



OTTER CREEK
ENGINEERING

Town of Lincoln Alternative Alignment On South Lincoln Road Road Rehabilitation Project

**Robert M. Clark, P.E.
Senior Project Engineer**

Background

The northernmost section of South Lincoln Road (immediately south of Lincoln Town Garage Property) has two major deficiencies that a road relocation would address:

1) Paralleling the New Haven River, this section of road has experienced washouts, and there are concerns of slope stability.

2) The Town desires to improve the reverse curve just south of the Town Garage since vehicles exiting the Town Garage are unable to see oncoming traffic.



Purpose

The Addison County Regional Planning Commission (ACRPC) awarded the Town of Lincoln funding for this project to identify and assess at least one new road alignment for which takes advantage of town-owned property, improves safety, and reduces the likelihood of flood damage while minimizing environmental impacts on South Lincoln Road.



Scope, Deliverables, and Schedule

A meeting was held with representatives from the Addison County Regional Planning Commission (ACRPC) and the Town of Lincoln. Project goals and objectives were reviewed to outline the following deliverables and schedule.

Deliverable	Expected Completion
Topographic Survey & Basemap	Winter 2019
Conceptual Designs	Winter 2019
Selection of Alternative and Cost Opinion	Winter 2019
Wetland Delineation	Spring 2020
30% Design Drawings	Spring 2020
Presentation to Transportation Advisory Committee	Spring 2020

The schedule was adjusted from the initial proposal submission to meet the Town's desire to have budgeting pricing in place, prior to Town Meeting day. As such, the conceptual designs were completed prior to wetland delineation.



Preliminary Investigations

OCE utilized the ANR Resource Atlas for identification of wetlands and sensitive features within the project limits, including river corridor and floodplain, and deer wintering and endangered species areas.



LEGEND

☒ DFIRM Floodways

Flood Hazard Areas (Only FEMA-digitized)

- AE (1-percent annual chance floodplains with a 100-year return period)
- A (1-percent annual chance floodplains without a 100-year return period)
- AO (1-percent annual chance zone of shallow flooding)
- 0.2-percent annual chance flood hazard zone

River Corridors (Jan 2, 2015)

- .5 - 2 sqmi.
- .25 - .5 sqmi.

Roads

- Interstate
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Not part of function Classification System

Waterbody

- Stream

1: 10,000

1in = 833 ft.
1cm = 100 meters



508.0 0 254.00 508.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere
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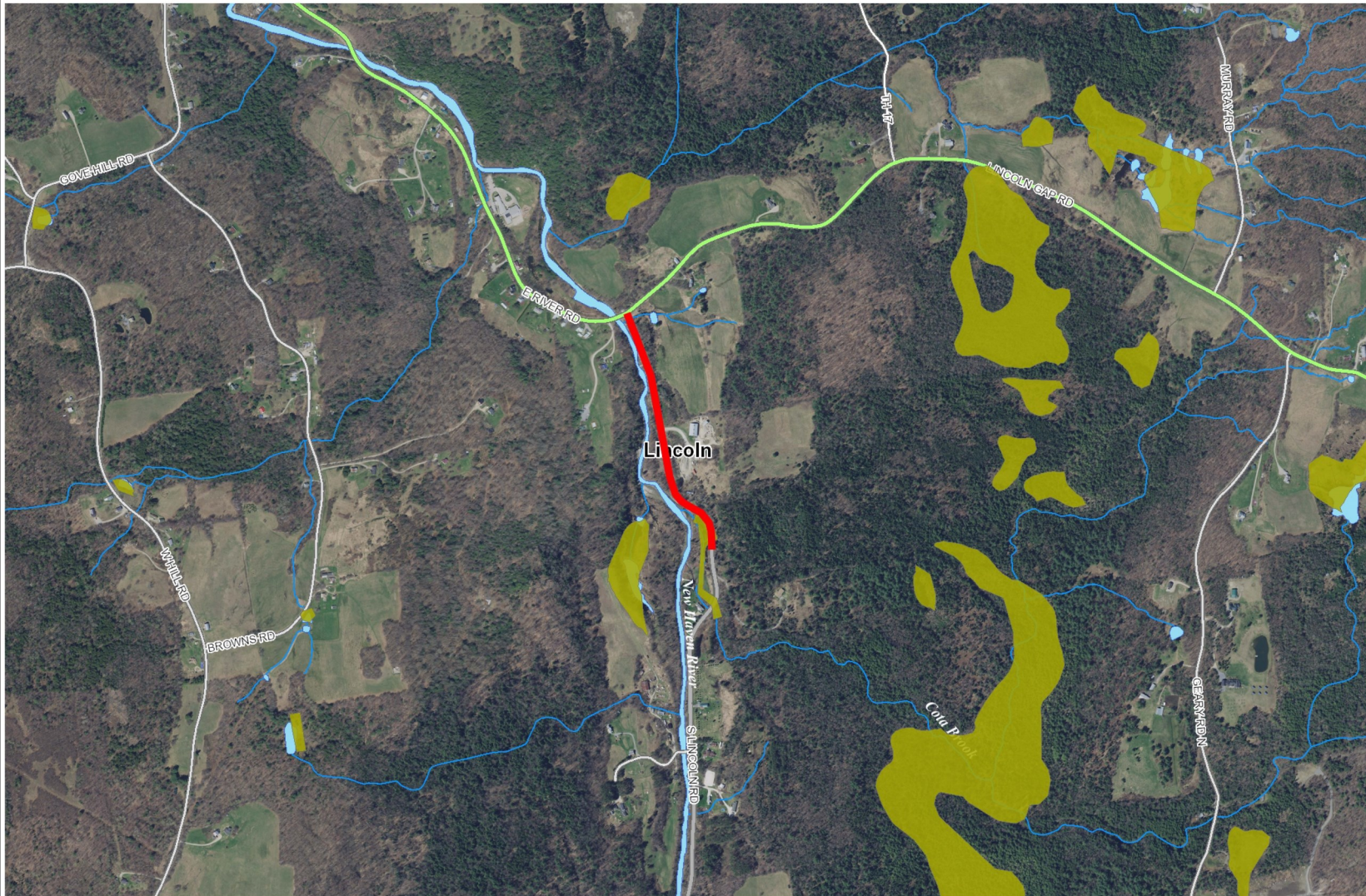
NOTES

Map created using ANR's Natural Resources Atlas



LEGEND

- Vernal Pools Confirmed - AE/VCE
- Wetland - VSW**
 - Class 1 Wetland
 - Class 2 Wetland
 - Buffer
- Wetlands Advisory Layer
- Roads**
 - Interstate
 - Principal Arterial
 - Minor Arterial
 - Major Collector
 - Minor Collector
 - Local
 - Not part of function Classification System
- Waterbody
- Stream
- Town Boundary



1: 10,000

1in = 833 ft.
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NOTES

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1,667.0 0 834.00 1,667.0 Feet

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LEGEND

Rare Threatened Endangered Species

- Threatened or Endangered
- Rare

Deer Wintering Areas

- Deer Wintering Areas

Roads

- Interstate
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Not part of function Classification System

Waterbody

- Stream
- Town Boundary

1: 10,000

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NOTES

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1,667.0 0 834.00 1,667.0 Feet

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Meeting with Steering Committee and Changes with Scope of Improvements

- A meeting was conducted with the Town and regional planning to review alternatives. The Town selected an alternative which included the following modifications to engineering design:
 - 1) Relocation of the road to minimize impact on available Town garage parcel for storage of materials, as space on this site is somewhat limited.
 - 2) A proposed parking lot on the north for access by residents to the Town parcel for hiking and other outdoor activities.
 - 3) A one way road request for viewing of the beaver ponds along the existing roadway alignment.
 - 4) A desire for minimal vertical curves, and a consistent slope between the north and south terminus points of the project by the highway foreman.
 - 5) Minimal material to be disposed off site, and reducing views to the Town garage parcel by constructing a vegetated manmade earthen berm.

Field Work/Conceptual Design

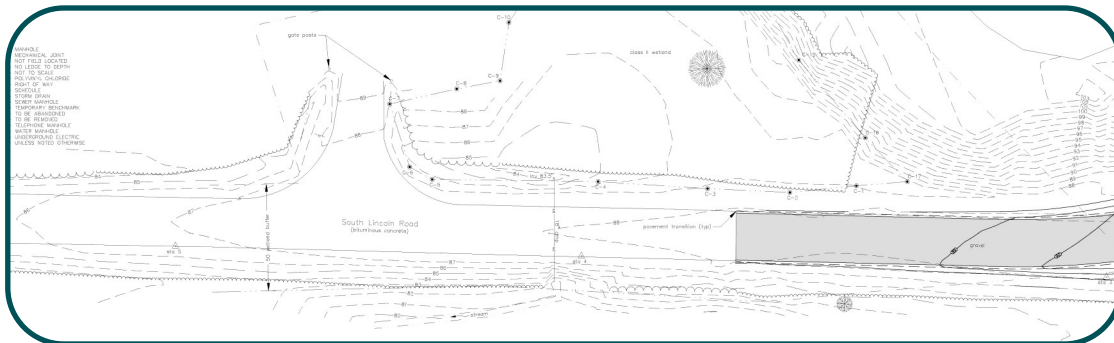
■ Test Pits Completed by the Town

The Town dug several test pits and did not identify any ledge of unsuitable soil conditions. The area proposed for relocation consists generally of sands and gravels with some large cobbles.



- **Topographic Survey**

Completed in late fall / early winter of 2019 prior to snowfall and used as the basis for conceptual design.



Conceptual Designs

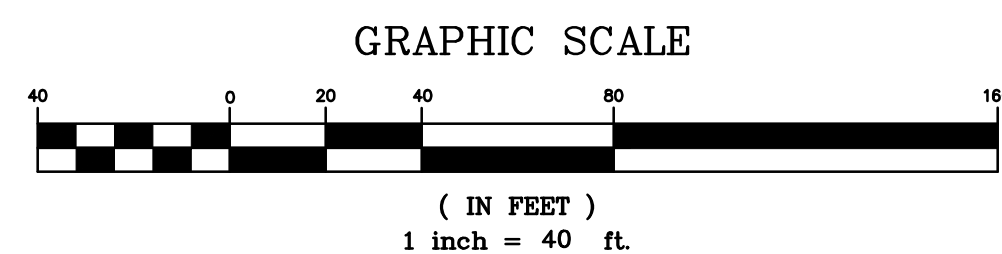
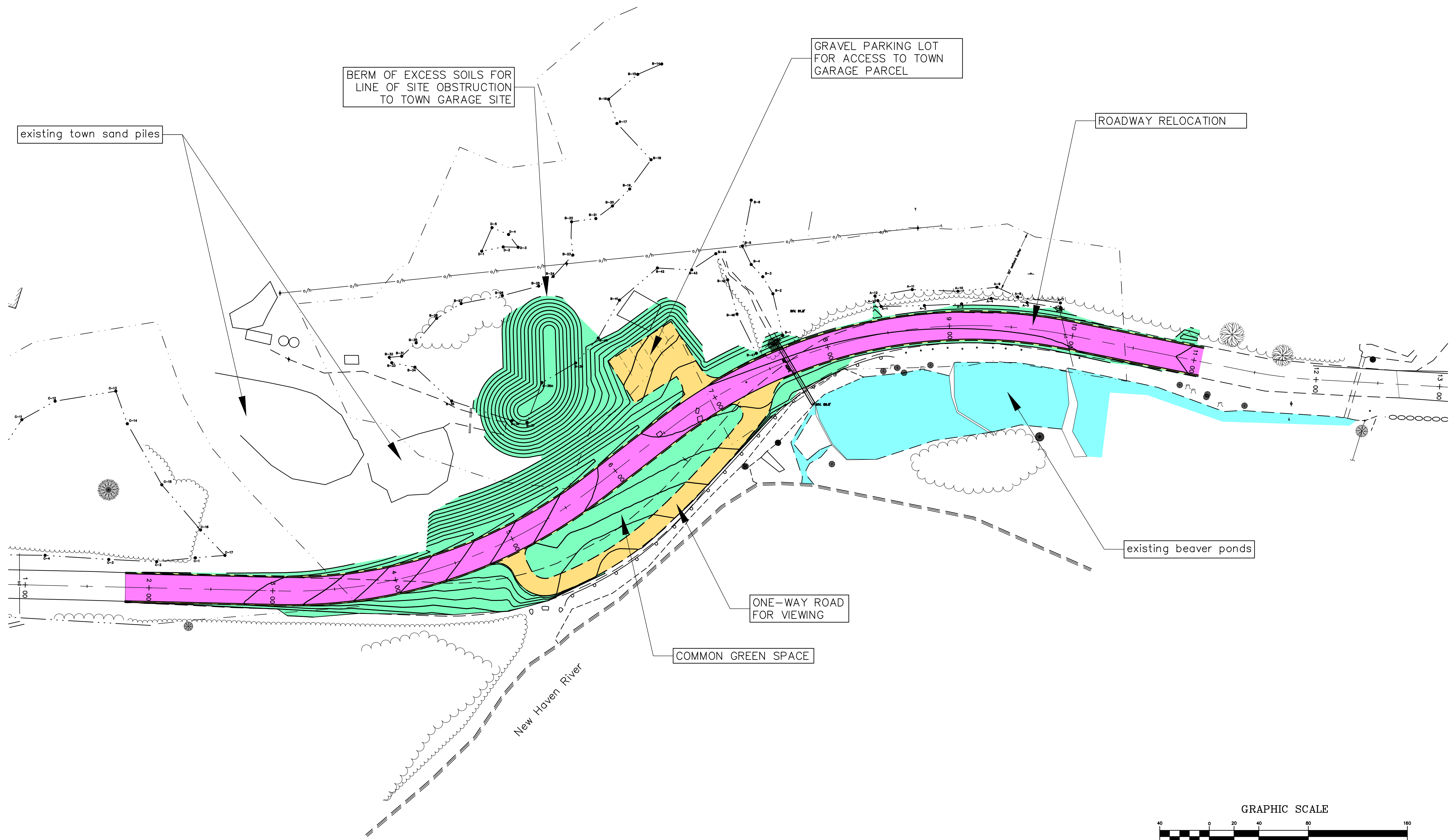
We developed (2) two conceptual plans for roadway alignment. In both cases, vertical (sag and crest) curves are not a concern, and the focus was on horizontal alignment to improve site distance from the Town garage.

Interim Work completed by the Town

After agreeing to a conceptual design, the Town completed the following prior to wetland delineation in the spring of 2020:

- 1) The Town paved portions of South Lincoln Road, stopping on the north and south ends of the proposed realignment project limits.
- 2) The Owner of the property passed away and the parcel of land (including the condemned building) was deeded to the Town.
- 3) The Town demolished the building and cut the trees down in the winter of 2019. Stumps were retained on site.





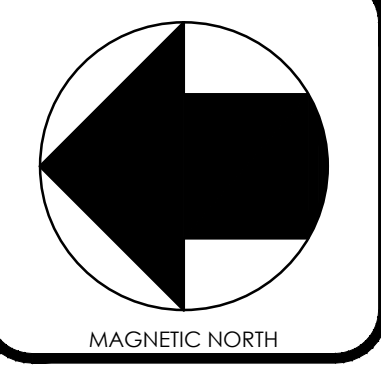
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TOWN OF LINCOLN
SOUTH LINCOLN ROAD FAILURE REMEDIATION
LINCOLN, VT

REVIEW

DATE ISSUED: 6/17/2020
REVISIONS:

DRAWN BY: RR
CHECKED BY: RC
SCALE: 1"=40'
PROJECT NO.: 046.004
CADD FILE: 046-004 COLOR
TITLE:

DRAWING NO.

Construction Cost Estimate

The following cost estimate was prepared based on the agreed-upon concept

Town of Lincoln South Lincoln Road Relocation Engineer's Opinion of Probable Construction Cost				
Item No.	Description	Unit Quantity	Unit Cost	Total Cost
A. Excavation, Demolition, Clearing & Grubbing				
A1	Stumping, Clearing, Grubbing	0.5 acres	\$ 15,000.00	\$ 7,500.00
A2	Common Excavation (Box Cut)	6,500 CY	\$ 5.00	\$ 32,500.00
A3	Finished Site Grading & Ditching	1 acres	\$ 10,000.00	\$ 10,000.00
A4	Loam, Seed, Lime, Fertilizer & Mulch	1 acres	\$ 15,000.00	\$ 15,000.00
Subtotal =				\$ 65,000.00
B. Roadway Construction				
B1	Full Depth Road - New	1,075 SY	\$ 25.00	\$ 26,875.00
B2	Full Depth Parking Lot	250 SY	\$ 20.00	\$ 5,000.00
B3	Fine Grade Shim Gravel (existing road)	1775 SY	\$ 15.00	\$ 26,625.00
B4	Dense Graded Gravel (Fill Areas)	250 CY	\$ 28.00	\$ 7,000.00
B5	Should Gravel	2,200 LF	\$ 2.00	\$ 4,400.00
B6	Bituminous Concrete Pavement (Base)	2,675 SY	\$ 15.00	\$ 40,125.00
B7	Bituminous Concrete Pavement (Top)	2,675 SY	\$ 15.00	\$ 40,125.00
Subtotal =				\$ 150,150.00
C. Miscellaneous				
C1	48-inch HDPE Culvert	65 LF	\$ 275.00	\$ 17,875.00
C2	Traffic Control	1 LS	\$ 10,000.00	\$ 10,000.00
C3	Mobilization, Demobilization	1 LS	\$ 15,000.00	\$ 15,000.00
C4	Bonds, Insurance, OH&P	1 LS	\$ 10,500.00	\$ 10,500.00
C5	General Conditions, Miscellaneous Work	1 LS	\$ 20,000.00	\$ 20,000.00
Subtotal =				\$ 73,375.00
Total Estimated Construction Cost =				\$ 288,525.00
Notes: 1. Construction Cost Estimates are based on Otter Creek Engineering's Opinion, at the time of issuance. Final quantities and costs are subject to engineering design and bidding climate. 2. Estimates above assume a completely public bid process, with no assistance from the Town 3. Date: 2/17/20				

This was provided in advance, for budgeting within the Town's next fiscal year.

Wetland Delineation

- A formal wetland delineation was completed in May of 2020, once weather conditions were favorable and the Governor's stay home, stay safe conditions were eased
- Three (3) wetlands (all Class II) were identified in close proximity to the site
- On May 27th, OCE met with the State Wetlands ecologist to review the delineations and discuss potential wetland impacts and permitting considerations. Delineations were confirmed with some minor modifications
- All class II wetlands require a fifty (50) foot buffer.



Wetland A is pictured at the right (east side of road), and the photograph to the left shows the culvert-connected wetland on the west side of the road (photos taken facing north).

30% Design Development

- Reverse curve designed for 35mph speed limit and improved sight distance
- 6 parking spaces on the north west side of the roadway, for access to the Town Garage Parcel
- Allowable one way road by the river for access to the Beaver Ponds
- Consistent Slope with minimal vertical curve
- Excess soils would be bermed on site, and the area revegetated to obstruct view of Town garage



1. THESE PLANS ARE BASED ON A TOPOGRAPHIC SURVEY CONDUCTED WITH A THREE SECOND TOTAL STATION ON JANUARY 3, 2020 AND JUNE 8, 2020 BY OTTER CREEK ENGINEERING, INC. AT THE TIME OF THE JANUARY SURVEY, THERE WAS APPROXIMATELY THREE INCHES OF SNOW COVER AND ALL WATER WAS FROZEN OVER.

A. WETLAND DELINEATION WAS CONDUCTED BY MARY BETH POLI OF OTTER CREEK ENGINEERING, INC. ON MAY 13, 2020, REVIEWED BY ZAPATA COURAGE, STATE OF VERMONT ENVIRONMENTAL CONSERVATION.

4. COORDINATE SYSTEM IS BASED ON AN ASSUMED 5000N,5000E BASE POINT AND MAGNETIC NORTH AT TIME OF SURVEY.

6. ALL UNDERGROUND UTILITIES ARE SHOWN AS APPROXIMATE LOCATIONS.

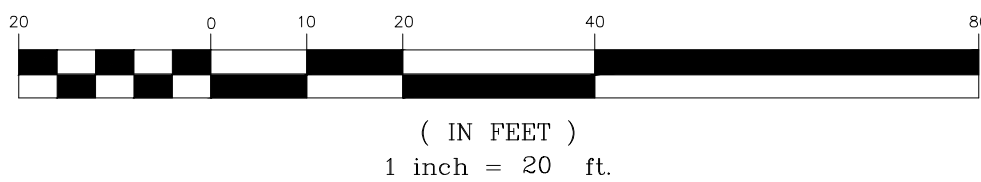
7. FOR CLARITY, OVERHEAD LINES ARE NOT SHOWN.

8. THIS IS NOT A BOUNDARY SURVEY.

9. CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS ACCOMPANY THESE PLANS AND ARE ESSENTIAL FOR CONSTRUCTION OF THIS PROJECT.

NOTE:
TEXT DENOTING EXISTING ITEMS IS SHOWN IN LOWER CASE, AND
TEXT DENOTING PROPOSED ITEMS IS UPPERCASE AND BOLD.

CI	= CAST IRON	MJ	= MANHOLE
CB	= CATCH BASIN	MM	= MECHANICAL JOINT
FL	= FLOW	NFL	= NOT FIELD LOCATED
CM	= CORRUGATED METAL PIPE	NLTD	= NO LEDGE TO DEPTH
CS	= CURB STOP	NBS	= NOT TO SCALE
CD	= DUCTILE IRON	PV	= POLYVINYL CHLORIDE
DM	= DRAIN MANHOLE	RCH	= RIGHT OF WAY
FL	= FLANGE	ROW	= SCHEDULE
FM	= FORCE MAIN	SD	= STORM DRAIN
FR	= FIBERGLASS REINFORCED PLASTIC	SEW	= SEWER MANHOLE
GP	= GALLONS PER MINUTE	TBM	= TEMPORARY BENCHMARK
GS	= GALVANIZED STEEL PIPE	TBA	= TO BE ABANDONED
GV	= GATE VALVE	TR	= TO BE PROVED
HDP	= HIGH DENSITY POLYETHYLENE	TWH	= TELEPHONE MANHOLE
IN	= INVERT	WMH	= WATER MANHOLE
IP	= IRON PIPE/PIN JOINT	UE	= UNDERGROUND ELECTRIC
IPV	= IRON PIPE/PIN USE	U.O.	= UNLESS NOTED OTHERWISE



MATCH TO DRAWING C-2

MATCH LINE



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TOWN OF LINCOLN
SOUTH LINCOLN ROAD
FAILURE REMEDIATION
LINCOLN, VERMONT

DATE ISSUED: 6/17/2020

REVISIONS:

DRAWN BY: PGF

CHECKED BY: RC

SCALE: 1" = 20'

PROJECT NO.: 046.004

CADD FILE: 046-004

TITLE:

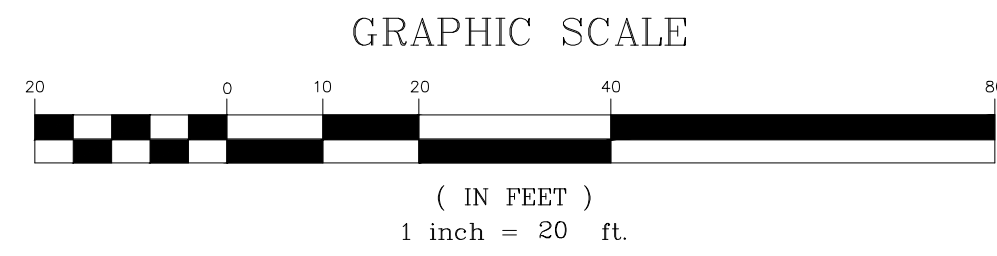
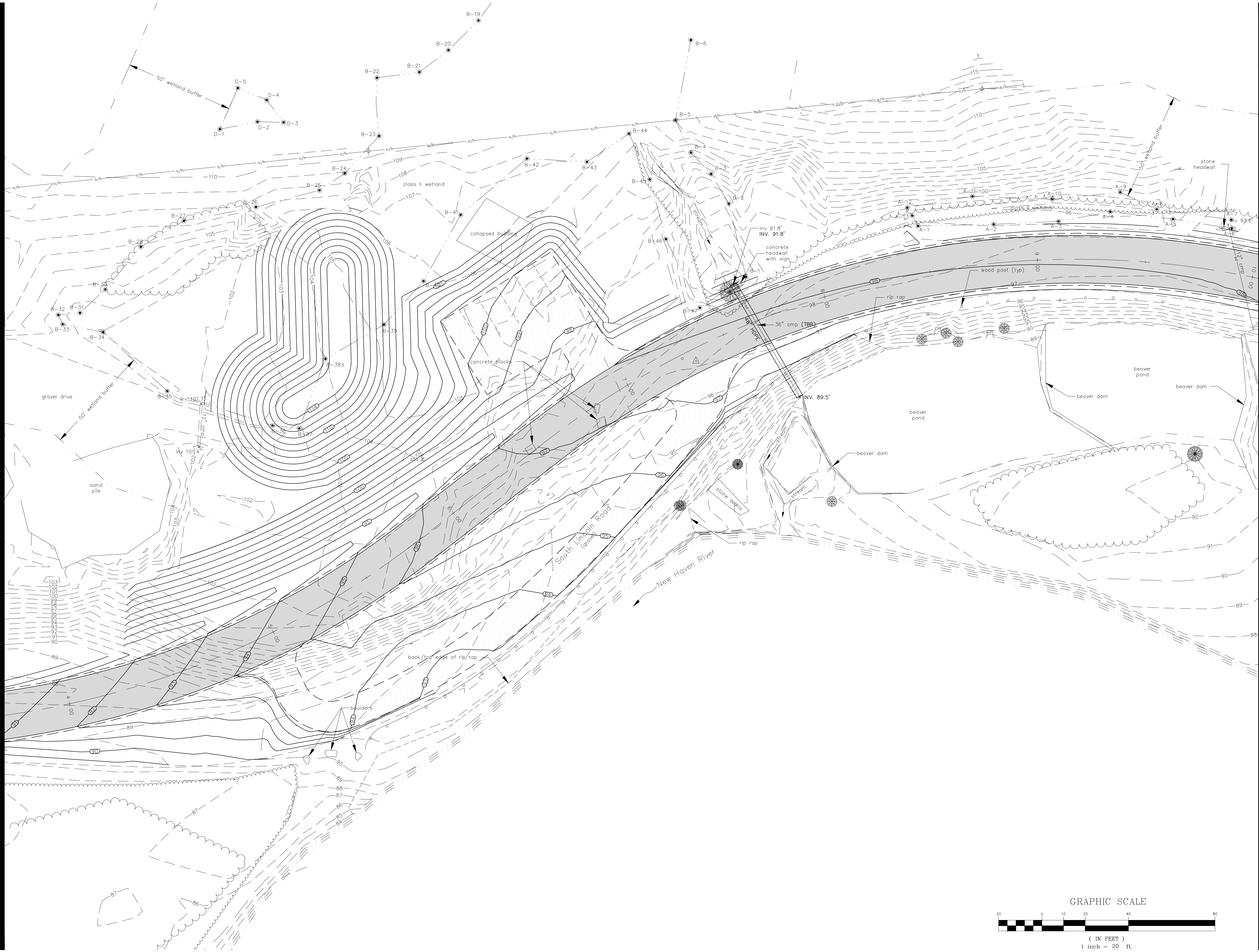
SITE PLAN

DRAWING NO.

C-1

MATCH TO DRAWING C-1

MATCH LINE



MATCH TO DRAWING C-3

MATCH LINE



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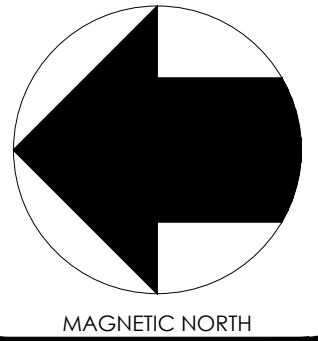
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TOWN OF LINCOLN
SOUTH LINCOLN ROAD
FAILURE REMEDIATION
LINCOLN, VERMONT

REVIEW

DATE ISSUED: 6/17/2020

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CHECKED BY: RC
SCALE: 1" = 20'
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CADD FILE: 046-004

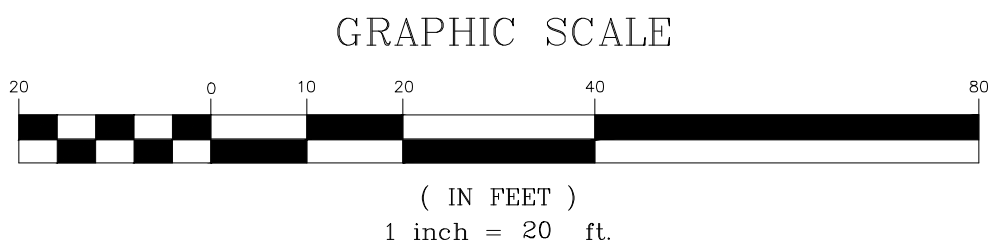
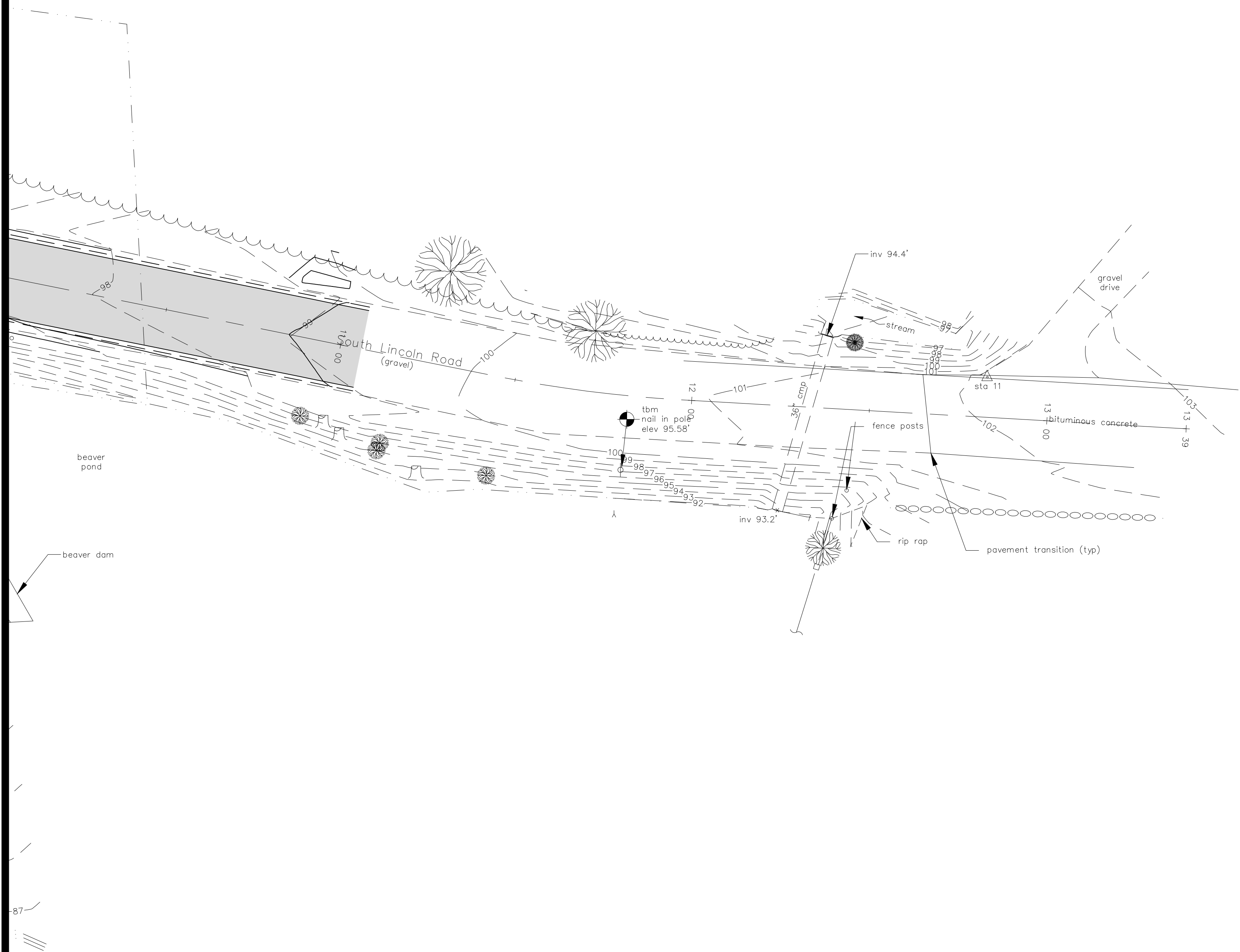
TITLE: SITE PLAN

DRAWING NO.

C-2

MATCH TO DRAWING C-2

MATCH LINE



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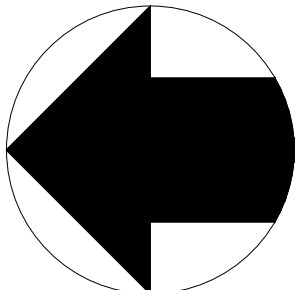
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MAGNETIC NORTH

TOWN OF LINCOLN
SOUTH LINCOLN ROAD
FAILURE REMEDIATION
LINCOLN, VERMONT

REVIEW

DATE ISSUED: 6/17/2020

REVISIONS:

DRAWN BY: PGF

CHECKED BY: RC

SCALE: 1" = 20'

PROJECT NO.: 046.004

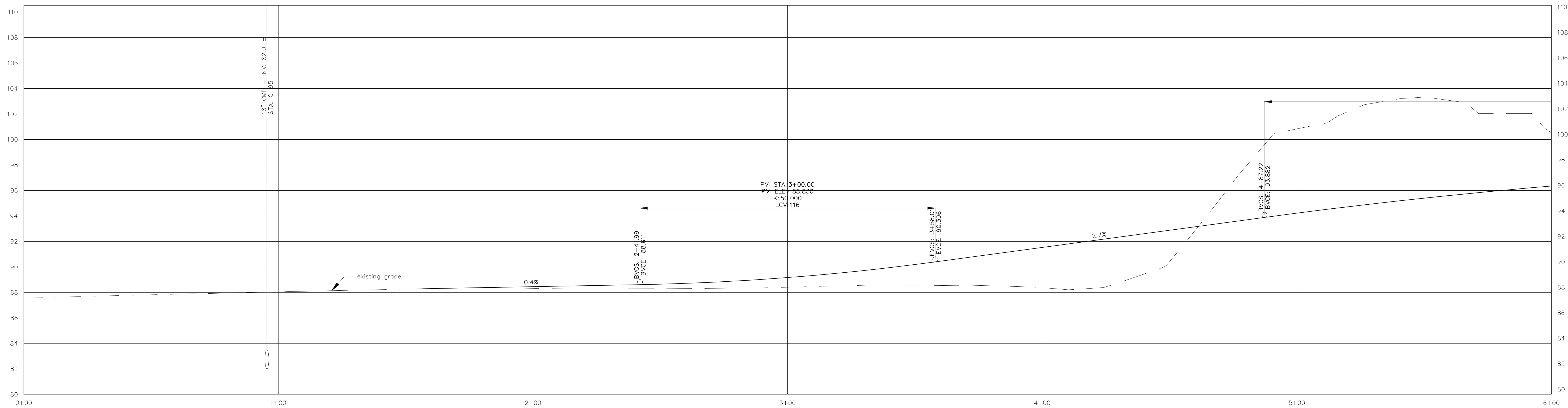
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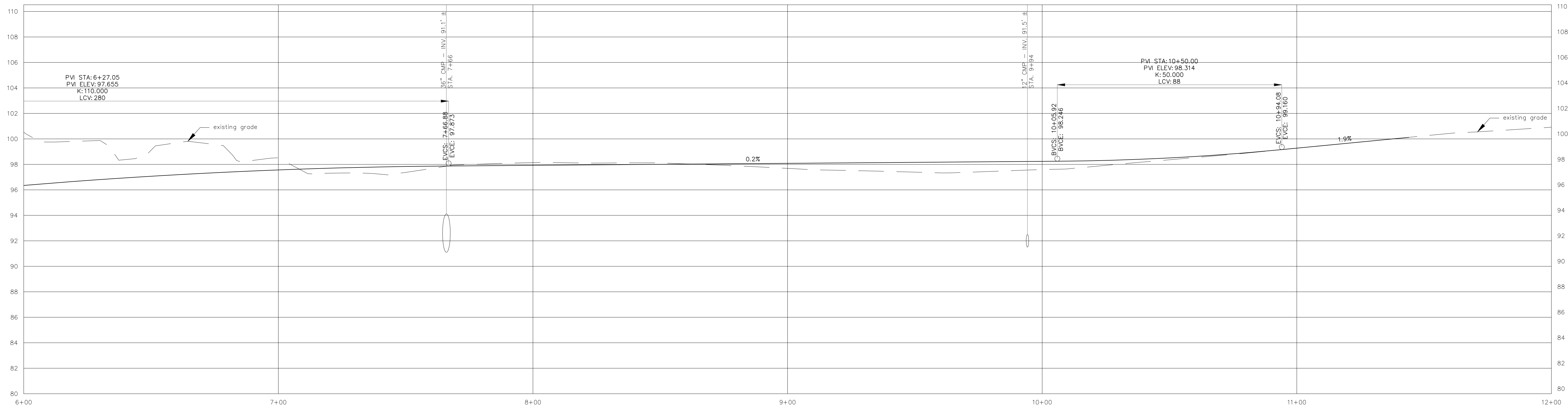
SITE PLAN

DRAWING NO.

C-3



ROAD PROFILE
SCALE: 1"=20' HORIZONTAL
1"=4' VERTICAL



ROAD PROFILE
SCALE: 1"=20' HORIZONTAL
1"=4' VERTICAL



**OTTER CREEK
ENGINEERING**

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TOWN OF LINCOLN
SOUTH LINCOLN ROAD
FAILURE REMEDIATION
LINCOLN, VERMONT

REVIEW

DATE ISSUED: 6/17/2020

REVISIONS:

DRAWN BY: PGF

CHECKED BY: RC

SCALE: AS NOTED

PROJECT NO.: 046.004

CADD FILE: 046-004

TITLE:

ROAD PROFILES

DRAWING NO.

C-4

Next Steps

- Review with State of Vermont / Army Corps of Engineers 30% design drawings
- Adjustments to final design, incorporating Agency comment prior to permit submission
- Wetland Permitting through ANR and the Army Corps of Engineers
- Construction in Fall of 2020

Note: The Town intends to complete construction through the Town Highway Department, rather than public process.

