

**\$23,740.00**

<b>Structure: CURB Precast Concrete Curb Walls</b>					
2	275700	Precast Curb Walls: Attached, no guardrail: 9'-4" Long x 0'-6" High x 0'-6" Wide.	\$390.00	<input checked="" type="checkbox"/>	\$780.00

**PRICE INCLUDES:**

- Concrete f/c: 5,000 psi @ 28 days. Cement per ASTM C-150.
- Reinforcing: Grade 60 epoxy coated deformed bar per ASTM A-615.

**\$780.00**

<b>Structure: CUTOFF Precast Concrete Cutoff Walls:</b>					
2	275800	Precast Cutoff Walls: 9'-4" Long x 3'-4" High x 1'-0" Wide.	\$363.00	<input checked="" type="checkbox"/>	\$726.00

**PRICE INCLUDES:**

- Concrete f/c: 4,000 psi @ 28 days. Cement per ASTM C-150.
- Reinforcing: Grade 60 black deformed bar per ASTM A-615.
- #5 bar connection pins. Drilling, mixing and placement of grout by contractor.
- Weight per Unit: 2.5 tons.

**\$726.00**

<b>Structure: FIELD Field Assembly Assistance of Precast Components</b>					
1	710600	Field Assistance:- Michie Corp field assembly assistance of precast components: (2 men, per day).	\$1,500.00	<input checked="" type="checkbox"/>	\$1,500.00
					<b>\$1,500.00</b>

<b>Structure: ENG Engineering Charges</b>					
1	716803	Engineering: MA PE stamped calculations & shop drawings.	\$4,000.00	<input type="checkbox"/>	\$4,000.00

- Services shall include stamped design calculations and shop drawings prepared on 2' x 3' size sheets.
- Fees for Engineering Services shall be invoiced immediately upon receipt by Michie Corporation of a signed quotation.
- Engineering charges specifically exclude Load Rating Certification and Mylar prints.

**\$4,000.00**



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Qty	Item	Description	Unit Price	TX	Extension
<b>Structure: DEL Delivery Charges</b>					
1	710500	Delivery Charges	\$2,925.00	<input type="checkbox"/>	\$2,925.00
- Product delivered via flatbed trailer, off loaded and set in place by others.					
					<b>\$2,925.00</b>
<hr/>					
<b>Structure: FUEL Fuel Surcharge - Per Delivery</b>					
0	710400	Fuel Surcharge - Zone 6	\$36.24	<input type="checkbox"/>	\$0.00
- All deliveries to this project are currently subject to a fuel surcharge based on distance from our plant.					
- Fuel surcharge is based on official energy statistics as provided by the US Government and are adjusted monthly. These energy statistics are published on the EIA website at:					
<a href="http://tonto.eia.doe.gov/oog/info/wohdp/diesel.asp">http://tonto.eia.doe.gov/oog/info/wohdp/diesel.asp</a> .					
					<b>\$0.00</b>





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Taxable	\$26,746.00
Non-Taxable	\$6,925.00
Sub Total	\$33,671.00
Tax	\$1,671.63
Total	\$35,342.63

**Michie Corp has been a NPCA certified plant for a continuous 26 years.**  
**For more on what it means to be an NPCA certified plant, visit: [www.precast.org](http://www.precast.org)**

**AGREEMENT:** The Buyer agrees to purchase from Michie Corporation (Seller), and the Seller agrees to sell to the Buyer, the products set forth on the front side hereof, and the Buyer agrees to pay to the Seller the stated unit prices therefore. This Agreement is subject to credit approval. This quotation is based on limited information. Michie Corporation reserves the right to modify this proposal subject to the receipt of a complete set of plans and specifications for this project. This quotation expires 30 days from the date shown.

**DELIVERY:** Unless otherwise noted, prices include delivery F.O.B. job site, and are based on maximum legal loads. Should partial deliveries be required, they will be subject to a split/short load delivery fee. F.O.B. job site means the place of delivery must be accessible by truck and trailer under its own power, with maximum load; otherwise final delivery shall be at the expense of the Buyer. Buyer shall furnish labor and equipment to unload trucks. All deliveries allow for one hour maximum unloading time, anything over will be charged at the rate of \$130.00 per hour. Buyer shall give delivery instructions within a reasonable time before shipment is to be made.

**FUEL SURCHARGE:** All deliveries are subject to a fuel surcharge. Fuel surcharge is based on official energy statistics as provided by the US Government and published on the EIA website at <http://tonto.eia.doe.gov/oog/info/wohdp/diesel.asp>.

**PAYMENT:** Seller's offer to sell the products herein is expressly conditioned upon Buyer's approved credit application or C.O.D. Payment is due to Seller net thirty (30) days from date of invoice and is not contingent upon Buyers receipt of payment or Owner's project payment schedule. All overdue accounts will be charged simple interest at the rate of 1.5% per month (18% per year) until such invoice is paid in good funds. If Seller turns this account over for collections Buyer agrees to pay all collection charges, including attorney fees and expenses, whether or not suit is brought. If at any time after acceptance of the order the financial responsibility of the Buyer becomes impaired or is unsatisfactory, the Seller reserves the right to require payment in advance of shipment or satisfactory security or guaranty that previous charges as well as future charges will be paid. Accounts over sixty (60) days will be placed on credit hold and will remain on hold until adequate arrangements have been made with the credit department.

**LIMITATION OF REMEDY AND LIABILITY:** It is expressly understood and agreed that the Seller's sole liability for any breach of warranty or other breach of default hereunder, and the Buyer's sole remedy therefore, shall be for the replacement or repair by the Seller of any defective material, or in the Seller's sole discretion, the amount of the purchase price paid to the Seller by the Buyer for any defective product. In no event shall the Seller be liable for consequential damages, nor shall the Seller be liable or responsible for any loss or damage suffered by the Buyer arising from or with respect to delay, interruption of business or disruption caused by Seller's inability or failure to supply materials or product set forth on the front side thereof.

**QUANTITY:** If Buyer elects to purchase only a portion of the material quoted herein, Seller retains the right to adjust prices on remaining items. When the Buyer requests a reduction of more than ten (10%) in the total quantity set forth on the front side hereof with respect to any item, the Seller has the right to increase the unit price of such item by a reasonable amount.

**DAMAGE CLAIMS:** Any damage to the product in transit must be noted on the delivery ticket or no claim for such damage will accrue against the Seller. Unloading of product is at the Buyer's risk and Seller assumes no responsibility for personal injury or for property damage. The Buyer will indemnify and save Seller harmless, including attorney's fees, against any such claims resulting from such unloading or from any claims against Seller arising from Buyer's installation of the products delivered hereunder.

**TAXES:** In addition to prices quoted on the front side hereof, the Buyer shall pay to the Seller any and all applicable sales or use taxes.

**DELAYS AND FORCE MAJEURE:** Seller shall not be liable for delay in delivering products where occasioned by any cause of any kind or extend beyond control of Seller including without limitation, armed conflict or economic dislocation resulting there from, embargoes, shortages of labor, raw material, fuel, energy, production facilities or transportation, labor difficulties; civil disorders of any kind; action of civil or military authorities (including priorities and allocations); fires; floods; and accidents. It is intended that no liability shall accrue against Seller by reason of its not delivering any of the items set forth on the front side hereof, or any portion thereof, affected by any such occurrence. In event the delay caused by any of the foregoing, the time for performance shall be extended for such a time as may be reasonably necessary to enable Seller to perform. Seller at all times reserves the right to apportion its production among its customers as it may determine.

**DEFAULT OF BUYER:** Upon a default in payment by the Buyer of any amount due under this Contract, or under any other Contract between Buyer and Seller, Seller may at its option suspend performance of further manufacturing and/or delivery of the product to the Buyer, cancel the undelivered portion of this Contract or exercise any other remedies available under the New Hampshire Uniform Commercial Code, and in such event, all sums owing from Buyer to Seller shall without notice of demand become immediately due from Buyer to Seller. Buyer hereby agrees to pay all costs incurred by Seller in connection with Buyer's default hereunder, including the Seller's reasonable attorney's fees, exercise of any of its rights under this Contract shall not bar Seller from exercising its rights under any applicable lien law or other statute.

**RETURNS:** Full credit subject to a 30% handling/restocking charge will be allowed on undamaged standard inventory precast product authorized for return.





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**SPECIALS:** All specialty and non-standard product require a thirty percent (30%) deposit prior to fabrication. Special items not considered as standard inventory by Seller, and manufactured by Seller to Buyer's specifications or job requirements, will upon payment become the sole property of the Buyer and shall not be accepted for return after delivery. In addition, Buyer may not cancel or terminate for any reason its obligation to purchase special items once Seller has purchased the raw materials necessary to manufacture same. In addition, in the event Seller elects to cancel any portion of this Contract under the Paragraphs set forth above, Buyer shall be liable for the purchase price of any such special item with respect to which Seller has commenced the manufacturing process.

**INSPECTIONS:** All inspection charges are for Buyer's account. All inspections shall be conducted at Seller's plant by Buyer's authorized representative with reasonable advance notice. Failure of Buyer to avail himself of inspection privileges shall be deemed a waiver of the same.

**ENGINEERING:** Submittal drawings to be scheduled and invoiced upon receipt of signed order. Should stamped design drawings and/or buoyancy calculations be required, an additional charge will be assessed for this service.

**FIELD ASSISTANCE:** Seller may, at its sole discretion, provide the services of a field representative upon receipt of a request from Buyer. This service is offered only on the condition that Seller shall not be deemed to have approved or in any manner to have assumed responsibility for the engineering design of the job, supervision, inspection or quality of the workmanship. IN NO EVENT SHALL THE SERVICES OR STATEMENTS OF A FIELD REPRESENTATIVE BE DEEMED A WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO ANY OF THE SELLER'S PRODUCTS OR SERVICES.

**TITLE:** Title to the products sold and paid for hereunder shall pass to Buyer upon arrival of truck on jobsite, but Buyer shall not have the right to divert or re-consign such shipment to any destination other than that specified on the delivery ticket.

**PRICES:** The prices set forth on the front side hereof are guaranteed for shipment within ninety (90) days from the quotation date and are subject to a maximum escalation of eight (8%) percent for each thirty (30) days thereafter.

**GOVERNING LAW:** This contract shall be governed by and shall be construed in accordance with the law in force on the date of formation of this Contract in the State of New Hampshire.

**BONDS:** Seller has the right to receive the Bond copy upon request.

**COMPLETE AGREEMENT:** This Contract constitutes the final, complete and full agreement between the Seller and Buyer. No terms or conditions other than those contained herein, and no agreement or understanding, oral and written, in any manner purporting to modify these terms or conditions, whether contained in the Buyer's Purchase form, Seller's shipping release of elsewhere shall be binding on the Seller hereafter. All proposals, negotiations and representations, if any, made prior, and with reference hereto are merged herein. Waiver by Seller or Buyer of any breach of these provisions shall not be construed as a waiver of any other breach.

Thank you for considering Michie Corporation, Inc. for all your precast needs. Should you require additional assistance, please do not hesitate to contact us at your earliest convenience.

Sincerely yours,

The above Prices, Terms and Conditions are Accepted

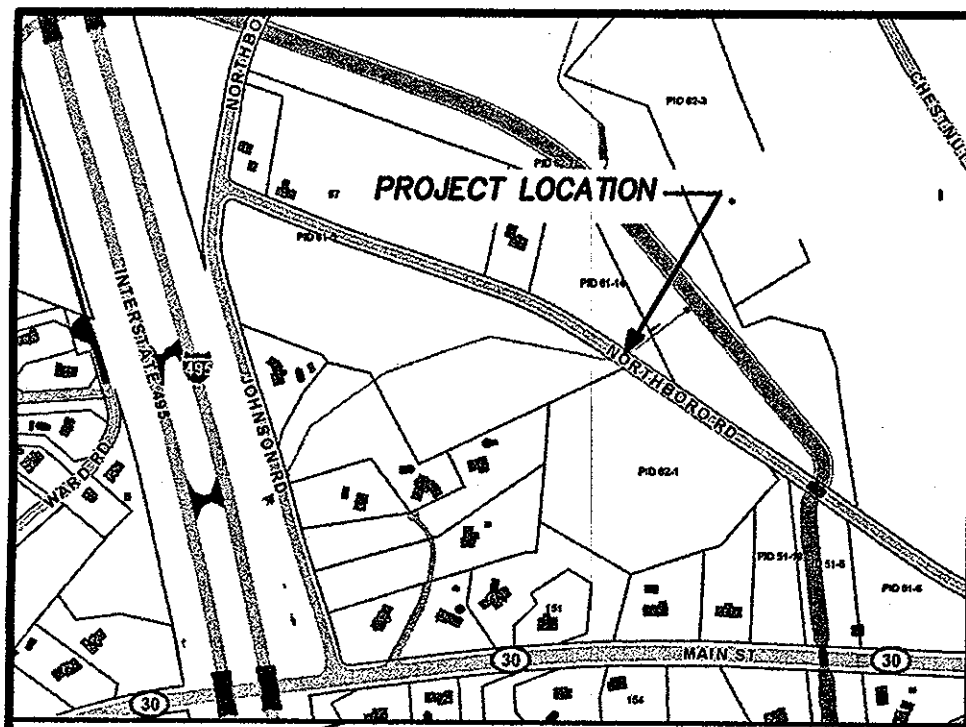
\_\_\_\_\_  
Don Arsenault  
Precast Sales

Date: \_\_\_\_\_

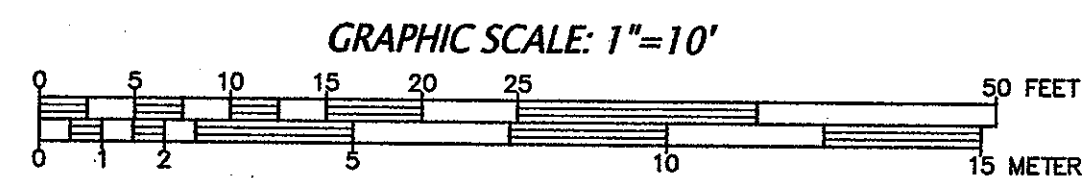
\_\_\_\_\_  
Bob Sykes  
Town of Southborough, MA

Date: \_\_\_\_\_





LOCUS MAP  
NOT TO SCALE



SITE PLAN: SCALE 1"=10'

SEEDING/RESTORATION NOTES:

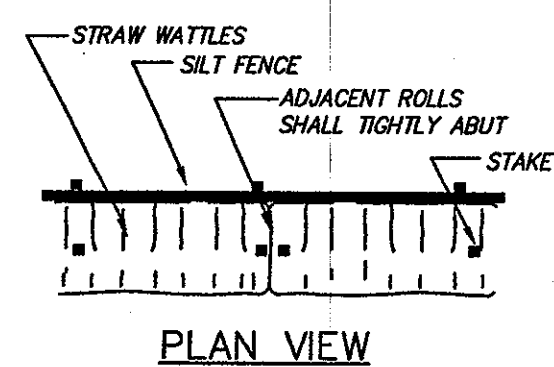
1. TEMPORARY DISTURBANCES WITHIN WETLAND AREAS SHALL BE SEEDED WITH "NEW ENGLAND ROADSIDE MATRIX WET MEADOW MIX," BY NEW ENGLAND WETLAND PLANTS INC., OR EQUAL.
2. DISTURBED UPLAND AREAS SHALL BE SEEDED WITH "NEW ENGLAND EROSION CONTROL / RESTORATION MIX," BY NEW ENGLAND WETLAND PLANTS, INC., OR EQUAL.

GENERAL NOTES:

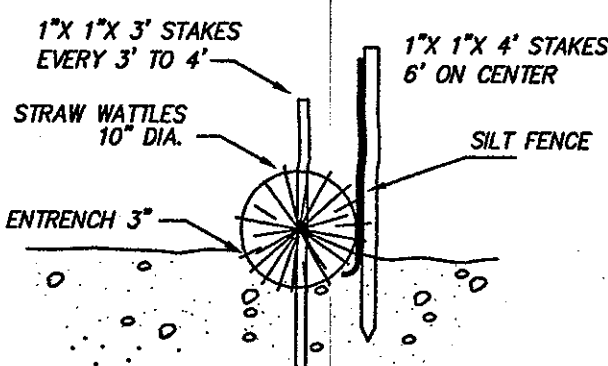
1. EXISTING TOPOGRAPHY IS BASED UPON A FIELD SURVEY BY CONNORSTONE ENGINEERING IN JULY OF 2015.
2. THE LOT SHOWN AND THE PROPOSED HOUSE THEREON ARE NOT LOCATED WITHIN THE 100 YEAR FEDERAL FLOOD HAZARD AREA AS SHOWN ON THE FLOOD INSURANCE RATE MAPS FOR THE TOWN OF SOUTHBOROUGH, COMMUNITY PANEL No. 25027C0666F, DATED JULY 16, 2014.
3. WETLAND DELINEATION BY GODDARD CONSULTING, LLC IN JULY OF 2015.
4. EXISTING UTILITY LINES SHOWN ON THIS DRAWING ARE FROM AVAILABLE INFORMATION AND ARE APPROXIMATE LOCATIONS. THE ENGINEER DOES NOT GUARANTEE THEIR ACCURACY OR THAT ALL UTILITIES AND SUBSURFACE STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION AND INVERT ELEVATIONS OF THE UTILITIES AND STRUCTURES, AS REQUIRED, PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL CONTACT DIG SAFE: 1-800-344-7233 (72 HOURS BEFORE DIGGING).
4. LEGAL STATUS AND LOCATION OF EASEMENTS AND RIGHT-OF-WAYS, NOT DETERMINED BY THIS SURVEY. THE TOWN SHALL BE RESPONSIBLE TO ACQUIRING ANY REQUIRED PERMISSION OR EASEMENTS FROM ABUTTING PROPERTY PRIOR TO CONSTRUCTION.

CONSTRUCTION BEST MANAGEMENT PRACTICES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE ORDER OF CONDITIONS ISSUED BY THE SOUTHBOROUGH CONSERVATION COMMISSION AND THE GENERAL PERMIT ISSUED BY THE ARMY CORPS OF ENGINEERS. TURBIDITY OF WATER DOWNSTREAM OF THE SITE SHOULD NOT BE VISIBLY GREATER THAN TURBIDITY UPSTREAM OF THE PROJECT SITE.
2. WORK SHALL BE PERFORMED DURING PERIODS OF LOW FLOW. WORK SHALL BE COORDINATED TO AVOID PREDICTED PRECIPITATION EVENTS.
3. GENERAL CONSTRUCTION SEQUENCING:
  - INSTALL EROSION CONTROL MEASURES PRIOR TO CONSTRUCTION.
  - SITE PREPARATION - SAW CUT AND REMOVE PAVEMENT AND PERFORM INITIAL EXCAVATION TO THE MAXIMUM PRACTICAL WHILE STILL MAINTAINING FLOW WITHIN THE EXISTING CULVERT.
  - INSTALL TEMPORARY DIVERSION BERMS
  - BEGIN BYPASS PUMPING
  - EXCAVATE AND REMOVE EXISTING CULVERT, PROVIDE CONSTRUCTION DEWATERING AS REQUIRED.
  - PREPARE BASE MATERIAL
  - INSTALL CULVERT
  - PLACE EMBEDMENT MATERIAL AND STABILIZE BANKS.
  - CLEAN REMAINING DEBRIS
  - REMOVE TEMPORARY DIVERSIONS
  - INSTALL FINAL BACKFILL AND GRAVEL BASE OVER CULVERT AND PAVEMENT PATCH.
  - FINAL STABILIZATION, LOAM AND SEEDING
  - SITE CLEAN UP
4. BYPASS PUMPS SHALL BE SIZED PER ACTUAL FLOW CONDITIONS TO BE APPROVED BY THE OWNER. BACK UP PUMPING EQUIPMENT SHALL BE KEPT ON-SITE AT ALL TIMES DURING PUMPING OPERATIONS.
5. AT THE CONTRACTORS' OPTION, BYPASS PUMPING MAY BE REPLACED WITH A FLUME I.E. DURING OVERNIGHT AND WEEKEND HOURS OR AS PHASING PERMITS. FLUME TO BE SIZED BASED UPON FIELD CONDITIONS AND FLOW.
6. GRADUALLY DEWATER AND RE-WATER RIVER AND STREAM SEGMENTS TO AVOID ABRUPT CHANGES IN STREAM FLOW. AFTER CONSTRUCTION REMOVE COFFERDAMS DOWNSTREAM-TO-UPSTREAM IN A MANNER THAT MINIMIZES INTRODUCTION OF SEDIMENT TO THE WATERWAY.
7. THE CONTRACTOR SHALL COORDINATE CONSTRUCTION TO ALLOW INSPECTIONS OF THE WORK BY A QUALIFIED WETLAND SCIENTIST (IF REQUIRED).
8. THE CONTRACTOR SHALL PROVIDE THE ENGINEER A FINAL SCHEDULE INCLUDING TEMPORARY DIVERSION, THAT WILL MINIMIZE THE EXTENT AND DURATION OF THE HYDROLOGICAL DISRUPTION. NO OPEN TRENCH EXCAVATION IN FLOWING WATERS.
9. DEWATERING- THE CONTRACTOR SHALL PROVIDE THE ENGINEER AN ACCEPTABLE PLAN FOR CONSTRUCTION DEWATERING. IN GENERAL, DEWATER PRIOR TO EXCAVATION; USE UPSTREAM SUMPS TO COLLECT GROUNDWATER AND PREVENT IT FROM ENTERING THE CONSTRUCTION SITE; AND MANAGE / TREAT SURFACE AND GROUNDWATER ENCOUNTERED DURING EXCAVATION WITH: GEOTEXTILE FILTER BAGS UNDERLAIN WITH STRAW BALES ("DIRTBAG", OR APPROVED EQUAL). PROVIDE ADDITIONAL BMP'S AS REQUIRED.
10. EVERY ATTEMPT SHOULD BE MADE TO MAINTAIN THE EXISTING BANKS BEYOND THE LIMIT OF CULVERT INSTALLATION.
11. POLLUTION CONTROL MEASURES SHALL BE IMPLEMENTED DURING CONSTRUCTION INCLUDING: WASH EQUIPMENT PRIOR TO BRINGING TO THE WORK AREA TO REMOVE LEAKED PETROLEUM PRODUCTS AND AVOID INTRODUCTION OF INVASIVE PLANTS; LOCATE REFUELING AREAS AND HAZARDOUS MATERIAL CONTAINMENT AREAS AWAY FROM STREAMS AND OTHER SENSITIVE AREAS; AND ESTABLISH APPROPRIATE AREAS FOR WASHING CONCRETE MIXERS TO PREVENT WASH WATER FROM ENTERING RIVERS AND STREAMS.



PLAN VIEW



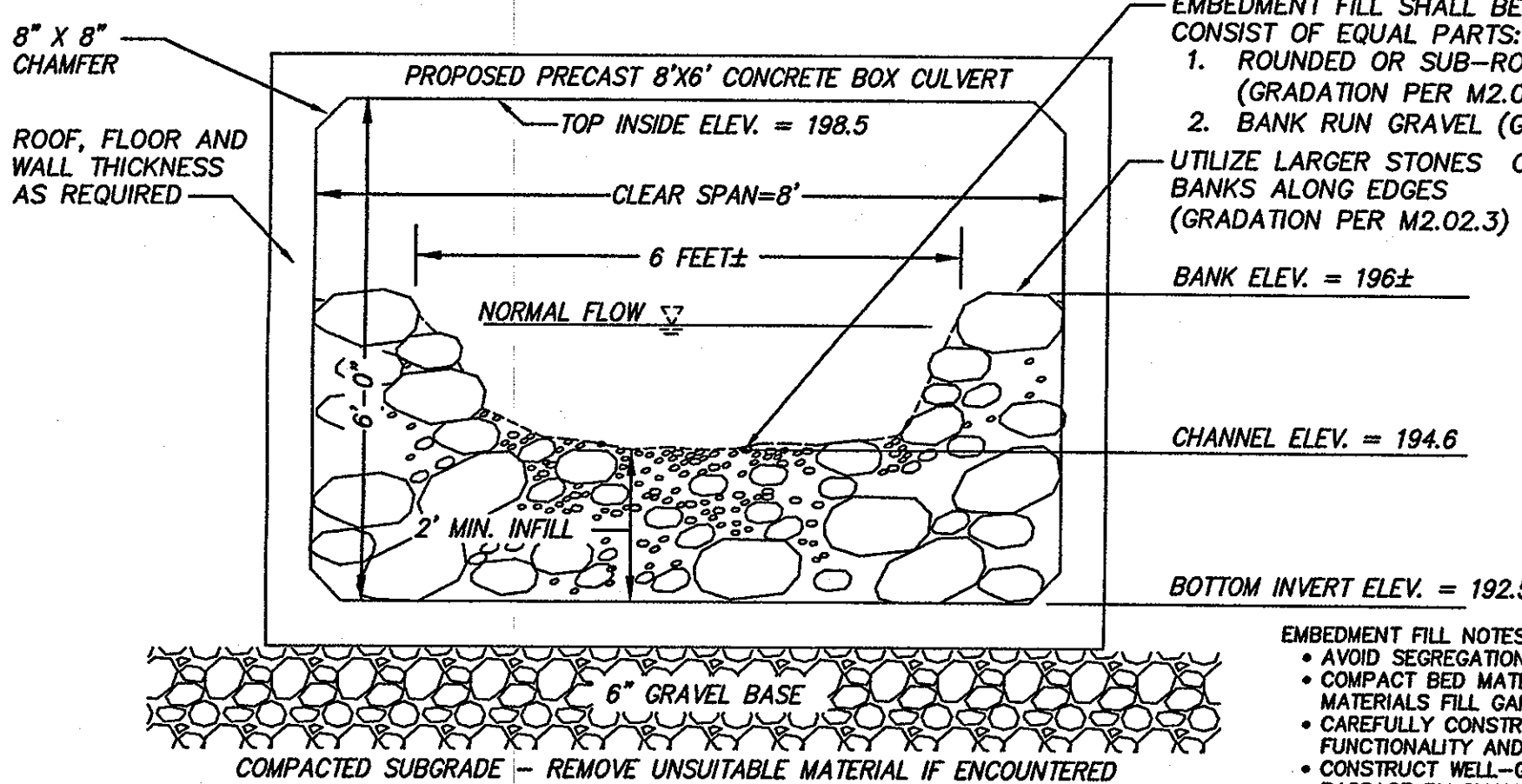
CROSS SECTION

- NOTES:
1. STRAW ROLL INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE ROLL IN A TRENCH, 3" DEEP. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.
  2. INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

SEDIMENT BARRIER DETAIL  
NOT TO SCALE

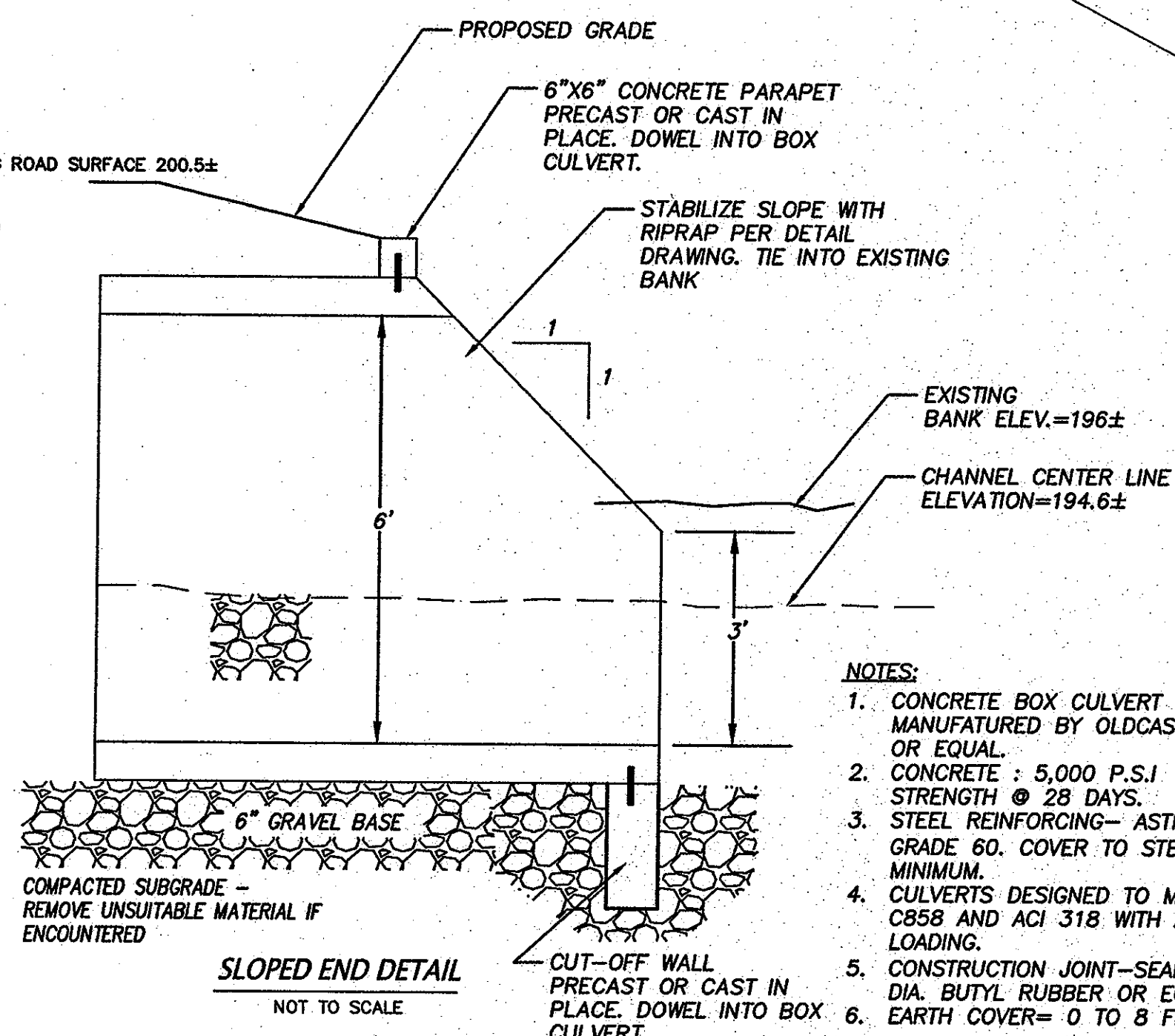
EXISTING ROAD SURFACE 200.5±

EXISTING ROAD SURFACE 200.5±



BOX CULVERT DETAIL  
NOT TO SCALE

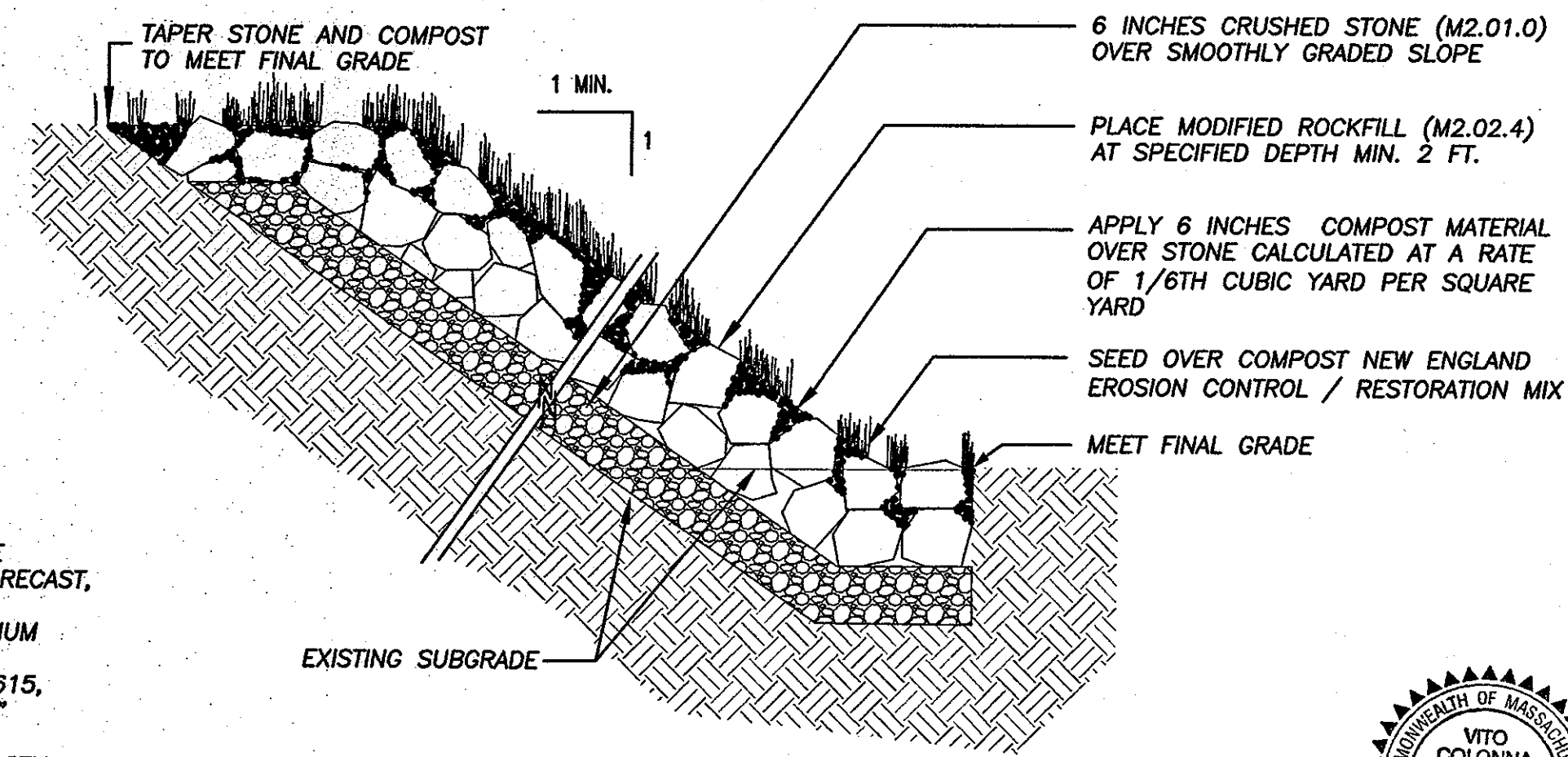
- EMBEDMENT FILL SHALL BE COMPACTED IN PLACE AND CONSIST OF EQUAL PARTS:
1. ROUNDED OR SUB-ROUNDED ROCK FILL (GRADATION PER M2.02.04)
  2. BANK RUN GRAVEL (GRADATION PER M2.01.07)
- UTILIZE LARGER STONES CREATE BANKS ALONG EDGES (GRADATION PER M2.02.3)
- BANK ELEV. = 196±
- CHANNEL ELEV. = 194.6
- BOTTOM INVERT ELEV. = 192.5
- EMBEDMENT FILL NOTES:
- AVOID SEGREGATION OF BED MATERIALS
  - COMPACT BED MATERIAL AND ENSURE THAT FINE MATERIALS FILL GAPS AND VOIDS
  - CAREFULLY CONSTRUCT BED FORMS TO ENSURE FUNCTIONALITY AND STABILITY
  - CONSTRUCT WELL-GRADED BANKS FOR ROUGHNESS, PASSAGE BY SMALL WILDLIFE, AND IN-STREAM BANK-EDGE HABITAT
  - TIE CONSTRUCTED BANKS INTO UPSTREAM AND DOWNSTREAM BANKS. TO BE INSTALLED SO THAT THE JUNCTURE BETWEEN NATURAL BANK AND CONSTRUCTED BANK IS STABLE. THE BANKS SHOULD NOT TO HINDER WILDLIFE USE OF THE STREAMBED AND BANKS FOR PASSAGE.



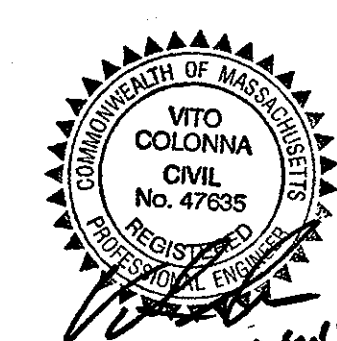
SLOPED END DETAIL  
NOT TO SCALE

NOTES:

1. CONCRETE BOX CULVERT TO BE MANUFACTURED BY OLDCASTLE PRECAST, OR EQUAL.
2. CONCRETE : 5,000 P.S.I. MINIMUM STRENGTH @ 28 DAYS.
3. STEEL REINFORCING- ASTM A-615, GRADE 60. COVER TO STEEL-1" MINIMUM.
4. CULVERTS DESIGNED TO MEET ASTM C858 AND ACI 318 WITH AASHTO HS-20 LOADING.
5. CONSTRUCTION JOINT-SEALED WITH 1" DIA. BUTYL RUBBER OR EQUIVALENT.
6. EARTH COVER= 0 TO 8 FEET MAX.



RIPRAP SLOPE DETAIL  
NOT TO SCALE



PREPARED FOR:  
TOWN OF SOUTHBOROUGH  
DEPARTMENT OF PUBLIC WORKS  
147 CORDAVILLE ROAD  
SOUTHBOROUGH, MA 01772  
508-485-1210

**CONNORSTONE  
ENGINEERING INC.**  
CIVIL ENGINEERS AND LAND SURVEYORS  
10 SOUTHWEST CUTOFF, SUITE 7  
NORTHBOROUGH, MASSACHUSETTS 01532  
PHONE: 508-393-9727 FAX: 508-393-5242

**CULVERT REPLACEMENT PLAN  
FOR  
NORTHBOROUGH ROAD  
IN  
SOUTHBOROUGH, MA.**

10/6/2015	PER CON COMM REVIEW COMMENTS
REVISED:	DESCRIPTION:
DRAWN BY: REM	CHECK BY: VC
DATE: AUGUST 18, 2015	
SCALE: 1"=10'	SHEET 1 OF 1.