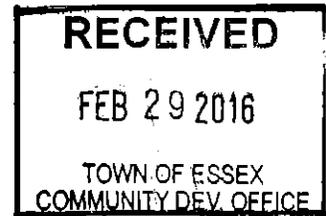


JHSTUART

CIVIL/ENVIRONMENTAL ENGINEERS

February 17, 2016

Town of Essex
Attn: Greg Duggan, Planner
81 Main Street
Essex Jct., Vermont 05452



Re: Hayward Design Build (10 Old Stage Road)

Dear Greg:

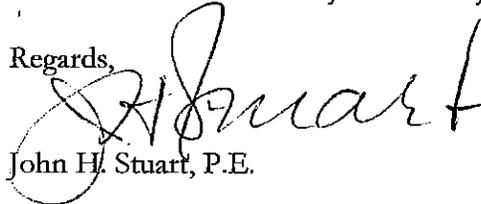
In accordance with the conditions contained in the Sketch Plan Approval issued on December 10, 2015, the following materials are provided:

1. All construction to conform to approved plans.
2. Building envelopes have been provided for all lots and the Lot 6 envelope preserves the Class III wetland.
3. The project involves six (6) lots with one for the existing house and the remaining for new houses construction.
4. Additional wastewater allocation has been secured and a copy of the decision attached.
5. Two new trees have been added to the Lot 2 frontage.
6. Building envelopes are provided meeting the required setbacks.
7. The site plan shows a "Non-motorized, multi-use access easement" and a crosswalk connection to the Old Stage sidewalk. The future path is grass and will remain so.
8. Calculations are attached for the fixture uses planned for the new construction. Lots 2-6 will have a 1" water service.
9. The project has been planned to incorporate the Town Stormwater and Erosion Control Plan. Runoff from each new house lot will be directed to grassed areas adjacent to the house and driveway with any excess directed to infiltration trenches. These improvements will properly treat and contain a 25 year storm event.
10. The fire demand for the planned single family dwellings is 400 GPM for a 2,000 SF dwelling, according to NFPA 1710. The existing hydrant opposite Lot 2 was flow tested at 1016 GPM.
11. Attached is the survey subdivision plat.
12. New buildings will not exceed 40 feet in height.

13. Topsoil removed as part of the construction activities shall be replaced to a four (4) inch compacted depth and seeded in accordance with NRCS and Town specifications.
14. All new curb cuts shall receive a cut permit along with an inspection schedule.
15. A road improvement fee of \$2,779 shall be provided by the applicant prior to issuance of a zoning permit.
16. The recreation impact fee shall be provided prior to the issuance of a zoning permit.
17. All new utilities will be installed underground.
18. All covenants, deeds and legal documents shall be submitted for review by the Town Attorney prior to the issuance of a zoning permit.
19. All lot markers shall be installed prior to the issuance of a zoning permit.
20. The Lost Nation Road water line extension and all wet taps shall be inspected by Public Works prior to the issuance of an occupancy permit.
21. The applicant will secure a Water and Wastewater permit from the Agency of Natural Resources prior to the issuance of a zoning permit. The project impervious area is below the threshold and a stormwater permit is not required.
22. All permit conditions shall run with the land and be enforceable against the applicant and all assigns.

Feel free to contact me if you have any questions or comments.

Regards,

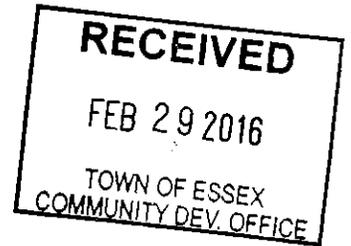

John H. Stuart, P.E.

JHS/ov10

cc: Hayward Design Build

encl. CD, Site Plan

10 OLD STAGE ROAD



The property is located at the intersection of Old Stage and Lost Nation Roads, with frontage on both roads. The parcel contains 3.15 acres.

Presently, a single family dwelling with several barns are situated on the east side of the parcel with the balance of the lot an open meadow that is surrounded, for the most part, with a mixture of mature trees and scrub brush. The land slopes gently from east to west with a small area of wetland vegetation near the west side of the lot. That resource has been delineated and classified a Class III wetland.

The entire parcel is located in the Mixed-Use PUD District. With off-site water and sewer, the minimum lot size for a potential subdivision is 20,000 square feet (SF). While located in the sewer district, the property was assigned only one dwelling unit for sewer connection; therefore, additional allocation to support further subdivision of the property has been secured by authority of the Selectboard. A gravity sewer would be constructed to serve all lots with the line running along the south side of the lots and terminating in a new pump station. A small diameter force main would be installed adjacent to the gravity line; then run along Old Stage Road (within the ROW); and east on Craftsbury Court to a municipal manhole. Water supply will be provided to the lots through individual services connected to an extension of the Lost Nation Road 8" water main. All sewer improvements will be privately owned, operated and maintained.

The parcel is to be divided into six (6) lots with one for the existing house/buildings and five (5) new single family dwellings. Each lot will have an individual driveway and have minimum lot area of 20,000 SF. Driveways have been planned to avoid existing mature vegetation wherever possible.

Stormwater will be directed to grassed areas next to houses and driveways for absorption and overland flow with any residual runoff directed to a infiltration trench keyed into the native soils. The parcel topography does not allow the use of a central detention basin due to the lack of sufficient elevation differential between the west side of the property to the available receiving stream located at the northwest corner. The impervious area for the new construction is 0.375 acres which is below the Town and State regulatory threshold (0.5 and 1.0 acres, respectively); therefore, the planned construction does not require a stormwater discharge permit. However, the all stormwater improvements have been designed in accordance with The Vermont Stormwater Management Manual. The wetland area has been preserved by the Lot 6 building envelope and will be protected during construction by the installation of a silt fence adjacent to the construction area.

10 Old Stage Road
Page 2

Easements would be provided for 1) gravity and force main sewer lines, 2) gas service, 3) buried electric/telephone lines, 4) stormwater and 5) a future bicycle path located on the north side of the lots. Off-lot construction for water and sewer improvements will occur within existing municipal rights-of-way.

10 Old Stage Road

Stormwater Management

The property is characterized as gently sloping to the west and southwest. The eastern half of the site contains well drained soils and the western end has poorly to moderately drained soils. The total impervious area for Lots 2-6 is 0.35 acres.

The topography of the site is not conducive to a conventional stormwater collection and treatment scheme such as a detention basin. The receiving stream adjacent to the northwest corner is too shallow and does not permit the variable operating depths associated with a basin; so, a less conventional approach is required.

Lots 2-4 will utilize on-lot infiltration trenches and Lots 5 and 6 will be managed by infiltration trenches on Lot 6. All lots will involve grading to force runoff from impervious areas, specifically driveways and rooftops, to be directed to surrounding grass areas for infiltration. Any residual runoff will be directed to the infiltration trenches for absorption. With these practices the project will retain runoff from a 25 year storm.

LIFT STATION DESIGN CRITERIA

Project Name: 10 Old Stage Road Subdivision
Essex, VT

A. Design Flow:

6 lots @ 200 GPD/lot	1,200 Gallons per Day
T O T A L	1,200 Gallons per Day

B. Required Tank Capacity:

Pumping dose:

1,200/4 doses daily = 400 Gallons

Emergency storage (6 hours) 300 Gallons

Required volume:

Dose + Emergency + 1.08' (Pump 'Off') = 1,235 gallons

Use 2,000 gallon tank (Available storage: 2,306 gallons)

C. Pump System Characteristics:

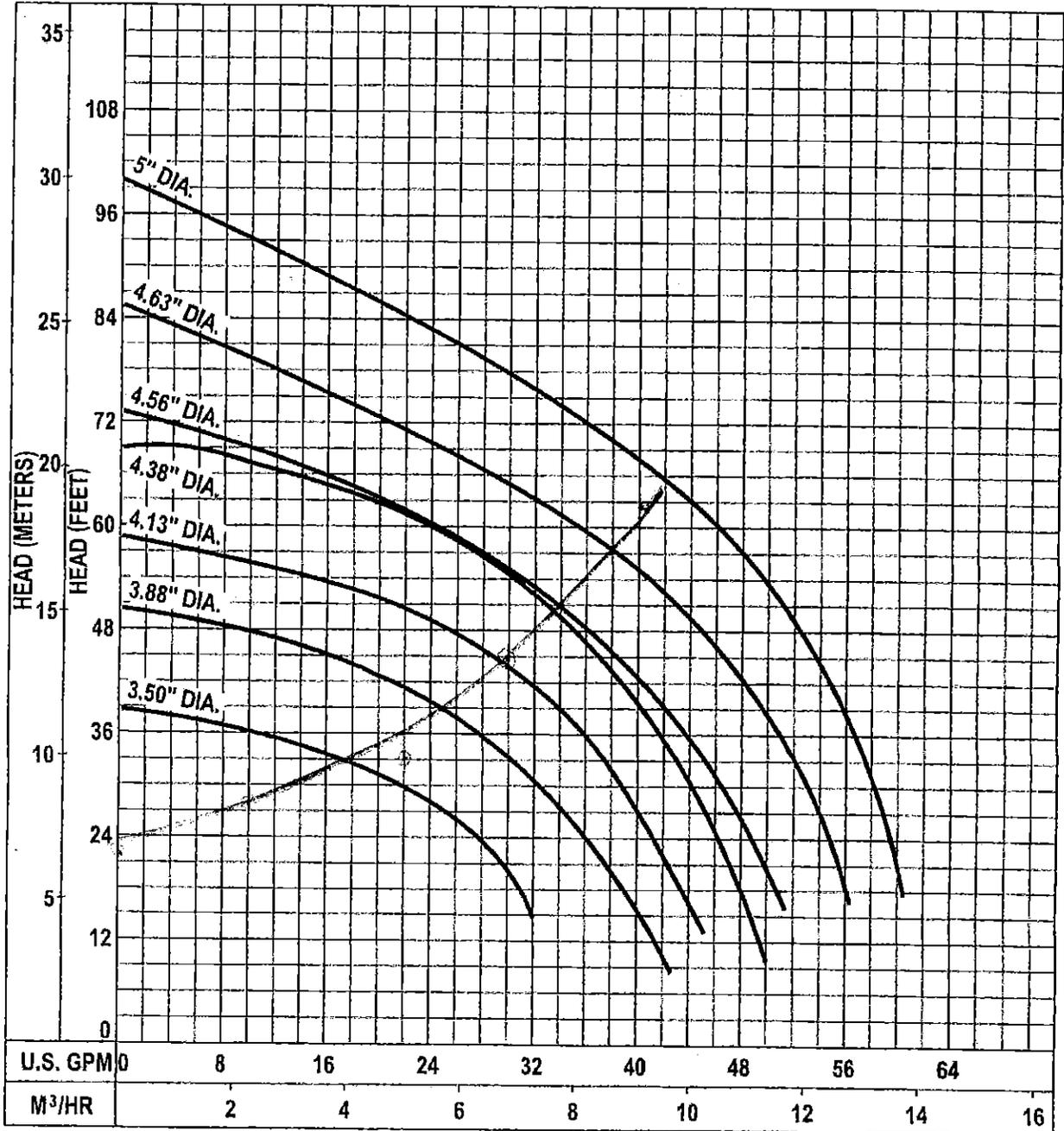
Discharge elevation:	542'
Pump 'Off' elevation:	517.33'
Differential:	~26'

Force main (2" x 1,400')	
Elevation Differential	~26'
Miscellaneous	2'
TDH	28 GPM @ 45'

Performance Curve - HPGX

RPM: 3450 DISCHARGE: 1-1/4"

10 AIR STAGE ROAD
02/10/2014



The curves reflect maximum performance characteristics without exceeding full load (Nameplate) horsepower. All pumps have a service factor of 1.2. Operation is recommended in the bounded area with operational point within the curve limit. Performance curves are based on actual tests with clear water at 70° F and 1280 feet site elevation.



TOWN OF ESSEX VERMONT

81 MAIN STREET, ESSEX JUNCTION, VERMONT 05452
Fax: 878-1353 • E-mail: manager@essex.org • Website: www.essex.org

January 26, 2016

JH Stuart Civil/Environmental Engineers
Attn: John Stuart, P.E.
P.O. Box 8367
Essex Junction, Vermont 05452

Re: 6-Lot Subdivision, (10 Old Stage Road)
Wastewater Allocation

Dear John,

Please find attached a copy of the approved wastewater allocation application for 23 Essex Way, which now has approved sewer allocation in the amount of 1,200 GPD. The request for additional allocation of 1,000 GPD was approved by the Selectboard on the January 25, 2016 meeting. The applicant will be required to apply for, and purchase the total approved allocation of 1,200 GPD of allocation by submitting a water and sewer application with the appropriate fees.

Please contact the office if you have any questions or comments regarding the content of this letter.

Sincerely;

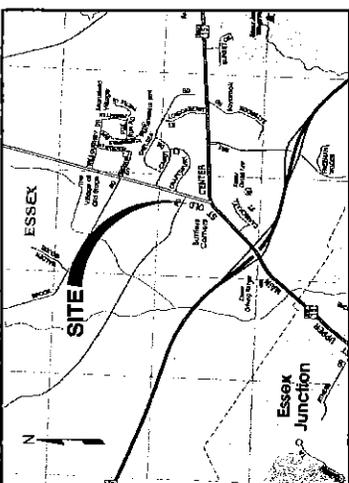
Aaron K. Martin, P.E.
Utilities Director / Town Engineer

Attachment

Cc: Dennis Lutz, P.E., Public Works Director
Sharon Kelley, Zoning Administrator
File

WAWPDOCS\WTR&SWR\Allocation\10 Old Stage 6-Lot Sub LTR 012616.doc

TOWN MANAGER	PARKS AND RECREATION	COMMUNITY DEVELOPMENT	PUBLIC WORKS	ASSESSOR	FINANCE	TOWN CLERK	LIBRARY	POLICE
878-1341	878-1342	878-1343	878-1344	878-1345	878-1359	879-0213	879-0313	878-8331



LOCUS
NOT TO SCALE

LEGEND

- PROPERTY LINE
- - - RIGHT OF WAY OR PARCEL LINE
- STONE WALL
- WIRE FENCE
- CALCULATED POINT
- I.R.F.
- I.P.F.
- I.R.S.

CERTIFICATION

I HEREBY CERTIFY THAT THE SURVEY SHOWN HEREON IS A ACCURATE REPRESENTATION OF THE PARCEL BOUNDARIES AND EASEMENTS AS SHOWN ON THE PLAT. THIS SURVEY WAS PERFORMED WITH ELECTRONIC TOTAL STATION SURVEY EQUIPMENT WITH A POSITIONAL TOLERANCE CONFIDENCE LEVEL ABOVE 95%. I FURTHER CERTIFY THAT THIS PLAT MEETS ALL THE REQUIREMENTS OF TITLE 27 V.S.A. SECTION 1403.

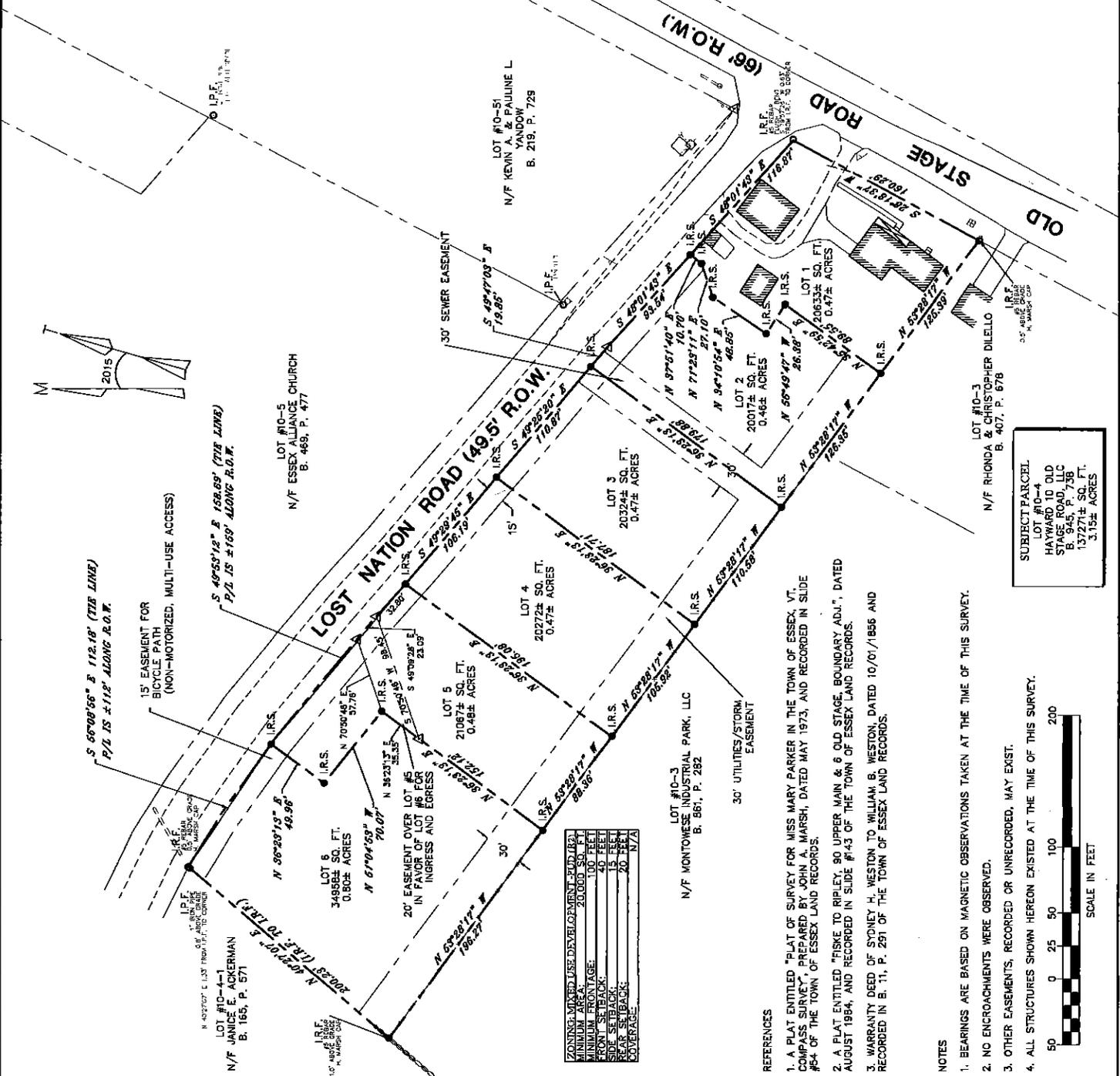
DATED _____
RICHARD W. BELL L.S. #636 VT.

SUBDIVISION OF LANDS OF HAYWARD TO OLD STAGE ROAD, LLC TO OLD STAGE ROAD, ESSEX, VERMONT

PROJ. #15909
DATE: SEPT. 2015
SCALE: 1"=50'
SURVEYED BY: RWB/TWW
CHECKED BY: RWB

SHEET 1 OF 1
DWG. # S-909

**RICHARD W. BELL
LAND SURVEYING, INC.**
287 SOUTH MAIN ST.
BARRE, VERMONT 05641
802-479-9282 • 802-792-5037
EMAIL: RBELL@BELL-LANDSURVEYOR.COM



ZONING MIXED USE DEVELOPMENT (MUD) (R2)

MINIMUM AREA:	20,000 SQ. FT.
MINIMUM FRONTAGE:	100 FEET
MINIMUM SETBACK:	10 FEET
MINIMUM SIDE SETBACK:	10 FEET
MINIMUM REAR SETBACK:	20 FEET
MINIMUM COVERAGE:	20 N/A

REFERENCES

- A PLAT ENTITLED "PLAT OF SURVEY FOR MISS MARY PARKER IN THE TOWN OF ESSEX, VT. COMPASS SURVEY", PREPARED BY JOHN A. MARSH, DATED MAY 1973, AND RECORDED IN SLIDE #54 OF THE TOWN OF ESSEX LAND RECORDS.
- A PLAT ENTITLED "FISKE TO RIPLEY, 90 UPPER MAIN & 6 OLD STAGE, BOUNDARY ADJ.", DATED AUGUST 1984, AND RECORDED IN SLIDE #143 OF THE TOWN OF ESSEX LAND RECORDS.
- WARRANTY DEED OF SYDNEY H. WESTON TO WILLIAM B. WESTON, DATED 10/01/1956 AND RECORDED IN B. 11, P. 291 OF THE TOWN OF ESSEX LAND RECORDS.

NOTES

- BEARINGS ARE BASED ON MAGNETIC OBSERVATIONS TAKEN AT THE TIME OF THIS SURVEY.
- NO ENCROACHMENTS WERE OBSERVED.
- OTHER EASEMENTS, RECORDED OR UNRECORDED, MAY EXIST.
- ALL STRUCTURES SHOWN HEREON EXISTED AT THE TIME OF THIS SURVEY.



10 Old Stage Road

Individual House Service Line

Typical House: Two (2) full baths (WC, lavatory, shower); kitchen sink, dishwasher, clothes washer; exterior hose bib

Total fixture units: 42 FU's

Flow requirement: ~20 GPM (ASHRAE)

Water service length:

Lots 2-4: 90 feet

Lots 5-6: 160 feet

Available water pressure: 44 psi (Public Works @ hydrant)

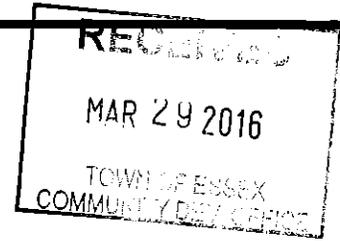
Water service diameter:

Lots 2-4: 1 1/4" (37 psi available at house)

Lots 5-6: 1 1/2" (38 psi available at house)

Gregory Duggan

From: Nate Hayward <nate@haywarddesignbuild.com>
Sent: Tuesday, March 29, 2016 12:37 PM
To: Gregory Duggan; John Stuart
Subject: Re: Items for 10 Old Stage Road



Hi Greg,

As I understood it, the Planning Commission's reason for suggesting the combined lots 5 and 6 with a duplex was the site distances for the lot 6 driveway. Our hope was that eliminating that driveway and having lots 5 and 6 share a driveway where it was previously located for lot 5 would eliminate that concern. Please let me know if that makes sense.

Thanks, Nate

On Tue, Mar 29, 2016 at 12:21 PM, Gregory Duggan <gduggan@essex.org> wrote:

Hi John,

I'm looking for a few more items on the Preliminary application for Old Stage Road. Nothing major, so you're still penciled in for April 28.

- The Planning Commission asked about the possibility of removing Lot 6 and instead putting a duplex on Lot 5 (in part to keep construction further away from the wetland). Was any consideration given to this suggestion?
- The Planning Commission had concerns about screening from adjacent properties. Please show more landscaping to the rear of the lots, particularly lot 2.
- Per Condition #7 of Sketch Approval, please show a connection from the crosswalk to the existing sidewalk on Old Stage Road.
- Site Plan
 - Please show zoning districts.
 - Please show the correct frontages for each lot.
 - Please move the street trees on Lot 2 to outside the 15-foot easement.
 - Please show soil types.
 - Please show uses of abutting properties.

Thanks,

Greg

Greg Duggan, Planner

Town of Essex, 81 Main St.

Essex Junction, VT 05452

802-878-1343

gduggan@essex.org

--

Nate Hayward - 802-578-3078

nate@haywarddesignbuild.com

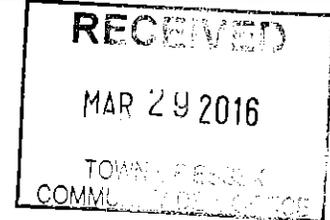
Hayward Design Build

302 Mountain View Drive, Suite 300

Colchester, VT 05446

Gregory Duggan

From: John Stuart <john@jhstuartassociates.com>
Sent: Tuesday, March 29, 2016 3:10 PM
To: Gregory Duggan
Subject: Re: Items for 10 Old Stage Road



Hi Nate:

I don't have the data handy, but the sight distance was sufficient for the Lots 5/6 drive.

On Tue, Mar 29, 2016 at 1:57 PM, Gregory Duggan <gduggan@essex.org> wrote:

Hi Nate,

My memory is that the PC was interested in the duplex for the sight distances as well as to leave some more space from the wetland. The discussion was not reflected in the minutes from the meeting, but the zoning administrator has a similar memory.

Best,

Greg

Greg Duggan, Planner

Town of Essex, 81 Main St.

Essex Junction, VT 05452

[802-878-1343](tel:802-878-1343)

gduggan@essex.org

From: Nate Hayward [<mailto:nate@haywarddesignbuild.com>]
Sent: Tuesday, March 29, 2016 12:37 PM
To: Gregory Duggan; John Stuart
Subject: Re: Items for 10 Old Stage Road

Hi Greg,

Gregory Duggan

From: John Stuart <john@jhstuartassociates.com>
Sent: Friday, April 01, 2016 7:46 AM
To: Gregory Duggan
Subject: Hayward Design Build
Attachments: HaywardSidewalk.pdf



Hi Greg:

I have assembled the additional information outlined in your last email and the submittal is nearly ready for submittal; however, I need your input on one item.

The site plan depicted a cross-walk that originated at the northwest corner of the property where no pedestrian facilities exist. As shown, the sidewalk on the east side of Old Stage was separated from the cross-walk by a shallow grass swale. If I understand your comment, the crossing of the swale should be improved and would require a culvert, fill and pavement.

However, if the cross-walk is moved south to be opposite the driveway accessing the tri-plex any pedestrian traffic would have access to the sidewalk without any improvements.

If the latter is acceptable, the cross-walk could be oriented on an oblique to connect the corner with the drive.

I want to avoid any delay on this matter and endeavor to resolve the question before making the submittal.

See attached for further detail and I'd appreciate your input.

--

JH Stuart, P.E.

john@jhstuartassociates.com

22 Tanglewood Drive Essex, VT 05452

P.O. Box 8367 Essex, VT 05451

Telephone/fax: 802-878-5171

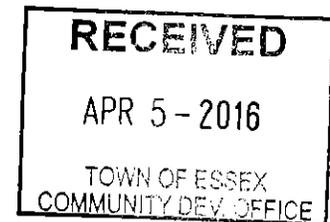
Mobile: 802-734-9805

www.jhstuartassociates.com

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Gregory Duggan

From: Nate Hayward <nate@haywarddesignbuild.com>
Sent: Tuesday, April 05, 2016 12:04 PM
To: Gregory Duggan
Cc: john@jhstuartassociates.com
Subject: Re: Items for 10 Old Stage Road



Hi Greg and John,

I just spoke with Jeff Severson, the wetlands ecologist that delineated the class 3 wetlands at 10 Old Stage Rd. I asked him if he would review local, state, and federal regulations as it relates to the class 3 wetland and the buffer question. He said he will be able to do that this week and provide us with a letter with his findings. If it is acceptable to you Greg I would like to continue to preliminary plat with the lot 5 and 6 configuration as it exists. We can supplement the application with the letter from Jeff, and amend if necessary for final plat. Does that sound like a reasonable approach?

Thanks a lot, Nate

On Tue, Mar 29, 2016 at 12:21 PM, Gregory Duggan <gduggan@essex.org> wrote:

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- The Planning Commission asked about the possibility of removing Lot 6 and instead putting a duplex on Lot 5 (in part to keep construction further away from the wetland). Was any consideration given to this suggestion?
- The Planning Commission had concerns about screening from adjacent properties. Please show more landscaping to the rear of the lots, particularly lot 2.
- Per Condition #7 of Sketch Approval, please show a connection from the crosswalk to the existing sidewalk on Old Stage Road.
- Site Plan
 - Please show zoning districts.
 - Please show the correct frontages for each lot.
 - Please move the street trees on Lot 2 to outside the 15-foot easement.

Gregory Duggan

From: Nate Hayward <nate@haywarddesignbuild.com>
Sent: Friday, April 22, 2016 12:04 PM
To: Gregory Duggan
Cc: john@jhstuartassociates.com
Subject: Re: Items for 10 Old Stage Road
Attachments: 10 Stage Road wetland memo 04 06 2016.pdf



Hi John and Greg,

I meant to forward this sooner. I've attached the letter from Jeff Severson, the wetlands ecologist, that we discussed. Greg: I am not sure if this provides any information that will be new from your perspective. I am hopeful that you, and the Planning Commission members, will review Jeff's letter and consider that our preliminary follows all local, state, and federal rules as it relates to class 3 wetlands. Thanks for your consideration. Have a good weekend.

Nate

On Tue, Apr 5, 2016 at 4:56 PM, Gregory Duggan <gduggan@essex.org> wrote:

Hi Nate,

That sounds fine, thanks for looking into it. I'm interested to see what Jeff says, but I don't think there's lots of regulations around class 3 wetlands. That said, I am interested in protecting wetlands, for various reasons. The Planning Commission raised the idea of combining Lots 5 and 6 and building a duplex; I liked the idea, so I raised it again in regards to your preliminary plan. Ultimately, the decision lies with the Planning Commission, but having feedback from a wetlands ecologist will certainly be helpful as the PC makes its decision.

Best,

Greg

Greg Duggan, Planner

Town of Essex, 81 Main St.

Essex Junction, VT 05452

[802-878-1343](tel:802-878-1343)

gduggan@essex.org

From: Nate Hayward [mailto:nate@haywarddesignbuild.com]
Sent: Tuesday, April 05, 2016 12:04 PM
To: Gregory Duggan
Cc: john@jhstuartassociates.com
Subject: Re: Items for 10 Old Stage Road

Hi Greg and John,

I just spoke with Jeff Severson, the wetlands ecologist that delineated the class 3 wetlands at 10 Old Stage Rd. I asked him if he would review local, state, and federal regulations as it relates to the class 3 wetland and the buffer question. He said he will be able to do that this week and provide us with a letter with his findings. If it is acceptable to you Greg I would like to continue to preliminary plat with the lot 5 and 6 configuration as it exists. We can supplement the application with the letter from Jeff, and amend if necessary for final plat. Does that sound like a reasonable approach?

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- Site Plan
 - Please show zoning districts.

Oakledge Environmental Services, Inc.

P.O. Box 4065, Burlington, VT 05406 (802) 660-8312

MEMORANDUM

To: Nate Hayward
From: Jeffrey Severson, Consulting Ecologist
Date: April 6, 2016
Re: Wetland Protection for 6-Lot Subdivision

This memorandum addresses the compliance of a proposed six-lot residential subdivision (the Project) located at 10 Old Stage Road in Essex Junction, Vermont with federal, state, and local wetland regulations. The project was reviewed to ensure compliance with Section 404 of the Clean Water Act (federal), the Vermont Wetland Rules (state), and the Surface Waters and Wetland Protection standards outlined in Section 3.11 of the Official Zoning Regulations for the Town of Essex (local).

The Project layout is shown on the Preliminary Plan (Sheet 1) and the Water and Sewer Services Plan/Profile (Sheet 2) of the plan set for the project prepared by J.H. Stuart Associates. Construction notes and infrastructure details are included on Sheets 3 and 4.

A wetland delineation of the entire property was completed by Oakledge Environmental Services, Inc. on September 1, 2015. A single small wetland is located on Parcel 6 in the western section of the property. The wetland boundaries were surveyed by Richard Bell, Land Surveyor, and are shown on Sheets 1 and 2. The wetland delineation was reviewed and confirmed by Tina Heath, District Wetland Ecologist for the Vermont Department of Environmental Conservation (VTDEC) on October 6, 2015.

Federal Regulations

The U.S. Army Corps of Engineers regulates the placement of or fill material into the "waters of the United States", which includes wetlands, under Section 404 of the Clean Water Act. The Project is designed to avoid wetland impacts and will not trigger Army Corps jurisdiction.

All construction activities will be confined to upland areas, and no work or equipment operation will be permitted within the wetland. Prior to construction, the contractor will be required to install silt fencing in the location shown on Sheet 1 in accordance with the specifications shown on the Silt Fence detail on Sheet 4. The silt fence will define the limits of disturbance near the wetland during construction and prevent the movement of sediments into the wetland.

As specified in the General Construction Notes on Sheet 4, "the planned construction must be under the direct supervision of a Professional Engineer who will observe all phases of work and upon completion certify compliance with the plans and [local] permit has been fulfilled".

State Regulations

The State of Vermont protects significant wetlands under the Vermont Wetland Rules.

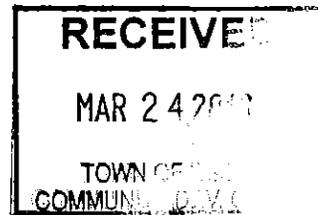
The Project complies with the Vermont Wetland Rules. The Project will not impact any Class One or Two wetlands or associated wetland buffer zones. The small wetland on the property was determined to be a Class Three wetland by Tina Heath, District Wetland Ecologist, which does not possess significant wetland functions and values. The wetland is not mapped on the Vermont Significant Wetland Inventory Map (VSWI) for the site, does not meet any of the Class Two wetland presumptions outlined in Section 4.6 of the Vermont Wetland Rules, and is not significant for any wetland functions or values outlined in the Rules. The Vermont Wetland Rules do not apply to Class Three wetlands, and do not establish buffer zones for these non-significant wetlands.

Local Regulations

The Town of Essex protects Class One and Class Two wetlands, and establishes buffer zones for these wetlands, under the Surface Waters and Wetland Protection standards that are outlined in Section 3.11 of the Official Zoning Regulations for the Town of Essex.

The Project complies with the Wetland Protection regulations outlined in Section 3.11. The Project site does not include any Class One or Class Two wetlands or their associated buffer zones. As noted, the small wetland on the property was determined to be a Class Three wetland by Tina Heath, District Wetland Ecologist, which does not possess significant wetland functions and values. The Section 3.11 Wetland Protection regulations do not apply to Class Three wetlands, and do not establish buffer zones for these non-significant wetlands.

Memorandum



To: Dana Hanley, Community Development Director
Sharon Kelley, Zoning Administrator
Greg Dugan, Town Planner

From: Dennis Lutz, P.E., Public Works Director
Aaron K. Martin, P.E., Utilities Director / Town Engineer

Date: March 25, 2016

Subject: 10 Old Stage Road
Preliminary Plan Review

*Emailed to J. Stuart
9 N. Hayward
4/8/16*

Public Works staff has reviewed the Preliminary Plan application for the above referenced proposed subdivision and offers the following comments:

Traffic:

1. As stated in the previous review memo from Public Works, a road improvement fee for additional gravel and other potential improvements to Lost Nation Road necessitated by the traffic increase due to the above referenced development will be required.
2. The gravel road impact fee for 715 feet of frontage is currently based on the following:
 $715 \text{ ft} \times (0.25 \text{ ft}) \times (12 \text{ ft}) = 2,145 \text{ CF}$ (half of road)
 $(2,145 \text{ CF}) \times (1 \text{ CY} / 27 \text{ CF}) = 79.4 \text{ CY}$
 $(79.4 \text{ CY}) \times (\$35.00 / \text{CY}) = \$2,779.00$
3. This subdivision lies adjacent to the small paved area on Lost Nation Road near Old Stage Road. The 5 new residences account for 50 trip ends per the ITE Trip Generation manual. Existing ADT traffic on the road is 390 at last count. Due to the nearby location of pavement and the approximate 11% traffic impact, it is our opinion that the traffic impact should be based not on adding gravel but on future pavement of this road between the end of the paved area and the furthest driveway – a distance of 420 feet. At a design width of 24 feet, a length of 420 feet and costs developed by Public Works for paving gravel roads (updated since 2007 using ENR) of \$1,508,274/mile, the traffic impact fee should be $.11 \times .075 \text{ miles} \times \$1,508,274$ or \$12,443.
4. The \$12,443 would go into a dedicated account and used for paving on this road. The Town's cost to match this paving would be \$89,603 – not an insignificant amount.
5. Our recommendation for the traffic impact fee is \$12,443. It could be collected in five payments as each of the five new units obtains a building permit.

Water and Sewer:

1. The applicant has received approval from the Selectboard to increase the original sewer allocation for the site from 200 GPD to a total of 1,200 GPD, with conditions. The applicant has enough sewer and water allocation for a total of six single family homes.
2. The Town's water and sewer fees are calculated based on two parts. A fixed flat amount per water or sewer connection, and an assigned allocation based on a per GPD

fee. In addition, if the fee schedule changes, then the fee charged shall be the fee in effect at the time of submittal for a building permit. The applicant will require water and sewer applications to connect for each building lot. The calculation below is based on one individual single family home.

- a. Water: $(200\text{gpd} \times \$5.65/\text{gal}) + \$1000 = \$2,130.00$
- b. Sewer: $(200\text{gpd} \times \$9.75/\text{gal}) + \$1000 = \underline{\$2,950.00}$
- c. Total = **\$5,080.00 per single family home**

3. A representative of the Town of Essex Public Works Department shall witness all connections and work performed on existing water and sewer infrastructure.
4. Further issues and concerns with the applicants design have been provided below in the Plan Review section.
5. Recent hydrant flow testing confirms that there is low static water pressure in this area of the Town's distribution system. Public Works recommends that fire demand calculations be submitted before final approval of the project. It appears that the fire demand will be satisfied but approval will not be given without the fire flow documentation.
6. The applicant's engineer shall provide peak domestic water demand calculations, based on the number of fixture units for each building unit, for proper sizing the water meter for each the proposed buildings. The Town of Essex will not size the meter based on line pressure in the building or size of incoming service line.
7. Again, all proposed sewer services and associated infrastructure proposed for this project shall be private. No Exceptions

Storm water:

1. The applicant's engineer has indicated that the project will only create 0.35 acres of impervious area and will not require a State or Local storm water permit. A storm water narrative has been provided for review and staff takes no exception to the methods to minimize storm water impacts on the site except as noted under the following comment.
2. Public Works is of the opinion that the curb cuts and lot drainage for lots 2, 3 and 4 do not need a drainage ditch along the road requiring a road culvert in the Town Right of Way. However the driveway to Lots 5 and 6 does. The ditch should start on a gradual slope near the curb cut to Lot #4 and gradually deepen to provide the requisite cover over an 18 inch HDPE culvert under the driveway to Lots 5 and 6. The ditch needs to be stone-lined from this culvert to the point where the current ditch joins the cross culvert and to where it connects to the existing drainage flow pattern. The Town should also be granted an easement along the western boundary of Lot 6 to insure that this drainage flow can be protected over time.

Design Drawings:

Sheet DWG 1 of 4 (Plan)

1. At Final plan submittal, the applicant must provide association language regarding the ownership and maintenance of the private sanitary sewer collection system proposed for this project.
2. The applicants engineer shall provide calculations to Public Works for review to ensure the proposed private pump station and size of force main is properly sized and meets State design criteria.
3. A note on each of the four drawings notifying the contractor to contact dig safe and the Town of Essex to locate all existing underground utilities before any excavation shall be required.

Sheet DWG 2 of 4 (Utility Plan and Profile)

1. As per Chapter 21 of the Vermont Water Supply rule, no Construction Permit for Public water system will be required for the waterline extension as proposed. All work shall be constructed in accordance with the Vermont Standards for Water System Design, Construction and Protection and with the Town of Essex Standard Specifications for Construction.
2. The extension of the existing water main on Lost Nation Road can be constructed by conventional means. A note on the plans shall be provided directing the Contractor to coordinate with Green Mountain Power to hold the existing utility poles during the excavation for the new water main extension.
3. The symbol legend on the plan indicates that the individual water services to the proposed homes are 1-inch copper lines. The lines to #5 and #6 are noted to be 1.5-Inch and lots #2 through #4 are 1.25-inch. Due to the lower pressures in this area, the Town agrees that a standard $\frac{3}{4}$ inch service will not be adequate to supply proper pressure to individual homes. The Town will require pressure and head-loss calculations to verify the proper size for each new water service.
4. The Town will not allow Old Stage Road or Craftsbury Court to be open cut for any reason other than the connection to the existing manhole on Craftsbury Court. The applicants engineer has indicated on the plans that the method of construction for the sanitary sewer force main shown on the plans will be by directional bore.
5. The current location of the sewer force main along the east side of Old Stage Road between Lost Nation Road and Craftsbury Court is within 10-feet of the Towns existing water main. The sewer force main and water main must have a minimum of 10-feet of separation. Notes must be added to the plan sheet directing the contractor to pothole the existing water main to verify the exact location of the existing water main, so the new sewer force main can have the required separation.

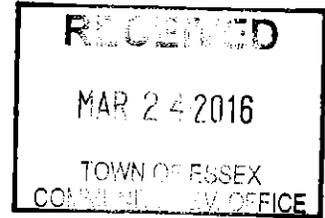
Sheet DWG 3 of 4 (Sewer Details)

1. Although all sanitary sewer infrastructure to be constructed shall remain private, all shall be constructed in accordance with the Town of Essex Standard Specifications for Construction.

2. For convenience, Staff has attached copies of the Town's standard sewer construction details for review and use by the applicant's engineer. Any deviation from these details will not be accepted by Public Works.

Sheet DWG 4 of 4 (Water and General Details)

1. For convenience, Staff has attached copies of the Town's standard water construction details for review and use by the applicant's engineer. Any deviation from these details will not be accepted by Public Works.
2. A note on the detail sheet shall be added requiring the contractor to coordinate all water infrastructure testing and inspection with the applicants engineer and a representative from the Town.



Memorandum

TO: Dennis Lutz, P.E., and Public Works Director
FROM: Aaron Martin, P.E., Town Engineer/Utilities Director *(AM)*
DATE: March 24, 2016
SUBJECT: Paving Gravel Roads
Updated Costs

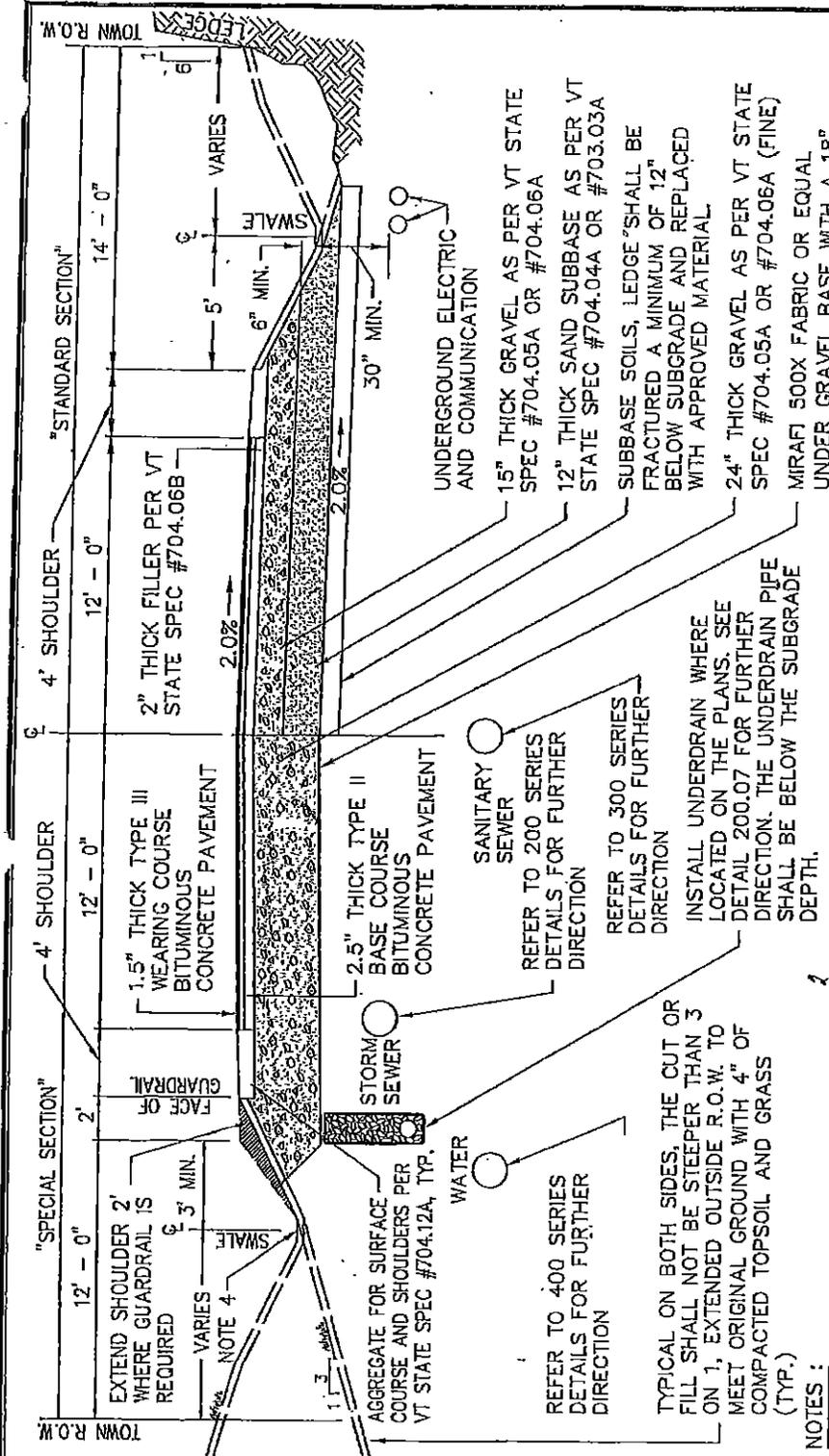
The total construction costs involved in paving a Class III gravel road has been updated using the current construction cost index provided by Engineering News Record. Attached is the original January 2007 Gravel Road Paving Report. Also attached is a copy of the existing standard road cross-section for a Type A Paved rural Road.

Construction Cost Index:

January 2007	7880
March 14, 2016	10,242
Percent Increase	30%

Total Construction Cost:

2007	\$219,737.50 per 1,000 LF of Gravel Road
2016	\$285,658.75 per 1,000 LF of Gravel Road



UNDERGROUND ELECTRIC AND COMMUNICATION

15" THICK GRAVEL AS PER VT STATE SPEC #704.05A OR #704.06A

12" THICK SAND SUBBASE AS PER VT STATE SPEC #704.04A OR #703.03A

SUBBASE SOILS, LEDGE SHALL BE FRACTURED A MINIMUM OF 12" BELOW SUBGRADE AND REPLACED WITH APPROVED MATERIAL

24" THICK GRAVEL AS PER VT STATE SPEC #704.05A OR #704.06A (FINE)

MIRAFI 500X FABRIC OR EQUAL UNDER GRAVEL BASE WITH A 18" MINIMUM OVERLAP AT ALL SEAMS

REFER TO 300 SERIES DETAILS FOR FURTHER DIRECTION

INSTALL UNDERDRAIN WHERE LOCATED ON THE PLANS. SEE DETAIL 200.07 FOR FURTHER DIRECTION. THE UNDERDRAIN PIPE SHALL BE BELOW THE SUBGRADE DEPTH.

REFER TO 400 SERIES DETAILS FOR FURTHER DIRECTION

TYPICAL ON BOTH SIDES, THE CUT OR FILL SHALL NOT BE STEEPER THAN 3 ON 1, EXTENDED OUTSIDE R.O.W. TO MEET ORIGINAL GROUND WITH 4" OF COMPACTED TOPSOIL AND GRASS (TYP.)

NOTES :

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE TOWN OF ESSEX PUBLIC WORKS REQUIREMENTS, THE VERMONT STATE STANDARD SPECIFICATIONS FOR CONSTRUCTION, AND THE APPROVED ENGINEERING PLANS AND SPECIFICATIONS.
2. SOIL BORINGS AND TEST PITS SHALL BE REQUIRED BY THE TOWN TO DETERMINE WHETHER THE STANDARD OR SPECIAL CROSS-SECTION SHALL BE USED.
3. THE STANDARD SECTION MAY BE USED WHEN THE SUBGRADE SOILS TO A DEPTH OF 36" BELOW FINISH GRADE ARE SOIL CLASSIFICATION A-1-a OR A-1-b.
4. REFER TO DETAIL 200.06 FOR SPECIFIC INFORMATION REGARDING DRAINAGE SWALE CONSTRUCTION. WHERE THE ROADWAY GRADE EXCEEDS 5.0% DRAINAGE DITCHES SHALL BE STONE LINED.
5. THE ROAD FINISH GRADE SHALL HAVE A MINIMUM SLOPE OF 0.5 %.
6. IF THE TOP COURSE OF PAVEMENT IS NOT INSTALLED WITHIN 60 DAYS OF THE BASE COURSE, THE CONTRACTOR SHALL APPLY EMULSION TO THE FULL WIDTH OF THE BASE COURSE BEFORE INSTALLING THE TOP COURSE.
7. GUARD RAIL SHALL BE USED WHEN THE HEIGHT OF FILL AT THE SHOULDER POINT IS GREATER THAN 10 VERTICAL FEET.
8. SHALLOW DITCHES MAY BE INSTALLED WHEN A CLOSED DRAINAGE SYSTEM WITH UNDERDRAINS ARE USED.



TOWN OF ESSEX
PUBLIC WORKS
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TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION
TYPE A RURAL ROAD
(PAVED)

Detail No: 100.03
Scale: NOT TO SCALE
Date: NOV. 2015

A-3

January 2007
ENR Cons. INDEX
7880

Report on Paving of Selected Town Gravel Roads

Background:

General: The Town has a total of 23.39 miles of Class III gravel roads, as noted in the "Highway Transportation Management Plan" dated January 2005. The Class III gravel roads are categorized by function into two general classifications – Collector Roads and Minor Roads. The Town also has 3.4 miles of gravel Class IV roads, but these roads are not the responsibility of the Town to maintain.

A "collector" road has the primary function of distributing traffic between minor roads and the major arterial system. A secondary function is land access and a tertiary function is to handle inter-neighborhood traffic movement. In the case of the gravel collector roads, they primarily function as interconnections with neighboring communities. A table of the gravel collector roads is located in Appendix Table 1.

The minor roads are those roads used primarily to provide access to adjacent properties and are not generally used for through traffic. In general, traffic volumes are low. A table of the gravel minor roads is located in Appendix Table 2.

The Class IV roads are listed in Appendix Table 3 and noted as being Unimproved Roads.

In the 1991 comprehensive study on all Town roads, a section was dedicated to gravel roads and three roads were identified as being potential candidates for future paving. These roads were Osgood Hill, Indian Brook and Brigham Hill. An excerpt from this report is included as Appendix 4. The cost in 1991 dollars was significant (\$1.3M) to reconstruct and pave all three roads. The paving of gravel roads was included in the Town Capital Plan up through FYE2000 and then discontinued in FYE2001. No funding had been included for many years and there was a concern raised by Village residents over Village residents potentially paying for paving of the Town's gravel roads through the Capital tax.

Traffic: Gravel roads function adequately in low volume traffic situations. As the traffic volume and number of heavy vehicles increase on a gravel road, the load carrying capability of the road surface decreases, especially during periods of spring runoff, fall to winter transition and wet weather. The Town collects limited traffic volume information on the gravel roads but the most recent data that is available is provided in Appendix Table 5.

Analysis of the data reveals the following:

- 1) Traffic volume on Lost Nation Road and Lamore Road (where hard data was obtained) has decreased over time due to the construction of the Circ Highway. This particular road group (including Discovery Road) functioned as a bypass to the Five Corners traffic until the Circ Highway was built. The overall drop is approximately 40%.
- 2) Indian Brook has a high traffic count for a gravel road but this generally occurs only during the late spring, summer and early fall due to the Park use.

- 3) As a comparison, paved roads with similar daily traffic counts to the higher traffic volume gravel roads include Willoughby Drive (616), Towers Road -north of Chapin (638), Sydney Drive (729) and Gentes Road (558). For further comparison, other selected paved roads have the following counts: Pinewood Drive (1311), Greenfield Road (1563), Susie Wilson Road Bypass (14,000).
- 4) Traffic which has been measured has remained relatively level on the remaining gravel roads over the last six years (i.e., no major increase).

Technical Issues:

Current gravel roads will not support a paving overlay without a significant reconstruction of the road. There are a number of issues/reasons for this, including:

- 1) Inadequate vertical and horizontal alignment of the road. Because the speeds on gravel roads are slower and the gravel roads generally tend to provide better traction (rougher surface friction factor than a paved road), some vertical and horizontal curves may have to be lessened in slope and curves lengthened to provide for safe vehicle travel when paved. A paved road will have to be wider, mainly to provide for adequate shoulders off the pavement.
- 2) Lack of adequate drainage. Many of the gravel roads have ditches with a combination of steep slopes, undersized culverts, "soft" soils and poor drainage leading away from the culverts. A gravel road can be replaced quickly, cheaply and easily in the event of a drainage system failure. Prior to paving of a gravel road, the drainage system must in many cases be rebuilt at least in part to preclude the early failure of the paved road. In addition, the paving of the road increases the rate of runoff from the road surface and drainage facilities that may have been adequate for a gravel road may not be adequate for a paved road. Ditches that consisted of natural soil (soft) will likely have to be stabilized with some stone.
- 3) Improper surface characteristics. The surface of a gravel road is designed with a road gravel that contains a significant portion of fine material – material passing the #200 sieve as silt or clay. It is not uncommon to have this material contain on the order of 9 % to 11 % "fines". This material acts as the binder on gravel roads, holding the coarser sand and gravel material in place. It is designed to shed water to the greatest extent that the surface can without creating a quagmire in the spring. Conversely, a paved road requires that the underlying material be coarse and open to act as a natural drain to enable the water to seep through and not collect directly below the paved zone. If fine grained materials are used or a gravel with more than 6 % fines, the result is a rapid break-up of the pavement, starting with cracking, potholes and finally break-up of the surface. To convert a gravel road to a paved road, a minimum depth of new coarse gravel sub-base of 24 inches is needed, topped by a 6 inch lift of clean finer gravel. Filter fabric should also be installed between the old base and the clean gravel.

Design/Construction Issues:

To estimate the approximate costs for paving a specific section of a gravel road, the following steps need to be considered before estimating for the actual pavement cost:

- 1) Survey the road to identify needed changes in vertical or horizontal alignment
- 2) Inspect all existing drainage structures for condition and adequacy
- 3) Calculate the drainage requirements for the new road and identify the drainage improvements that must be made
- 4) Establish a limit for clearing based on the new width, drainage considerations and horizontal/vertical alignment
- 5) Determine whether the existing road base needs to be cut the full 24 inches (+) or whether some combination of cuts and fills could be used
- 6) Class III gravel and Class III paved roads have different design specifications as provided in the Town specifications. If the Town is to upgrade a Class III Gravel road to a Paved Class III, Town standards must be adhered to. The Town Standards are reasonable and appropriate for the climate and soil conditions in Essex.
- 7) Determine if ledge is present in the road bed that will impact the excavation or drainage
- 8) Build the resolution of these issues into a final design

Basis of Estimate for the Study:

Using the information outlined previously, a very general cost estimate has been developed using a standard length of non-specific road. The estimate is based on the following:

1. Typical Class III paved road cross section, see Appendix item 6.
2. Typical Class III gravel road cross section, see Appendix item 7.
3. Reclaim existing gravel on the road when excavating for new subbase, and stockpile at the landfill. All excess material shall be placed at the landfill as well.

Estimated Costs for Paving 1,000 L.F. Of Class III Gravel Road

Item No.	Item Description	Cost
1	Clearing and Grubbing	\$ 2,320.00
2	Drainage Swale Excavation	\$ 17,455.00
3	Excavation of Subgrade	\$ 65,300.00
4	Road Fabric	\$ 6,500.00
5	Swale Stone (5" minus)	\$ 5,235.00
6	Road Subbase (VAOT 704.05A)	\$ 44,490.00
7	Paving	\$ 29,330.00
8	Storm Drain Crossings	\$ 5,160.00
	Subtotal	\$ 175,790.00
	Contingency (10%)	\$ 17,579.00
	Engineering (15%)	\$ 26,368.50
	Total	\$ 219,737.50

4. Although this cost appears very high, it is based on current prices as noted in the Mean's Estimating Guide as well as current project costs of other Town projects.

Costs and Impacts of Paving Selected Gravel Roads or Sections Thereof:

1. If the three roads (Brigham Hill, Osgood hill and Indian Brook) identified in 1991 were reconstructed properly as outlined in this memorandum, and paved today in their entirety, the total cost would be on the order of 6.7 million dollars.
2. In comparison to the funds spent on paved roads within the Town, the Town has budgeted the following sums the last few years for overlay/ reconstruction of the existing paved roads and related construction:

<u>Year</u>	<u>Operating Funds</u>	<u>Capital Funds</u>
FYE02	\$ 86,850	\$175,000
FYE03	\$133,270	\$135,500
FYE04	\$128,441	\$ 60,000
FYE05	\$124,600	\$110,000
FYE06	\$116,300	\$128,000
FYE07	\$133,000	\$142,200
FYE08	\$134,400	\$124,921

(Note: The above numbers do not reflect the fact that some large site specific projects were also funded during this period. Most of these projects were funded with State and Federal Aid equal to 90% of the project cost).

3. In a study done in 2001, it was noted that to maintain an overlay program that would resurface a paved road every 12 years, the annual sum of \$190,000 would be needed. That amount does not reflect the extra cost to reconstruct roads that have gone beyond their life-span. It is unfortunate but true that the Town has not been adequately funding its pavement overlay program on its existing paved roads.
4. If the costs to upgrade 1000 ft of a gravel road to a paved road (\$219,737) were used instead to bring the existing paved roads up to standard, the funds would pave 12,930 feet of a 30 foot wide paved road (2.45 miles of paved road). Diverting the limited available funds from the maintenance of existing paved roads to paving the gravel roads would cause the paved roads to deteriorate beyond the overlay stage and into the more expensive reconstruction stage.

Alternatives:

There are interim steps that can be taken to improve the gravel roads short of paving them. Some of these are:

1. Provide more funds for the addition of gravel to the existing roads. Currently, approximately \$15,000 per year is budgeted which provides a thin overlay on about 1.5 miles of gravel road. This is insufficient to replace the gravel that is lost each year to grading , spring mud season, washouts and the like. Many of the gravel roads have lost much of the traveled surface creating a road without the capability to handle the traffic

load. If 6 inches of gravel were added to 1 mile of gravel road, the cost would be on the order of \$26,500 for materials. If hauled by outside contractors, the cost would increase to approximately \$35,000/mile. If the construction materials budget were increased by \$50,000 per year, the Town could overlay the three highest traveled gravel roads over a two to three year period.

2. In the worst areas of gravel roads, fabric could be placed under the gravel to help distribute the traffic load to the subbase and reduce the extent of spring thaw problems. For a mile of road, this would cost on the order of \$30,000.

3. Another option, which has limited use due to the availability of material is to utilize the stockpile of recycled asphalt at the landfill and replace some of the top gravel with a thick layer (6 inches) of the recycled asphalt. This could be done in limited areas as a transition between the paved sections and the gravel sections. Some of the underlying base would have to be removed and replaced with coarse gravel before placing the recycled material.

Conclusions:

1. The cost to pave an existing gravel road is extremely expensive and cannot be accomplished within the normal budget process.
2. The need to continue maintenance on the paved roads is of greater importance than placing new pavement on the gravel roads, given traffic levels, accident history and other factors.
3. The traffic levels on the gravel roads have not increased significantly over the past five to six years ; safety issues are likely to increase to a higher level than exists today if the gravel roads are paved due to increased speed, road configuration and decreased surface friction.
4. An increase in the operating budget to provide for a better gravel road surface, incremental improvements to the drainage (increased culvert replacement, stoning of ditches), partial use of filter fabric and selected use of recycled asphalt will enable the gravel roads to better handle the traffic loads and reduce the level of complaints. It will improve the situation but not provide an end product equivalent to a paved road. However, this level of intermediate improvement would cost on the order of 7% of the paved gravel road cost.

**TABLE 1 - COLLECTOR ROADS
GRAVEL SECTIONS**

Road Name	Highway Number	Class	Length (miles)	1990 Traffic Count	Traffic level	2005 Traffic count	Traffic Level
Brigham Hill Rd	36	3	2.06	715	MH	904	H
Curve Hill Road	26	3	.20	-	ML	-	ML
Chapin Road	26	3	2.53	-	ML	-	ML
Discovery Road	21	3	.50	-	M	-	M
Indian Brook Rd	30	3	1.25	-	M	935	H
Lost Nation Rd	27	3	2.80	-	M	482	M
Lamore Rd	23	3	1.15	-	ML	-	ML
Old Pump Rd	59	3	1.04	-	L	-	L
Osgood Hill Rd	51	3	2.46	-	M	691	MH
Pettingill Rd	44	3	.76	-	ML	-	ML
Sleepy Hollow Rd	60	3	1.20	-	ML	-	ML

Total Miles: 15.95 miles

Percent of Total Essex Mileage = 16.2%

**TABLE 2 - MINOR ROADS
GRAVEL SECTIONS**

Road Name	Highway Number	Class	Length Miles		1990 Traffic Level	2005 Traffic Count	Traffic Level
Bixby Hill Rd	714 + 48	3	.90	-	ML	-	ML
Brigham Hill Ln	33	3	1.25	-	L	-	L
Catella Rd	50	3	1.1	-	ML	-	ML
Cilly Hill Rd	54	3	.10	-	L	-	L
Col Page Rd	38	3	.75	-	L	-	L
Fleury Rd	708	3	.16	-	L	-	L
Gray Way	57	3	.39	-	L	-	L
Hanley Lane	53	3	.30	-	L	-	L
Lost Nation Rd	27	3	.40	-	L	-	L
McGee Rd	29	3	.08	-	L	-	L
Naylor Rd	65	3	.35	-	L	-	L
Sawmill Rd	56	3	.85	-	L	-	L
Saxon Hill	66	3	.56	-	L	-	L
Towers Rd.Ext.	41	3	.25	-	L	-	L

Total miles 7.44 miles

Percent of Total Essex Mileage = 7.5%

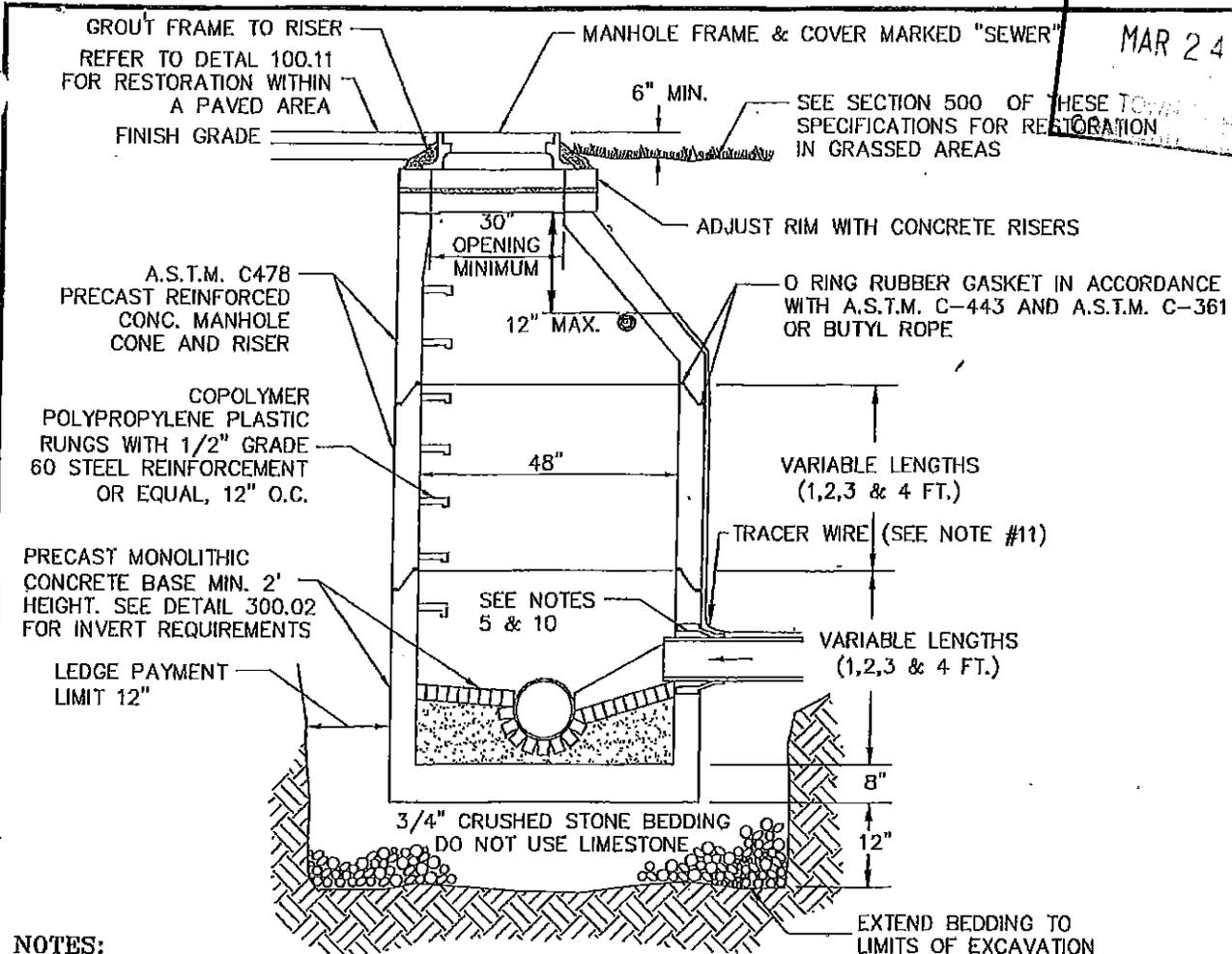
TABLE 3 - UNIMPROVED ROADS

Road Name	Town Highway Number	State Class	Length (miles)
Extension of Landfill Access Road	18	IV	0.22
Extension of McGee Road	29	IV	0.2
Extension of Brigham Hill Lane	33	IV	0.15
Extension of Hanley Lane	53	IV	0.55
West Sleepy Hollow Road	60	IV	1.95
Extension of Saxon Hill Road	66	IV	0.08
Water Tank Road off Bixby Hill	716	IV	0.2
Extension of Fern Hollow	748	IV	0.05

Total miles 3.4

Percent of Essex Mileage = 3.4%

MAR 24 2016



NOTES:

1. THERE SHALL BE NO PARGING OF INTERIOR SURFACES WITH MORTAR. ALL JOINTS SHALL BE SEALED ON EXTERIOR SURFACES ONLY.
2. REFER TO THE WRITTEN SPECIFICATIONS FOR BACKFILL AND COMPACTION REQUIREMENTS
3. REFER TO THE WRITTEN SPECIFICATIONS FOR SANITARY SEWER STRUCTURE MATERIAL REQUIREMENTS AND TESTING REQUIREMENTS.
4. RAISE FRAME TO FINISH GRADE ONLY AFTER BASE COURSE OF PAVEMENT IS IN PLACE. RAISE FRAME TO BASE COURSE GRADE IF WEARING COURSE IS TO BE PLACED NEXT CONSTRUCTION SEASON.
5. CAST IN PLACE RUBBER BOOTS SHALL BE USED ON ALL SEWER CONNECTIONS. A CORE-N-SEAL STYLE BOOT MAY BE USED UPON TOWN APPROVAL.
6. HIGH STRENGTH NON-SHRINK GROUT SHALL BE USED TO SET FRAME AND GRADE RINGS.
7. IN GRASS AREAS, FRAME AND COVER ARE TO BE INSTALLED A MINIMUM OF 6" ABOVE GRADE.
8. BACKFILL MANHOLES WITH MATERIAL APPROVED BY TOWN.
9. IF THE INVERT IN ELEVATION IS GREATER THAN 2' ABOVE THE INVERT OUT ELEVATION, REFER TO FIGURE A-21 FOR AN INSIDE DROP MANHOLE.
10. FRAME AND COVER SHALL CONFORM TO H-20 LOADING REQUIREMENTS.
11. INSERT A SECTION OF PVC CONDUIT OR TUBING THROUGH THE SIDEWALL OF THE STRUCTURE AS SHOWN FOR THE TRACER WIRE TO ENTER THE STRUCTURE. ONCE THE TRACER WIRE IS INSTALLED, SEAL THE VOID BETWEEN THE CONDUIT OR TUBING AND THE TRACER WIRE WITH A WATERPROOF SEALANT. INSIDE THE MANHOLE, A COIL OF WIRE LONG ENOUGH TO REACH THE COVER SHALL BE ATTACHED TO THE INSIDE OF THE STRUCTURE BY MEANS OF PLASTIC "ZIP-TIES" TO A STAINLESS STEEL RING,



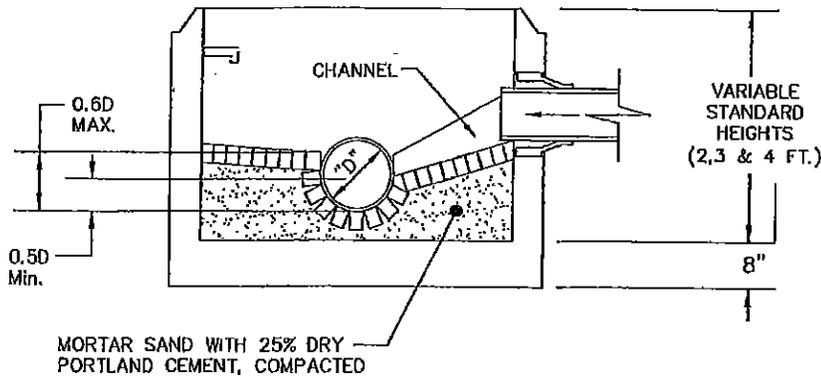
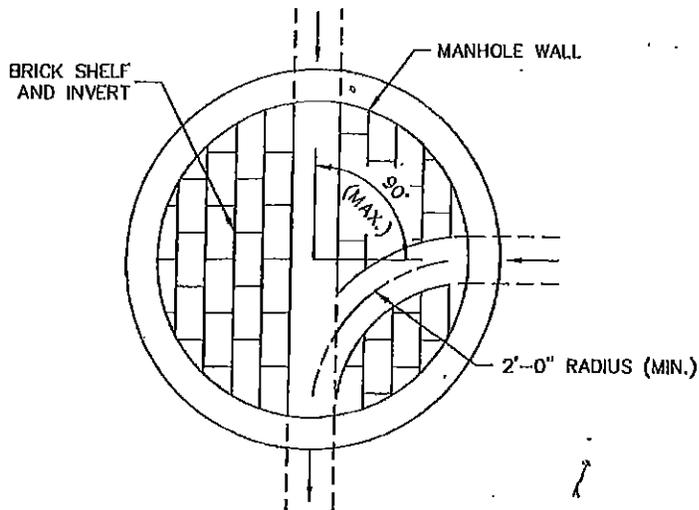
TOWN OF ESSEX
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E: www.essex.org

TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION

SANITARY SEWER MANHOLE

Detail No: 300.01
Scale: NOT TO SCALE
Date: NOV. 2015

A-20



NOTES:

- 1) NO PARING OF INTERIOR BRICKWORK OR JOINTS WITH MORTAR SHALL BE ALLOWED.
- 2) ALL INVERT BRICK WORK SHALL BE INSPECTED BY THE TOWN OF ESSEX BEFORE IT IS ACCEPTED.



TOWN OF ESSEX
PUBLIC WORKS
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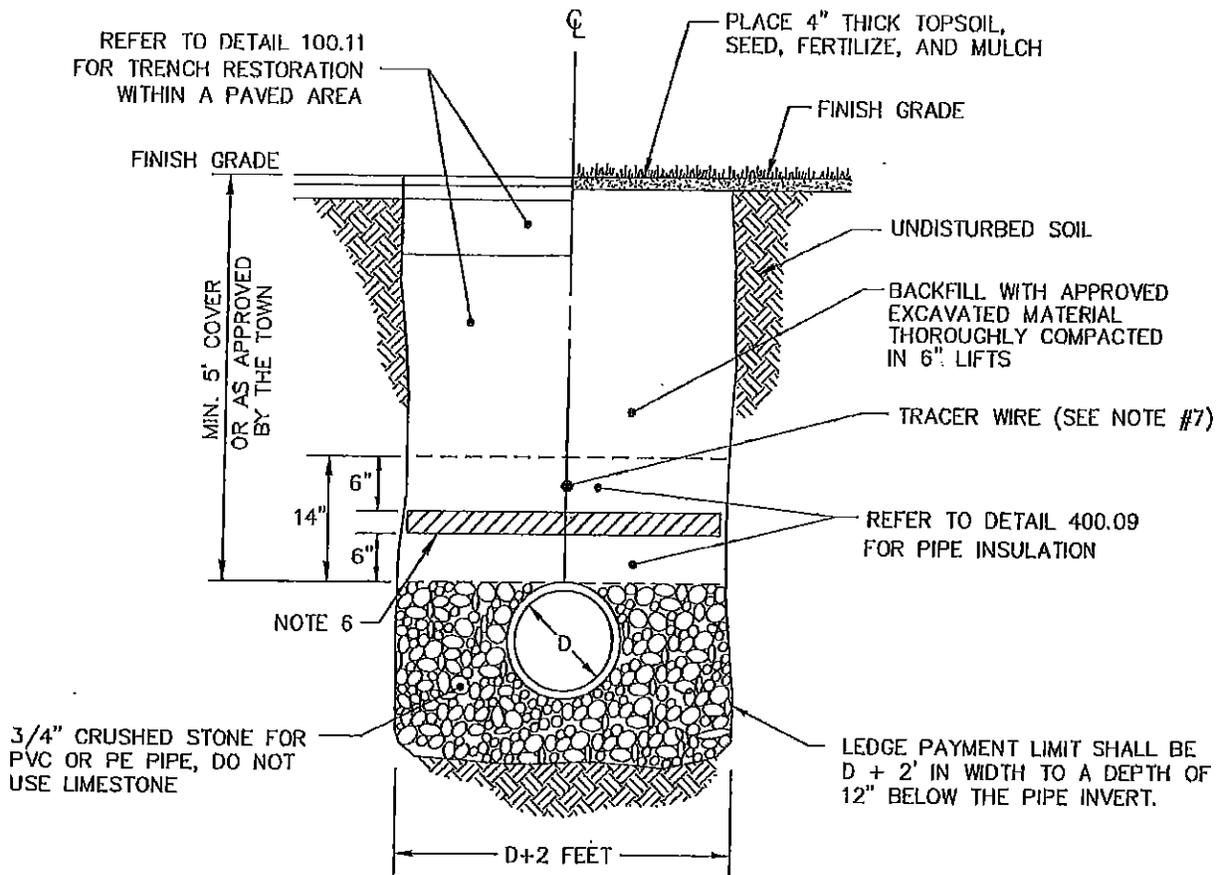
TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION

SANITARY SEWER
MANHOLE INVERT

Detail No:	300.02
Scale:	NOT TO SCALE
Date:	NOV. 2015

A-21

REFER TO DETAIL 100.11
FOR TRENCH RESTORATION
WITHIN A PAVED AREA



NOTES :

1. THE CONTRACTOR SHALL KEEP THE TRENCH ENTIRELY FREE OF WATER AT ALL TIMES UNTIL THE WORK IS COMPLETE AND READY FOR BACKFILLING.
2. THE SIDES OF THE TRENCHES SHALL BE SHEETED OR SLOPED TO THE ANGLE OF REPOSE IF THE TRENCH IS 4' OR MORE IN DEPTH.
3. BACKFILL TRENCH IN 6" LIFTS AND COMPACT EACH LIFT TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D698 STANDARD PROCTOR.
4. BACKFILL ABOVE THE CROWN OF THE PIPE SHALL BE COMMON FILL.
5. ALL WORK SHALL CONFORM TO THE WRITTEN SPECIFICATIONS AND PLANS UNLESS OTHERWISE SPECIFIED.
6. IF COVER OVER PIPE IS LESS THAN 5', PLACE 2" THICK INSULATION BOARD OVER PIPE FOR EVERY FOOT OF COVER LESS THAN 5'. IN NO CASE SHALL THERE BE LESS THAN 3.5' OF COVER OVER THE TOP OF PIPE.
7. INSTALL A CONTINUOUS SHEATHED SOLID CONDUCTOR COPPER TRACER WIRE OVER PIPE. THE WIRE SHALL BEGIN INSIDE ONE MANHOLE AND RUN TO THE NEXT MANHOLE. INSIDE THE MANHOLES, A COIL OF WIRE LONG ENOUGH TO REACH THE COVER SHALL BE ATTACHED TO THE INSIDE OF THE STRUCTURE. SEE DETAILS 300.01 AND 300.03

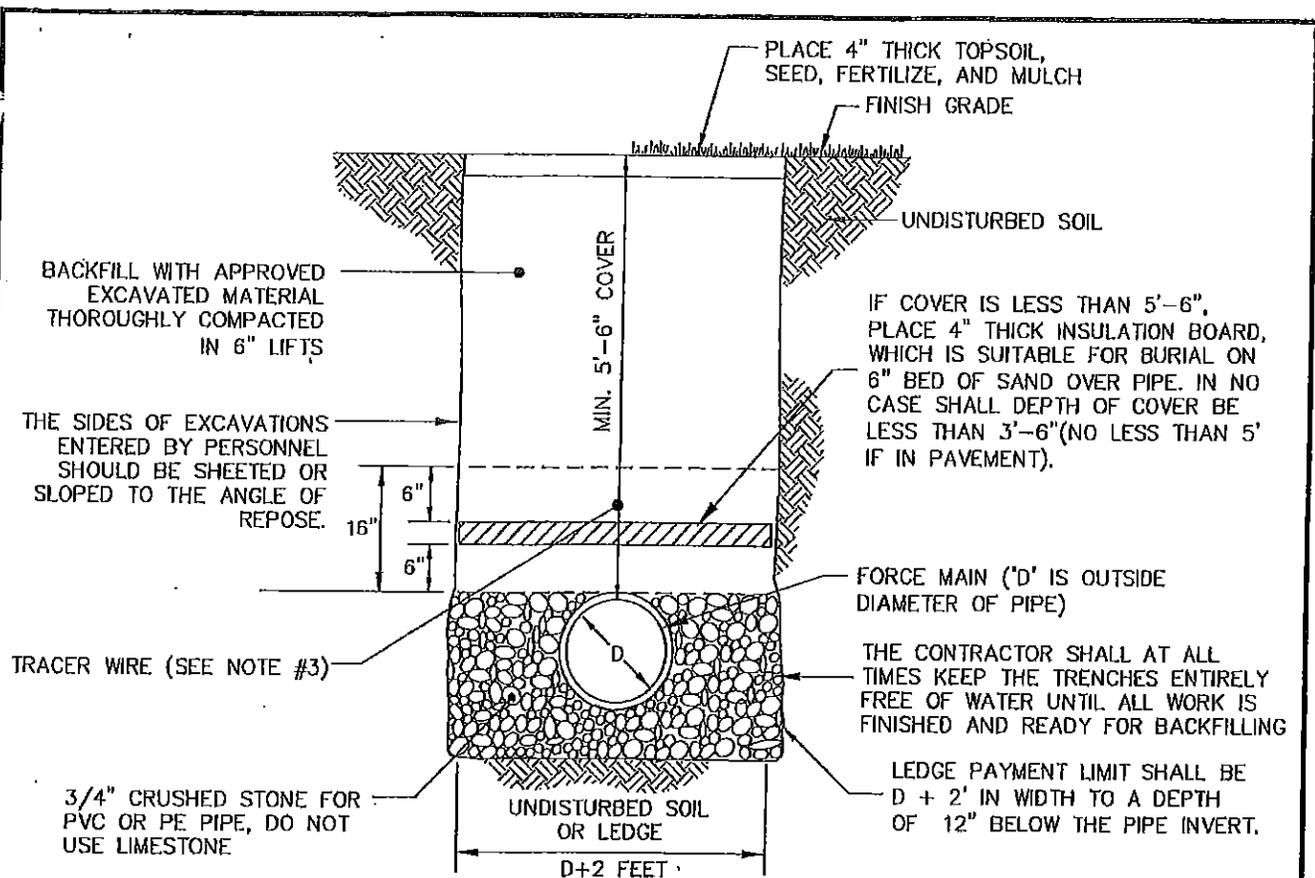


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ET WWW.ESSEX.ORG

TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION
**SANITARY SEWER TRENCH
(GRAVITY)**

Detail No: 300.04
Scale: NOT TO SCALE
Date: NOV. 2015

A-23



FORCE MAIN SPECIFICATIONS

1. PLACE THRUST BLOCKS AT ALL FORCE MAIN BENDS.

2. **TESTING:** THE CONTRACTOR SHALL FURNISH ALL FACILITIES AND PERSONNEL FOR CONDUCTING THE FOLLOWING TEST. THE FORCE MAIN SHALL BE FILLED WITH WATER AND TESTED BY THE CONTRACTOR TO A MINIMUM PRESSURE OF 50 PSI AT THE HIGHEST POINT ALONG THE FORCE MAIN FOR TWO HOURS AND THE PRESSURE SHALL NOT VARY MORE THAN 5 PSI. THE NEW LINES SHALL NOT BE ACCEPTED IF THE LEAKAGE DURING THE TWO-HOUR TEST IS GREATER THAN THAT DETERMINED BY THE FOLLOWING FORMULA.

$$L = \frac{ND\sqrt{P}}{7,400}$$

- WHERE L = THE ALLOWABLE LEAKAGE IN GALLONS PER HOUR
- N = THE NUMBER OF JOINTS IN THE LENGTH OF PIPELINE TESTED
- D = THE NOMINAL DIAMETER OF THE PIPE IN INCHES
- P = THE AVERAGE TEST PRESSURE MEASURED IN LBS/SQ IN

LEAKAGE IS DEFINED AS THE QUANTITY OF WATER THAT MUST BE SUPPLIED INTO THE NEWLY LAID PIPE TO MAINTAIN THE PRESSURE OF 50 PSI. THE CONTRACTOR SHALL AT ONCE LOCATE ANY LEAKS AND ACHIEVE THE ACCEPTABLE LIMIT AT NO EXTRA CHARGE TO THE OWNER.

3. INSTALL A CONTINUOUS SHEATHED SOLID CONDUCTOR COPPER TRACER WIRE OVER PIPE. THE WIRE SHALL BEGIN INSIDE ONE MANHOLE AND RUN TO THE NEXT MANHOLE. INSIDE THE MANHOLES, A COIL OF WIRE LONG ENOUGH TO REACH THE COVER SHALL BE ATTACHED TO THE INSIDE OF THE STRUCTURE. SEE DETAILS 300.01 AND 300.03.

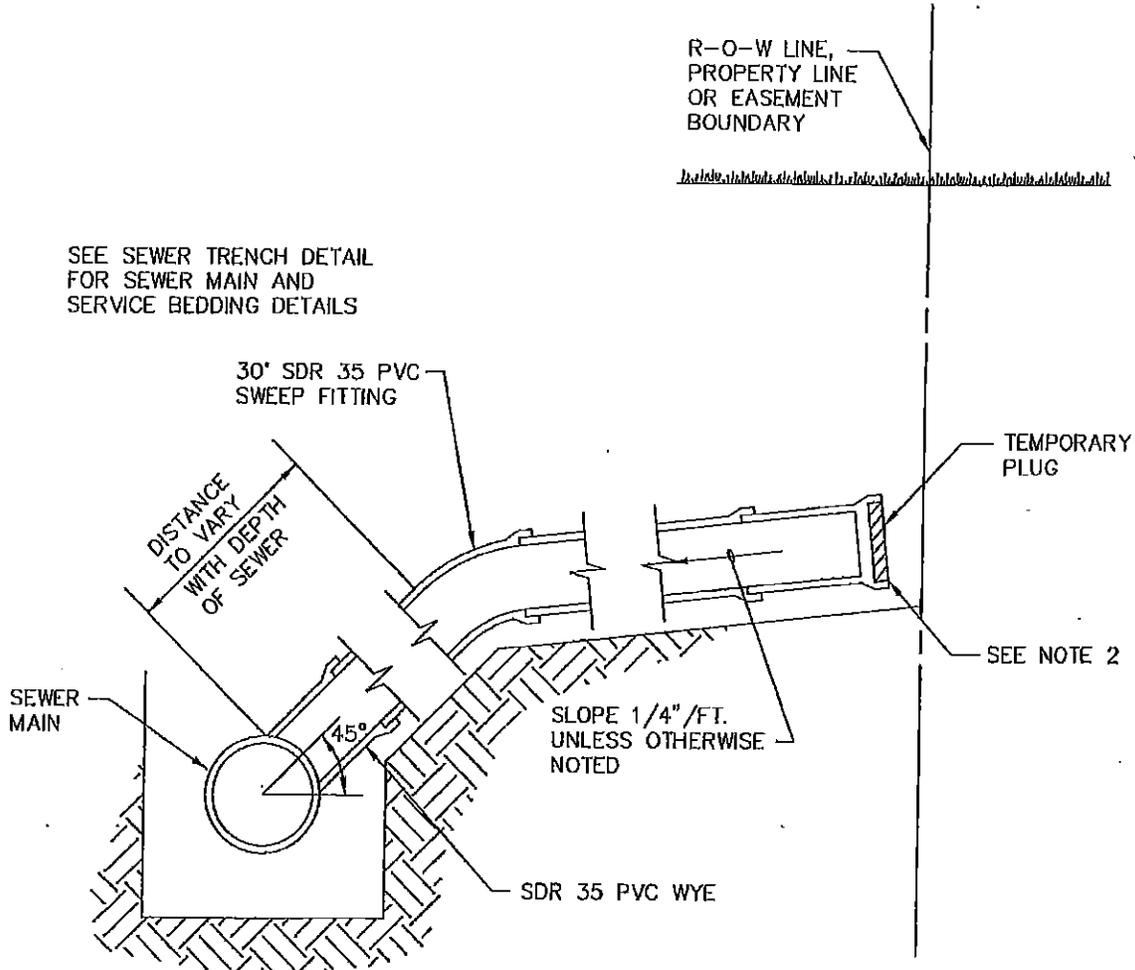


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TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION
SANITARY SEWER TRENCH
(FORCEMAIN)

Detail No: 300.05
Scale: NOT TO SCALE
Date: NOV. 2015

SEE SEWER TRENCH DETAIL
FOR SEWER MAIN AND
SERVICE BEDDING DETAILS



NOTES :

1. ALL SANITARY SEWER SERVICE PIPING WITHIN THE TOWN RIGHT OF WAY SHALL BE 6" SDR 35 PVC.
2. ALL CONNECTIONS TO THE NEW SERVICE SHALL BE WITH SDR 35 PVC FITTINGS OR APPROVED EQUAL. FERNCO STYLE FLEXIBLE COUPLINGS SHALL NOT BE USED.
3. ALL WORK SHALL CONFORM TO THESE SPECIFICATIONS AND DETAIL 300.04, SANITARY SEWER TRENCH (GRAVITY).



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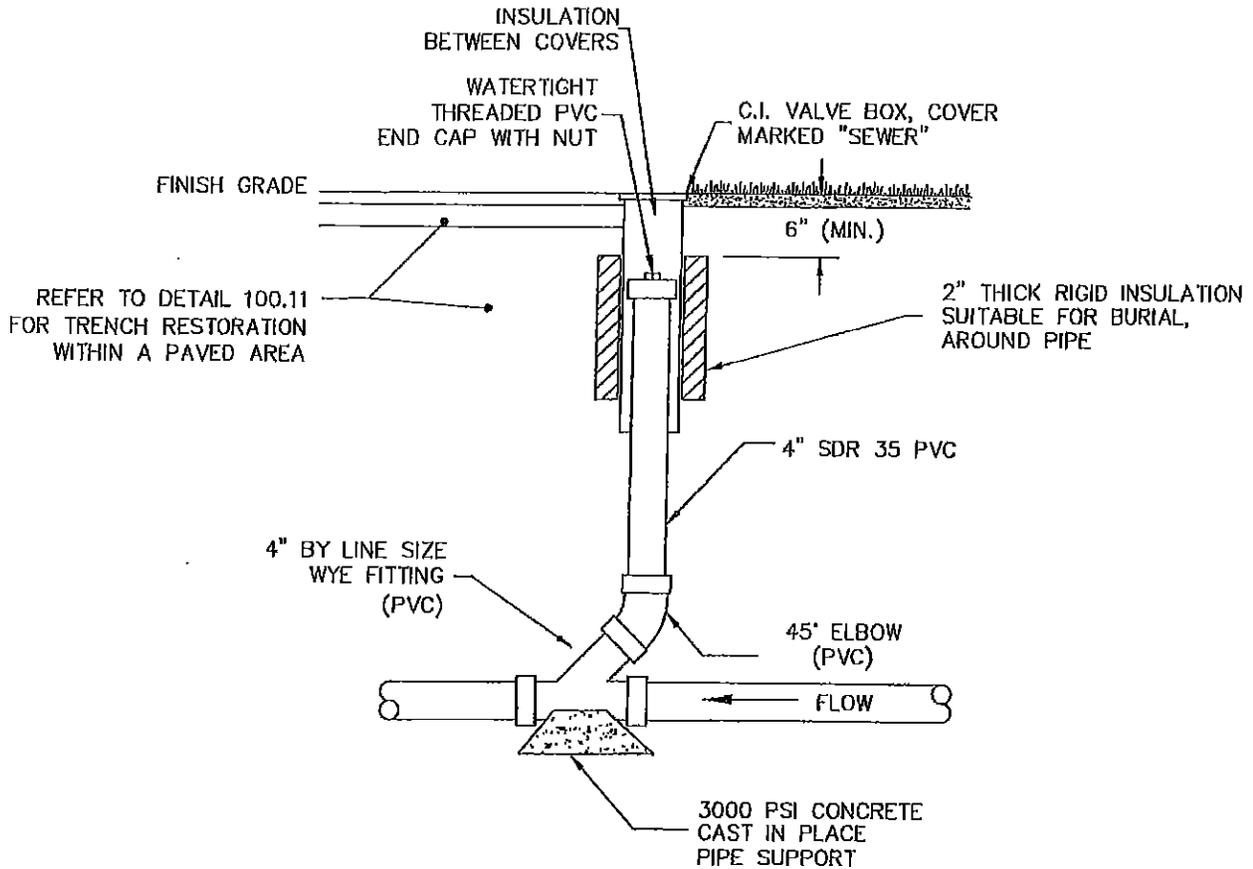
SERVICE CONNECTION

Detail No: 300.06

Scale: NOT TO SCALE

Date: NOV. 2015

A-25



NOTES :

1. CLEANOUTS FOR GRAVITY SEWERS AND FORCE MAINS SHALL BE PROVIDED AT LOCATIONS INDICATED ON THE PLANS OR AS DIRECTED BY THE TOWN OR ENGINEER.
2. CLEANOUT FRAMES AND COVERS SHALL BE CAST IRON.
3. ALL PIPING AND FITTINGS WITHIN THE TOWN RIGHT OF WAY SHALL BE A MINIMUM OF 6".

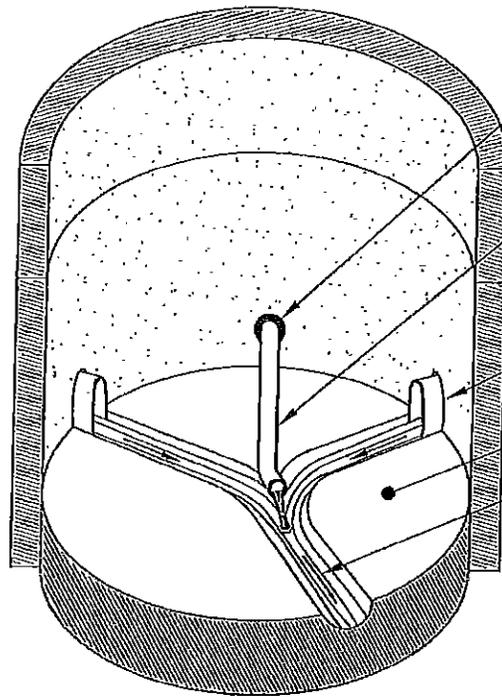


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TOWN OF ESSEX, VERMONT
 STANDARD SPECIFICATIONS FOR CONSTRUCTION
 SANITARY SEWER CLEANOUT

Detail No: 300.07
 Scale: NOT TO SCALE
 Date: NOV. 2015

A-26



CORE HOLE ABOVE EXISTING SHELF TO ACCOMMODATE THE NEW FORCEMAIN PIPE. ADD A NEW CORE AND SEAL BOOTED CONNECTION OR EQUAL.

NEW FORCE MAIN INLET INVERT TO BE 1" MIN. ABOVE EXISTING SHELF AND DIRECTED INTO EXISTING FLOW CHANNEL

EXISTING SEWER LINE INLET, TYP.

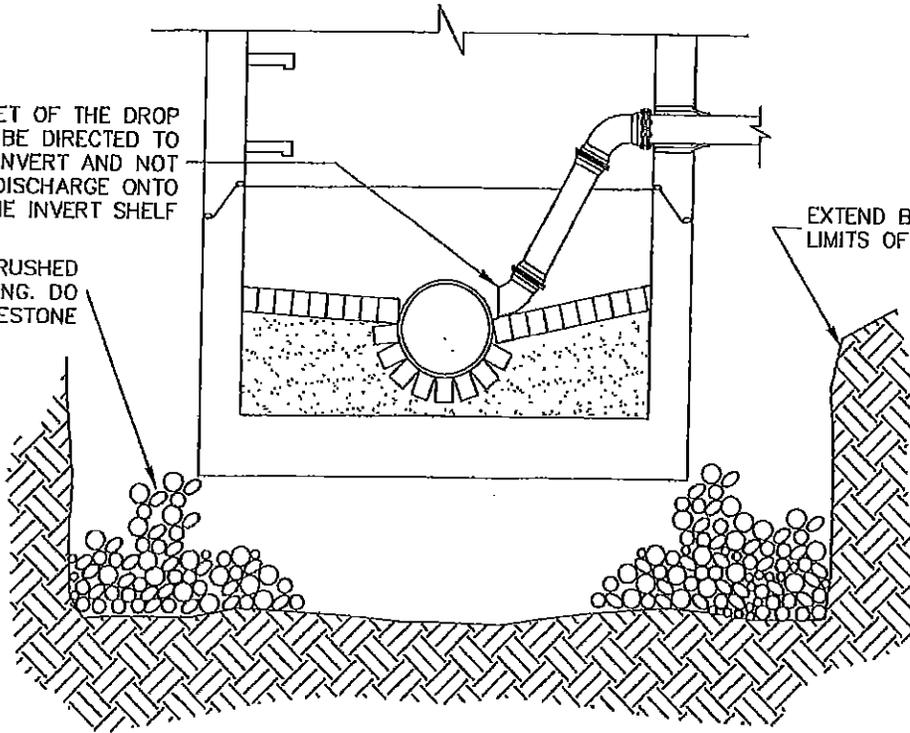
SHELF

DIRECTION OF FLOW

THE OUTLET OF THE DROP INLET SHALL BE DIRECTED TO THE SEWER INVERT AND NOT ALLOWED TO DISCHARGE ONTO THE INVERT SHELF

3/4" CRUSHED STONE BEDDING. DO NOT USE LIMESTONE

EXTEND BEDDING TO LIMITS OF EXCAVATION



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TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION

FORCEMAIN MANHOLE
CONNECTION

Detail No: 300.08

Scale: NOT TO SCALE

Date: NOV. 2015

A-27

REFER TO DETAIL 100.11
FOR TRENCH RESTORATION
WITHIN A PAVED AREA

PLACE 4" THICK TOPSOIL,
SEED, FERTILIZE, AND MULCH

FINISH GRADE

FINISH GRADE

UNDISTURBED SOIL
OR LEDGE (TYP.)

BACKFILL WITH APPROVED
EXCAVATED MATERIAL
THOROUGHLY COMPACTED
IN 6" LIFTS, SEE NOTES

TRACER WIRE (SEE NOTE #8)

MIN. 6' COVER

NOTE 5

12"

6"

D+6"

D+2 FEET

LEDGE PAYMENT LIMIT SHALL BE
D+2' IN WIDTH TO A DEPTH OF
12" BELOW THE PIPE INVERT.

PIPE BEDDING
SEE NOTE 7

NOTES :

1. THE CONTRACTOR SHALL KEEP THE TRENCH ENTIRELY FREE OF WATER AT ALL TIMES UNTIL THE WORK IS COMPLETE AND READY FOR BACKFILLING.
2. THE SIDES OF THE TRENCHES SHALL BE SHEETED OR SLOPED TO THE ANGLE OF REPOSE IF THE TRENCH IS 4' OR MORE IN DEPTH.
3. BACKFILL TRENCH IN 6" LIFTS AND COMPACT EACH LIFT TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE CONTENT AS DETERMINED BY ASTM D698 STANDARD PROCTOR.
4. BACKFILL SHALL HAVE NO STONES LARGER THAN 1.5-INCHES IN DIAMETER.
5. SEE DETAIL 400.09 FOR PIPE INSULATION REQUIREMENTS.
6. ALL WORK SHALL CONFORM TO THESE SPECIFICATIONS AND PLANS UNLESS OTHERWISE SPECIFIED.
7. THE PIPE BEDDING FOR DUCTILE IRON PIPE SHALL BE THOROUGHLY COMPACTED SAND OR GRAVEL. 3/4" STONE BEDDING SHALL BE USED AS PIPE BEDDING FOR PVC OR PE PIPE.
8. INSTALL A CONTINUOUS SHEATHED SOLID CONDUCTOR COPPER TRACER WIRE OVER PIPE. THE WIRE SHALL BEGIN IN A TEST BOX ADJACENT TO ONE HYDRANT AND RUN TO A TEST BOX ADJACENT TO THE NEXT HYDRANT. SEE DETAIL 400.02.



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TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION

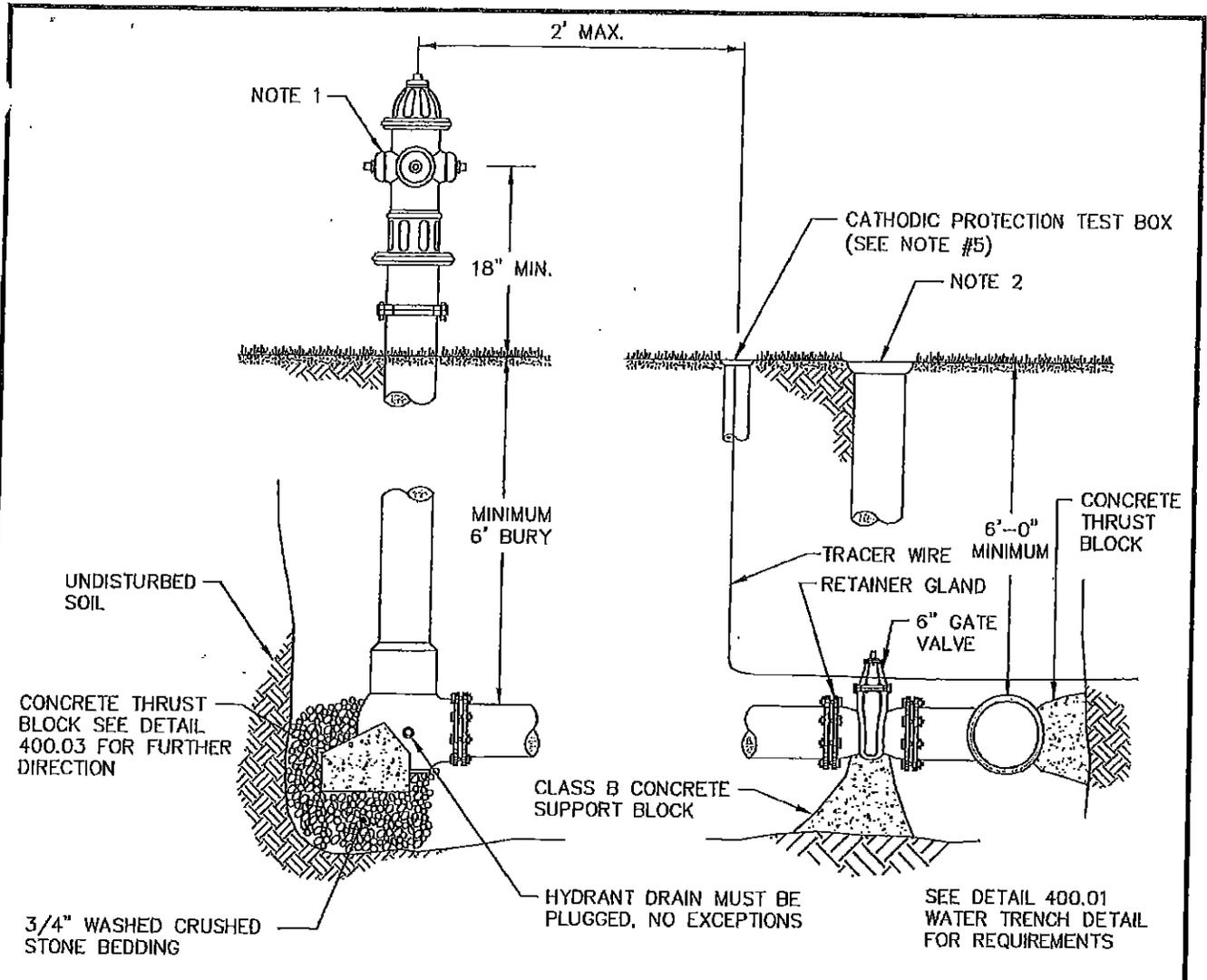
WATER TRENCH

Detail No: 400.01

Scale: NOT TO SCALE

Date: . NOV. 2015

A-29



NOTES:

1. NEW HYDRANT SHALL BE KENNEDY GUARDIAN K-81D. NO SUBSTITUTIONS WILL BE APPROVED UNLESS NOTED.
2. VALVE BOXES SHALL BE CAST IRON TWO PIECE SLIDE TYPE WITH 5 1/4" SHAFT AND A CAST IRON COVER MARKED "WATER".
3. ALL HYDRANT PIPING OFF OF MAIN SHALL BE 6" AND MATCH THE EXISTING WATERMAIN PIPE MATERIAL EITHER CLASS 52 DUCTILE IRON OR C900 PVC. ALL MECHANICAL JOINT FITTINGS AND RETAINER GLANDS SHALL CONFORM TO CURRENT AWWA STANDARDS, SEE SPECIFICATIONS FOR REQUIREMENTS.
4. ALL WORK SHALL CONFORM TO THE WRITTEN SPECIFICATIONS AND PLANS UNLESS OTHERWISE SPECIFIED.
5. INSTALL A CATHODIC PROTECTION TEST BOX (BINGHAM & TAYLOR MODEL P200NFG OR APPROVED EQUAL) WITHIN 2' OF ALL NEW HYDRANTS FOR TERMINATING THE TRACER WIRES IN.



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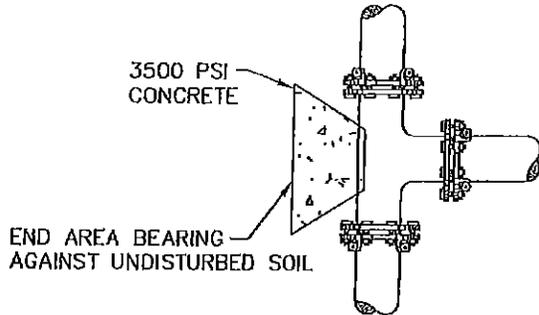
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STANDARD SPECIFICATIONS FOR CONSTRUCTION

FIRE HYDRANT

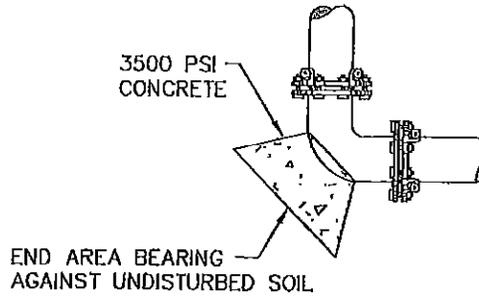
Detail No: 400.02
Scale: NOT TO SCALE
Date: NOV. 2015

A-30

NOTE: PLACE 4 mil POLYETHYLENE BETWEEN FITTINGS AND THRUST BLOCK



TEES - CAPS



BENDS: 11°, 25°, 22.5°, 45°, 90°

SOIL TYPE - CLAY/SILT

FITTING \ SIZE	6"	8"	12"
1 1/4" & 2 1/2"	3	4	9
45°	4	8	17
90°	9	16	35
TEES OR END CAPS	6	11	25
VALVES	3	3	3

SQ FT BEARING AREA

BASED ON 100 PSI WORKING PRESSURE PLUS 100 PSI SURGE ALLOWANCE AND BEARING CAPACITY OF 1000 LBS/SQ FT

SOIL TYPE - SAND

FITTING \ SIZE	6"	8"	12"
1 1/4" & 2 1/2"	2	2	5
45°	2	4	9
90°	4	8	17
TEES OR END CAPS	3	6	12
VALVES	2	2	2

SQ FT BEARING AREA

BASED ON 100 PSI WORKING PRESSURE PLUS 100 PSI SURGE ALLOWANCE AND BEARING CAPACITY OF 2000 LBS/SQ FT

SOIL TYPE - TILL/SHALE

FITTING \ SIZE	6"	8"	12"
1 1/4" & 2 1/2"	1	1	2
45°	1	2	4
90°	2	4	9
TEES OR END CAPS	2	3	6
VALVES	2	2	2

SQ FT BEARING AREA

BASED ON 100 PSI WORKING PRESSURE PLUS 100 PSI SURGE ALLOWANCE AND BEARING CAPACITY OF 4000 LBS/SQ FT



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STANDARD SPECIFICATIONS FOR CONSTRUCTION

CONCRETE THRUST BLOCK

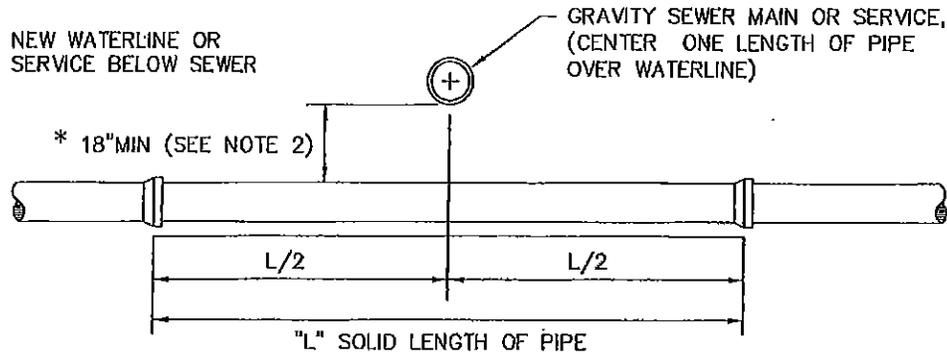
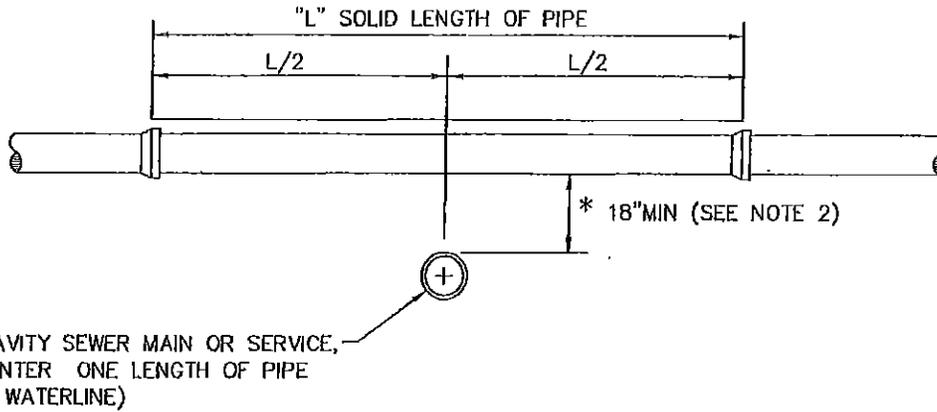
Detail No: 400.03

Scale: NOT TO SCALE

Date: NOV. 2015

A-31

NEW WATERLINE OR SERVICE ABOVE SEWER PREFERRED METHOD



NOTES :

1. ALL WATER LINES CONSTRUCTED SHALL HAVE A MINIMUM OF 10' HORIZONTAL SEPARATION,
- * 2. IF 18" OF VERTICAL SEPARATION CANNOT BE MAINTAINED, THE SEWER SHALL BE CONSTRUCTED TO WATERLINE STANDARDS, A MINIMUM OF 20 FEET CENTERED ON THE CROSSING.
3. ALL WORK SHALL CONFORM TO THESE SPECIFICATIONS, THE PROJECT PLANS, AND AWWA STANDARDS, UNLESS OTHERWISE SPECIFIED.

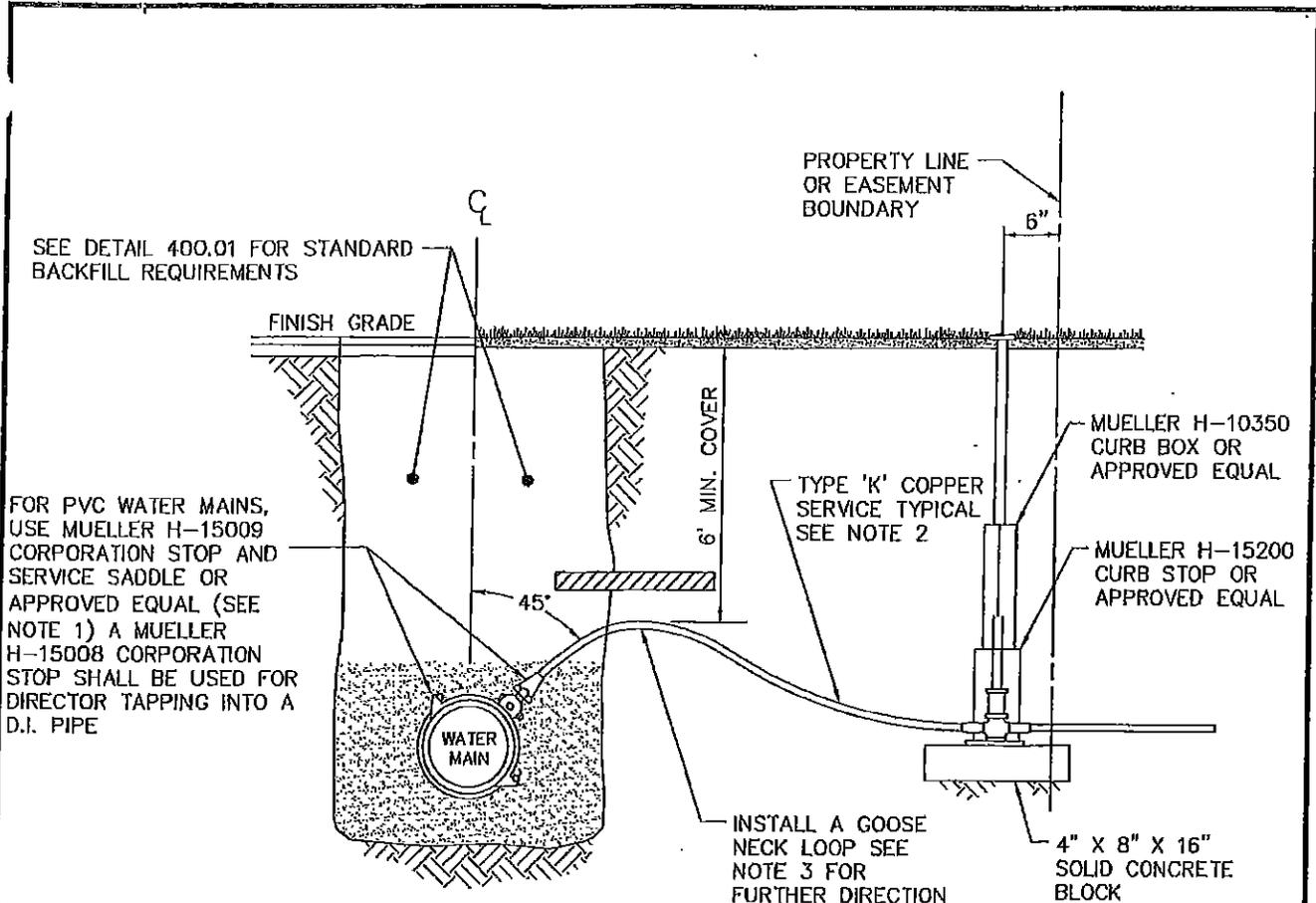


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TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION
WATER AND SEWER CROSSING

Detail No: 400.04
Scale: NOT TO SCALE
Date: NOV. 2015

A-32



NOTES :

1. SERVICE SADDLES SHALL BE COATED IRON WITH STAINLESS STEEL BANDS AND HARDWARE OR APPROVED EQUAL.
2. ALL RESIDENTIAL SERVICE LINES UP TO AND INCLUDING 1.5" DIAMETER SHALL BE TYPE K COPPER. ALL SERVICE LINES GREATER THAN 1.5" MAY BE PVC OR PE AS APPROVED BY THE DEPARTMENT OF PUBLIC WORKS.
3. ALL SERVICE CONNECTIONS 1-1/2" AND UNDER SHALL HAVE A LOOP INSTALLED DIRECTLY OFF OF THE MAIN. THE HIGHEST POINT OF THIS LOOP SHALL BE INSULATED IF LESS THAN 6' OF COVER.
4. IF COVER OVER SERVICE IS BETWEEN 5'-6', PLACE 2" THICK INSULATION BOARD OVER PIPE. IF COVER IS BETWEEN 4'-5' THEN PLACE 4" THICK INSULATION BOARD OVER PIPE. IN NO CASE SHALL THERE BE LESS THAN 5' OF COVER IN PAVED AREAS OR 4' OF COVER IN GRASS AREAS.
5. ALL WORK SHALL CONFORM TO THESE SPECIFICATIONS AND PLANS UNLESS OTHERWISE SPECIFIED.
6. THE PIPE BEDDING FOR TYPE "K" COPPER PIPE SHALL BE THOROUGHLY COMPACTED SAND, 3/4" STONE BEDDING SHALL BE USED AS PIPE BEDDING FOR PVC OR PE PIPE.



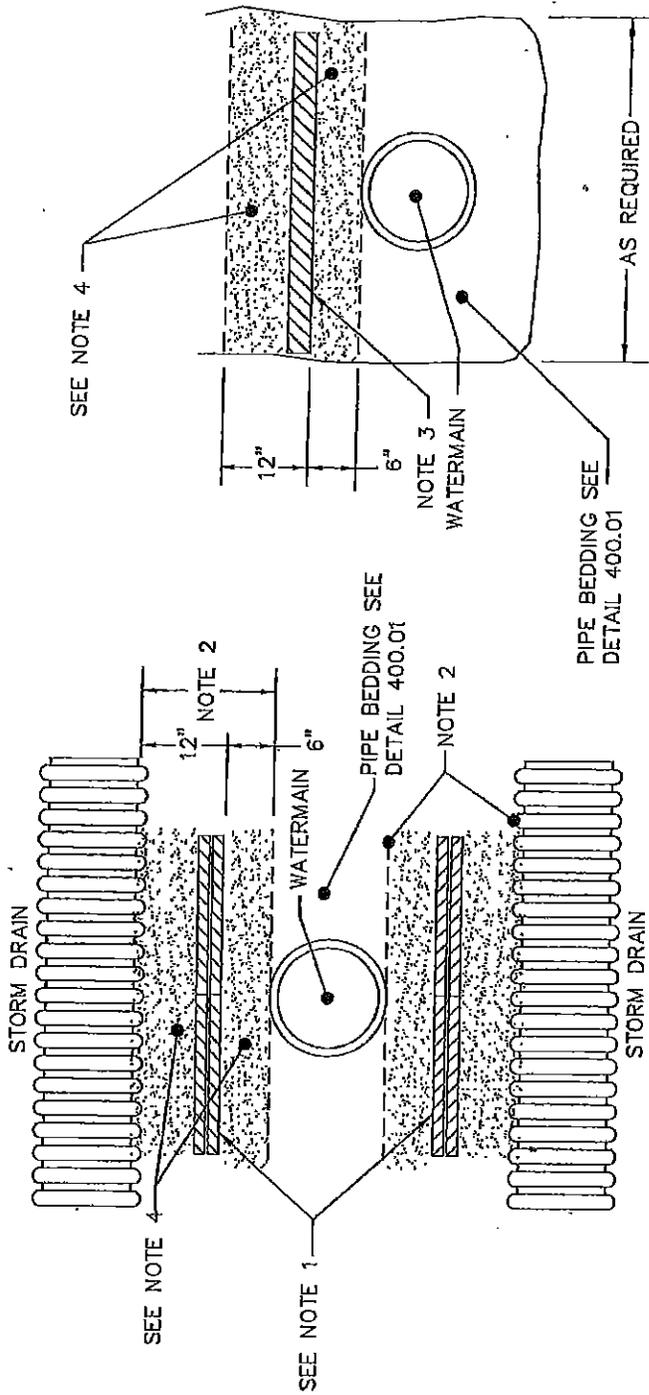
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TOWN OF ESSEX, VERMONT
STANDARD SPECIFICATIONS FOR CONSTRUCTION

WATER SERVICE CONNECTION

Detail No: 400.05
Scale: NOT TO SCALE
Date: NOV. 2015

A-33



LACK OF COVER

STORM CROSSING

NOTES :

1. INSULATION THICKNESS BETWEEN WATER MAINS AND STORM DRAINS SHALL BE A MINIMUM OF 4" IN THICKNESS. EACH SHEET SHALL BE OFFSET ON EACH LAYER SO AS TO NOT CREATE VOIDS. INSULATION IS REQUIRED IF THE SEPARATIONS IS LESS THAN 18".
2. THE ISOLATION DISTANCES FOR INSULATING STORM DRAINS UNDER WATER MAINS ARE THE SAME AS CROSSING OVER.
3. IF COVER OVER SERVICE IS BETWEEN 5'-6', PLACE 2" THICK INSULATION BOARD OVER PIPE. IF COVER IS BETWEEN 4'-5', THEN PLACE 4" THICK INSULATION BOARD OVER PIPE. IN NO CASE SHALL THERE BE LESS THAN 5' OF COVER IN PAVED AREAS OR 4' OF COVER IN GRASS AREAS.
4. BACKFILL WITH APPROVED EXCAVATED MATERIAL IN 6" LIFTS AND COMPACT EACH LIFT TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE. BACKFILL SHALL HAVE NO STONES LARGER THAN 1.5-INCHES, IN ORDER TO AVOID DAMAGING INSULATION.
5. ALL WORK SHALL CONFORM TO THESE SPECIFICATIONS AND PLANS UNLESS OTHERWISE SPECIFIED.



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STANDARD SPECIFICATIONS FOR CONSTRUCTION

PIPE INSULATION

Detail No:	400.09
Scale:	NOT TO SCALE
Date:	NOV. 2015

A-37

Sent to JStreet
Nate Hayward

Jennifer Booker

From: Brad Larose
Sent: Tuesday, March 29, 2016 12:22 PM
To: Jennifer Booker
Subject: RE: 10 Old Stage Road

Jenn –

I know this is late, but I figured I'd reply anyway. The police department has no concerns regarding this subdivision prelim. app.

Thanks.

Chief Bradley J. LaRose
Essex Police Department
145 Maple Street
Essex Junction, Vermont 05452
blarose@essex.org
(802) 857-0093 direct

From: Jennifer Booker
Sent: Monday, March 07, 2016 2:55 PM
To: Allyson Vile; Charlie Cole; Brad Larose; Aaron Martin
Cc: Sharon Kelley; Gregory Duggan
Subject: 10 Old Stage Road

Good Afternoon,
Attached is a new Subdivision Prelim application for 10 Old Stage Road, hard copy is in mailbox!
Thanks,

Jenn Booker
Community Development Secretary
802-878-1343
Jbooker@essex.org

