Town of Southbury

Replacement of Bridge No. 130013

Purchase Brook Road over Purchase Brook

February 28, 2024

CARDINAL
ENGINEERING ASSOCIATES

Introduction

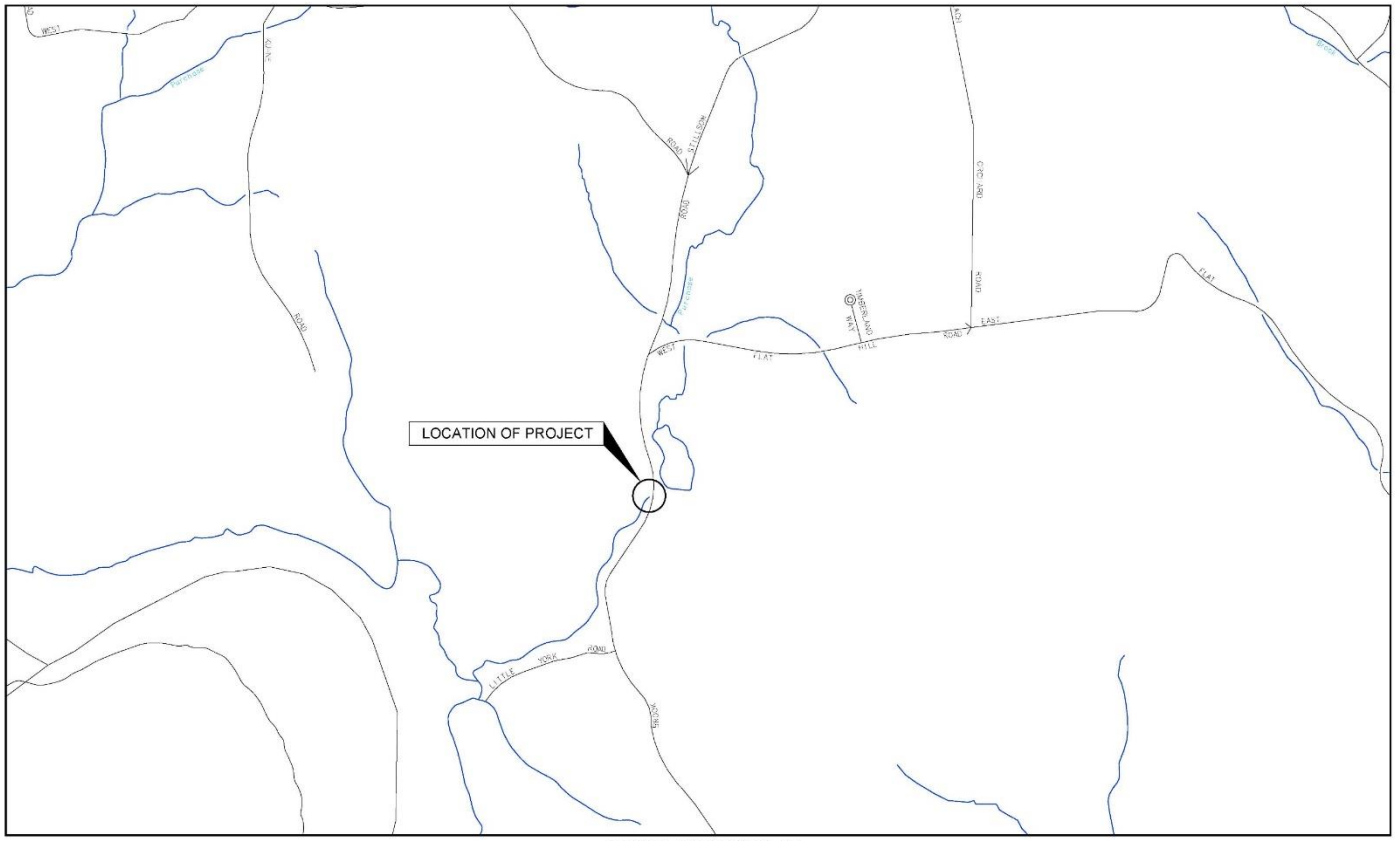
This project consists of the replacement of Purchase Brook Road Bridge (Bridge No. 130013) over Purchase Brook in the Town of Southbury.

Purchase Book Road is a Rural Local Road with an ADT of ≈ 100 vehicles and runs north/south in the western corner of Southbury (probably more now that River Road is closed to through traffic). The existing bridge carries a two-lane paved road across Purchase Brook.

Purchase Brook Road (looking South)

Downstream Culvert Elevation (looking East)

Location Plan



PROJECT LOCATION PLAN
SCALE: 1" = 500'

PURCHASE BROOK ROAD
OVER
PURCHASE BROOK

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180 RESEARCH PKWY | MERIDEN, CT 06450 | 203-238-1969
457 BANTAM RD | LITCHFIELD, CT 06759 | 860-597-9106

Existing Conditions

Downstream View – Scour / Spalling (typ)

Stem at Waterline with exposed rebar w/section loss

Spalling w/exposed rebar and section loss (typ)

Existing Bridge

- **10’x7’ Cast-in-Place concrete Box, built 1948**
- **Structure in critical condition**
- **Sufficiency Rating = 44.52%**
- **ADT : ≈ 100 vpd.**

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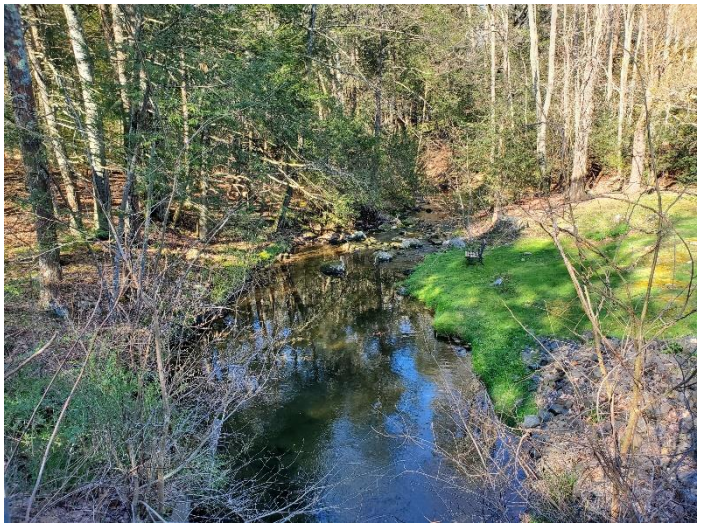
Existing Conditions

Downstream Wingwall – Deteriorated Concrete

Upstream Wingwall – Deteriorated Concrete

Upstream – Purchase Brook



Downstream – Purchase Brook

Proposed Project

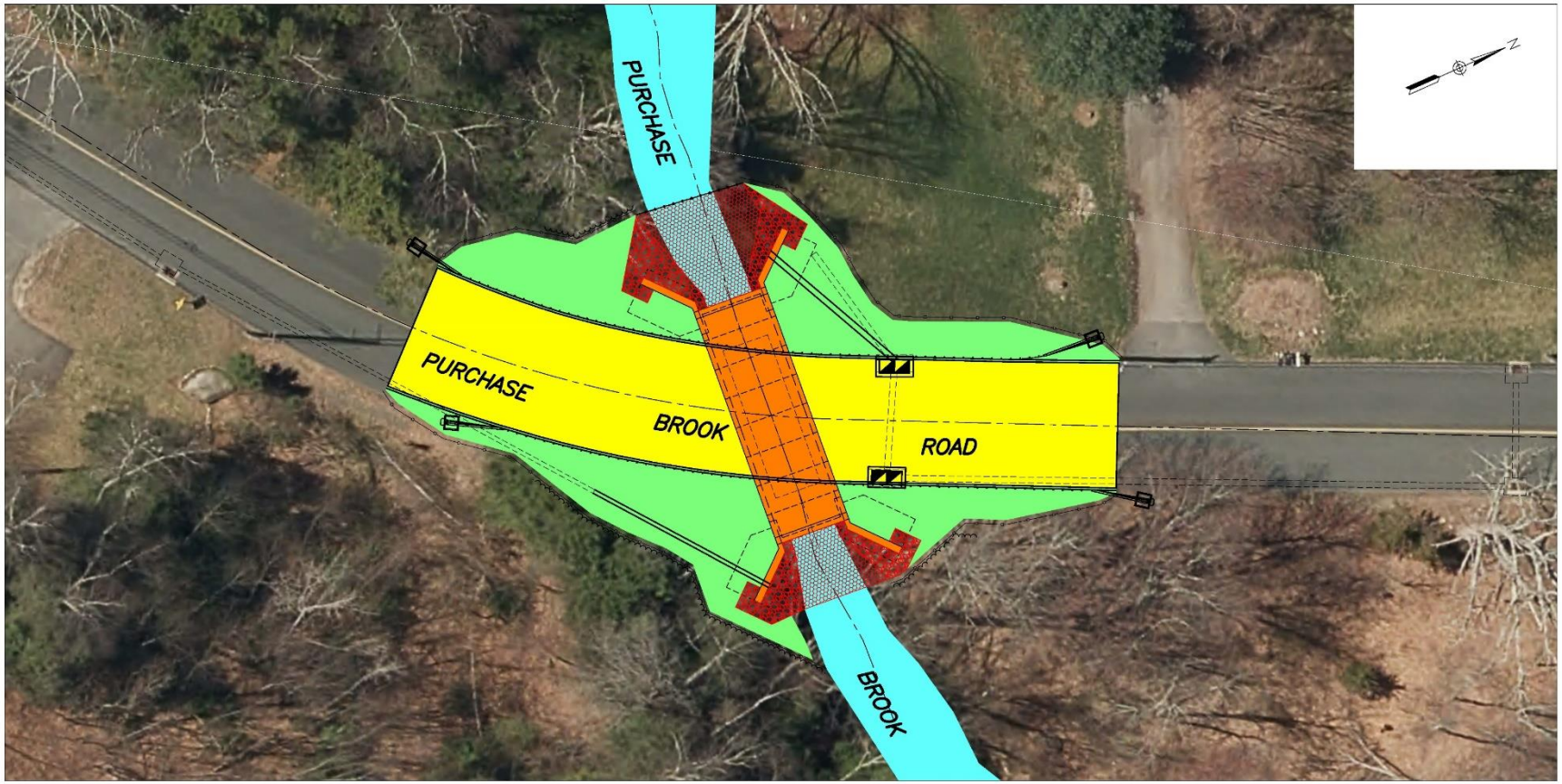
Existing Structure:

- 10’ x 7’ Cast-in-Place Concrete Box.
- Severe Deterioration of downstream end with exposed rebar and major section loss.
- All wingwalls exhibit signs of deterioration – southeast and norththwest show major loss of concrete.
- Metal Beam rail not crash compliant.
- Passes an 85-year flow prior to overtopping. Design standard is 100-year with one-foot of freeboard.

Proposed Structure:

- 14’ x 8’ Precast Concrete Box Culvert with cast in place wingwalls.
- Invert will be depressed 1’ with Natural Streambed Material above the Invert
- Existing River Channel Remains in Natural Condition.
- Passes CTDOT Design Flow (100-year) with 1- foot of Freeboard at Roadway Low point.
- Traffic protection will be provided with Metal Beam Rail R-B 350 (Type II) Section.

Proposed Project



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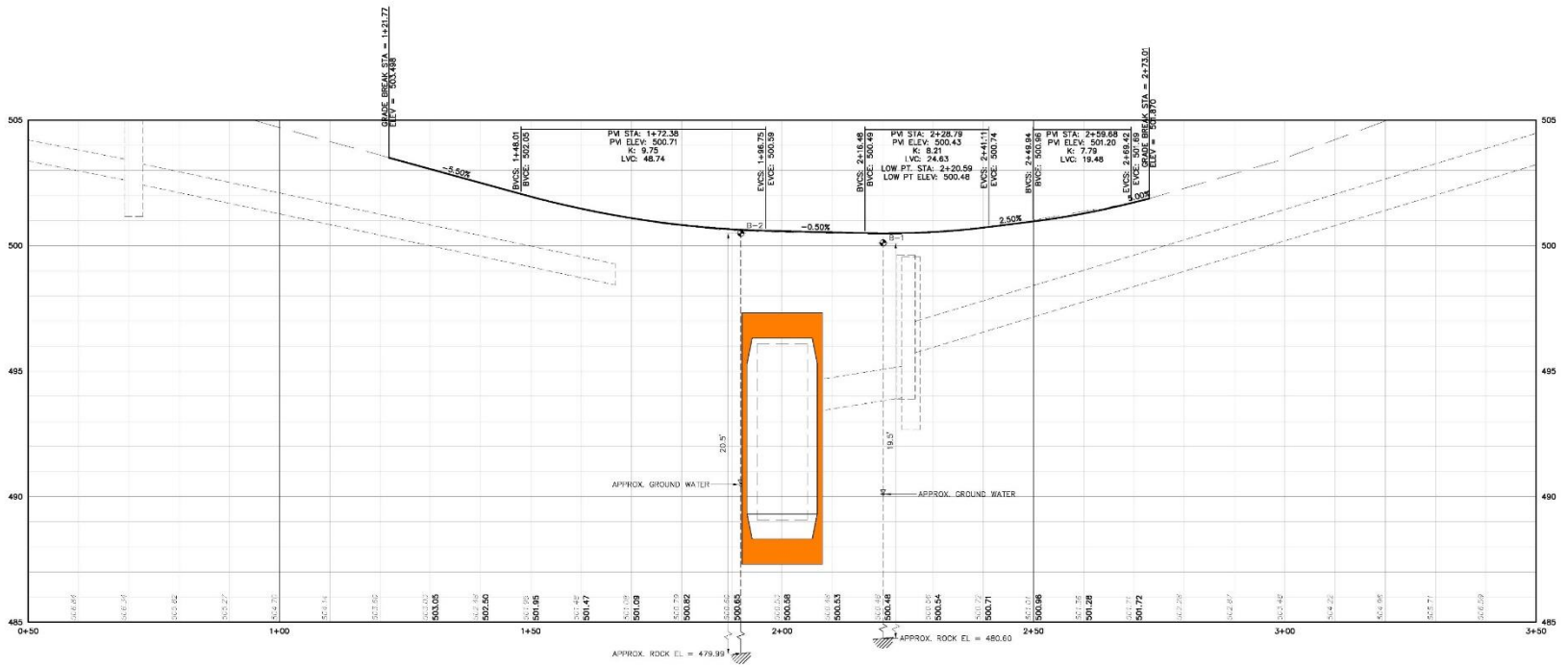
Proposed Project



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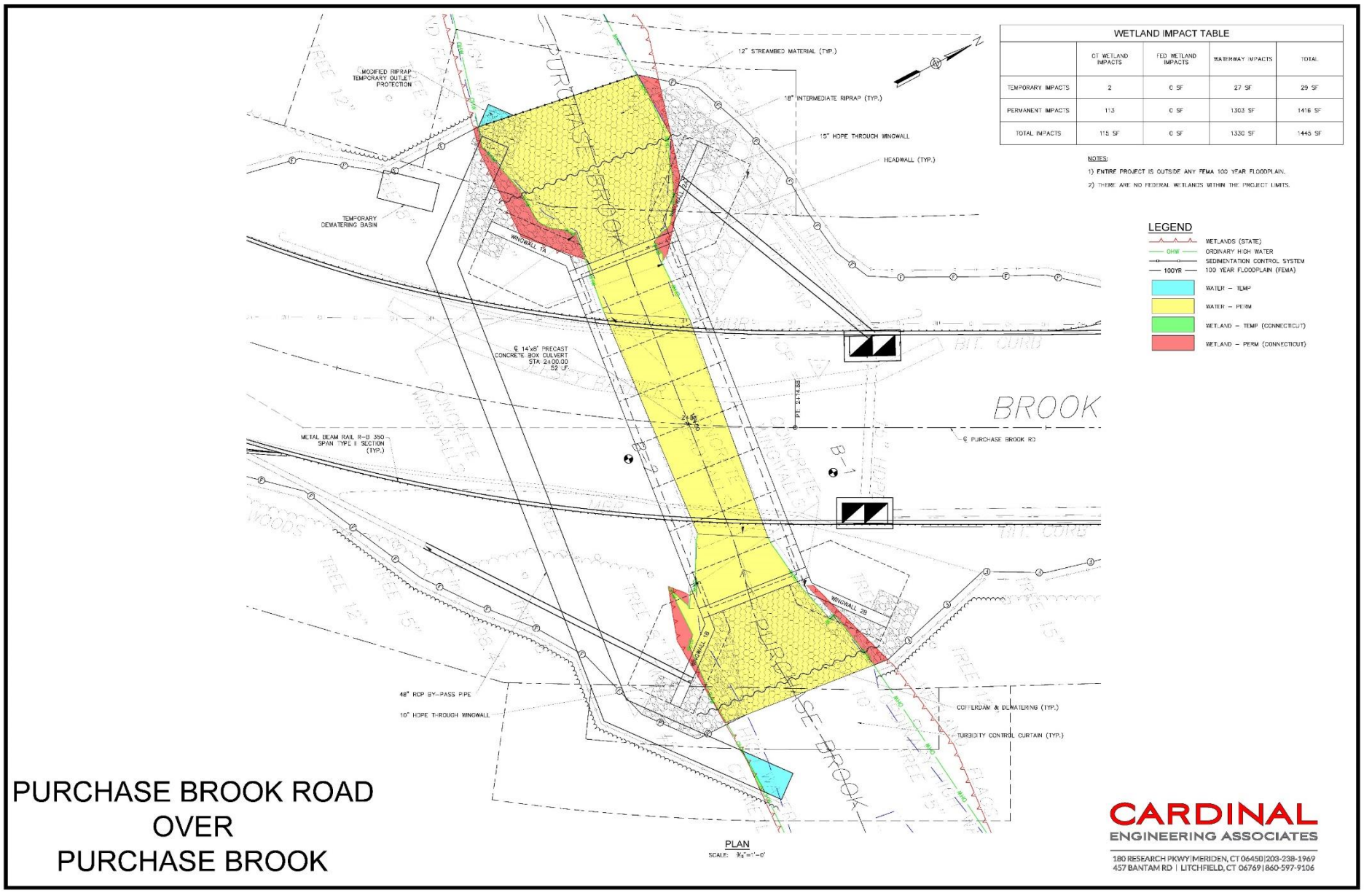
Wetlands/Watercourse Impacts



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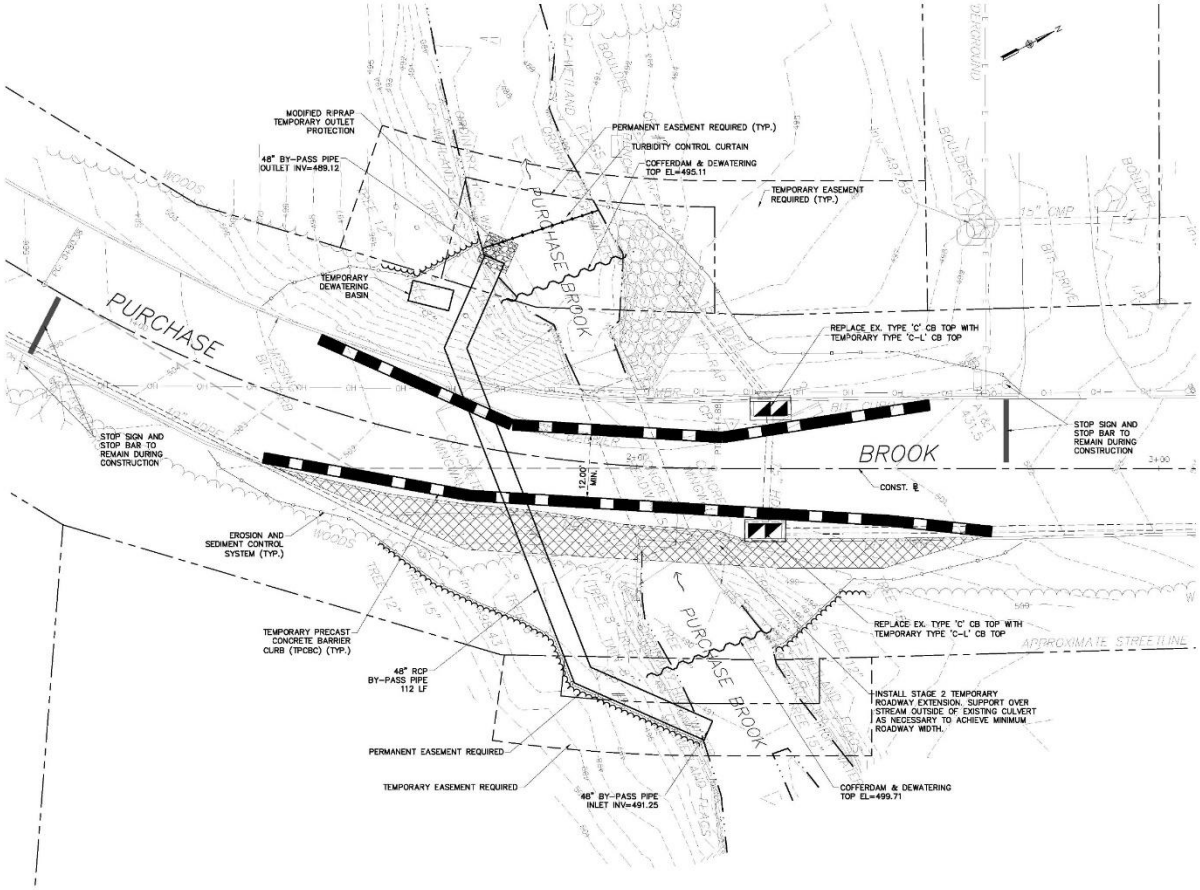
Water Handling Plan – Phase I



STAGE 1 PLAN
SCALE: 1"=10'

LEGEND

- TEMPORARY PRECAST CONCRETE BARRIER CURB (TPCBC)
- COFFERDAM
- EROSION AND SEDIMENT CONTROL SYSTEM
- TURBIDITY CONTROL CURTAIN
- TEMPORARY EASEMENT

STAGE 1 - SUGGESTED CONSTRUCTION SEQUENCE

1. INSTALL EROSION & SEDIMENT CONTROL SYSTEM.
2. INSTALL 48" BY-PASS PIPE USING TEMPORARY ALTERNATING ONE WAY TRAFFIC PATTERN AS NECESSARY.
3. CONSTRUCT COFFERDAMS AND DIVERT FLOW TO BY-PASS PIPE.
4. PLACE TEMPORARY BARRICADES, SAND BARREL ARRAY AND TRAFFIC DRUMS AS NECESSARY TO PROTECT THE WORK AREAS ON THE BRIDGE AND REDIRECT TRAFFIC.
5. CONVERT CATCH BASIN TOPS AS SHOWN.
6. INSTALL TEMPORARY PAVEMENT EXTENSION, SUPPORTING OVER STREAM OUTSIDE EXISTING CULVERT AS NECESSARY TO MAINTAIN MINIMUM ROADWAY WIDTH IN STAGE 2.

TEMPORARY HYDRAULIC DATA	
AVERAGE DAILY FLOW	2.69 CFS
AVERAGE SPRING FLOW	5.23 CFS
2-YEAR FREQUENCY DISCHARGE	135 CFS
TEMPORARY DESIGN DISCHARGE	135 CFS
TEMPORARY DESIGN FREQUENCY	2 YEAR
TEMPORARY WATER SURFACE ELEVATION UPSTREAM	498.71
TEMPORARY WATER SURFACE ELEVATION DOWNSTREAM	494.11

CONSTRUCTION SEQUENCE GENERAL NOTES

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH BEST MANAGEMENT PRACTICES.
2. SEQUENCE OF CONSTRUCTION NOTES SHALL BE USED IN CONJUNCTION WITH THE HIGHWAY CONSTRUCTION, MAINTENANCE AND PROTECTION OF TRAFFIC PLANS.
3. THE SUGGESTED STEPS ILLUSTRATE A SEQUENCE OF CONSTRUCTION THAT CONFORMS TO STAGING REQUIREMENTS. THE SEQUENCE MAY BE ALTERED, SUBJECT TO THE APPROVAL OF THE ENGINEER SO LONG AS THE OPERATION OF VEHICULAR TRAFFIC IS MAINTAINED.
4. NEITHER THE WORK NOR STEPS LISTED IN THE CONSTRUCTION SEQUENCE ARE INTENDED TO COVER ALL DETAILS OF THE WORK. THE CONTRACTOR SHALL PREPARE A DETAILED CONSTRUCTION SEQUENCE AND SCHEDULE FOR REVIEW AND APPROVAL BY THE ENGINEER.
5. THE TEMPORARY COFFERDAM SHALL CONSIST OF SHEETS OR ANY OTHER APPROVED SYSTEM THAT THE CONTRACTOR ELECTS TO USE WHICH WILL SAFELY CONVEY WATER FLOWS THROUGH THE CONSTRUCTION AREA, BE ABLE TO SUPPORT CONSTRUCTION ACTIVITY AND EXCAVATION AND SHALL CONFORM TO PERMITS.
6. THE CONTRACTOR IS HEREIN NOTIFIED THAT THE OVERHEAD ELECTRICAL FACILITIES WILL REMAIN LIVE THROUGHOUT THE DURATION OF CONSTRUCTION.

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OVER
PURCHASE BROOK

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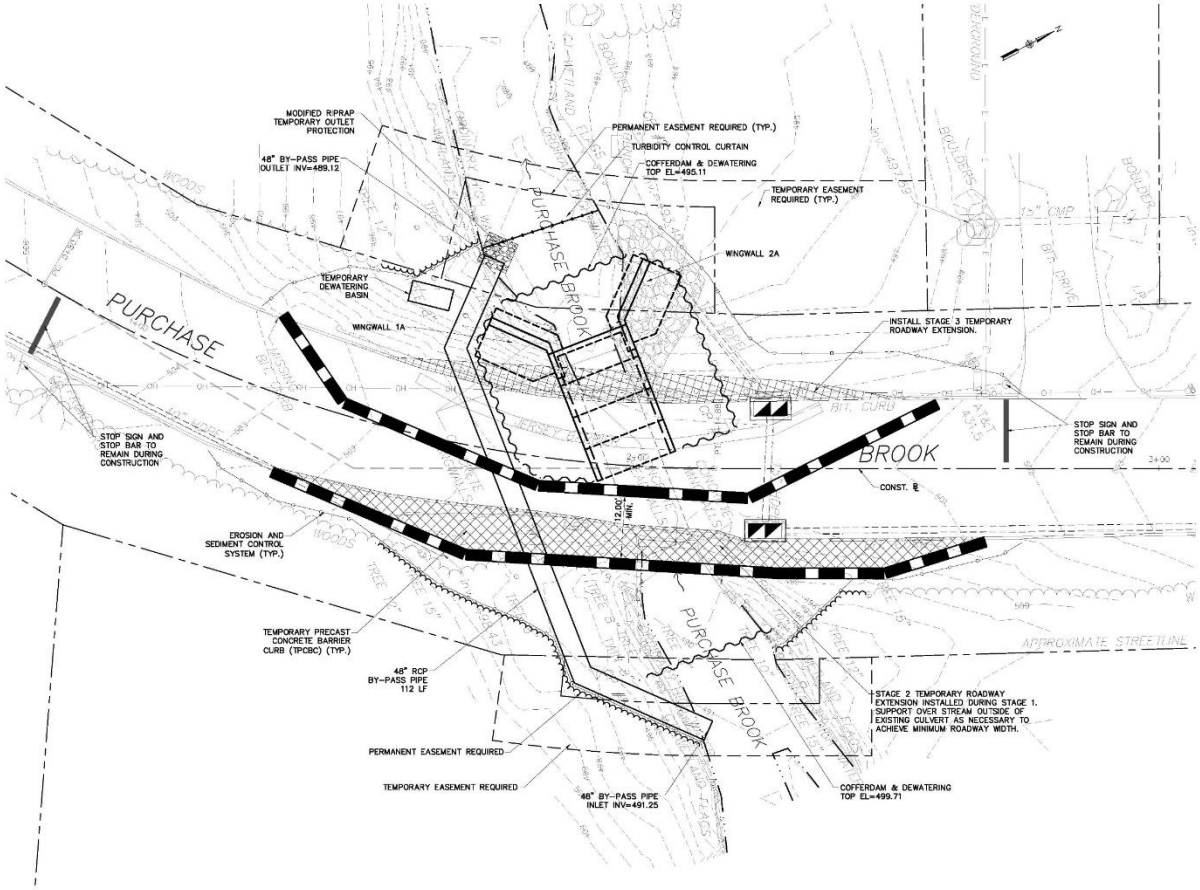
Water Handling Plan – Phase II



STAGE 2 PLAN
SCALE: 1"=10'

STAGE 2 - SUGGESTED CONSTRUCTION SEQUENCE

1. RELOCATE TEMPORARY PRECAST CONCRETE BARRIER.
2. REMOVE THE EXISTING CULVERT, HEADWALL & WINGWALLS TO EXTENTS NEEDED TO INSTALL STAGE 1 CULVERT COMPONENTS.
3. INSTALL STAGE 1 CUTOFF WALLS, RETURN WALLS & PRECAST BOX CULVERT SEGMENTS.
4. INSTALL STAGE 1 WINGWALL FOOTINGS & WINGWALL STEMS.
5. BACKFILL BOX AND WINGWALLS
6. INSTALL STAGE 3 DOWNSTREAM TEMPORARY PAVEMENT EXTENSION.

LEGEND

- TEMPORARY PRECAST CONCRETE BARRIER CURB (TPCBC)
- COFFERDAM
- EROSION AND SEDIMENT CONTROL SYSTEM
- TURBIDITY CONTROL CURTAIN
- TEMPORARY EASEMENT

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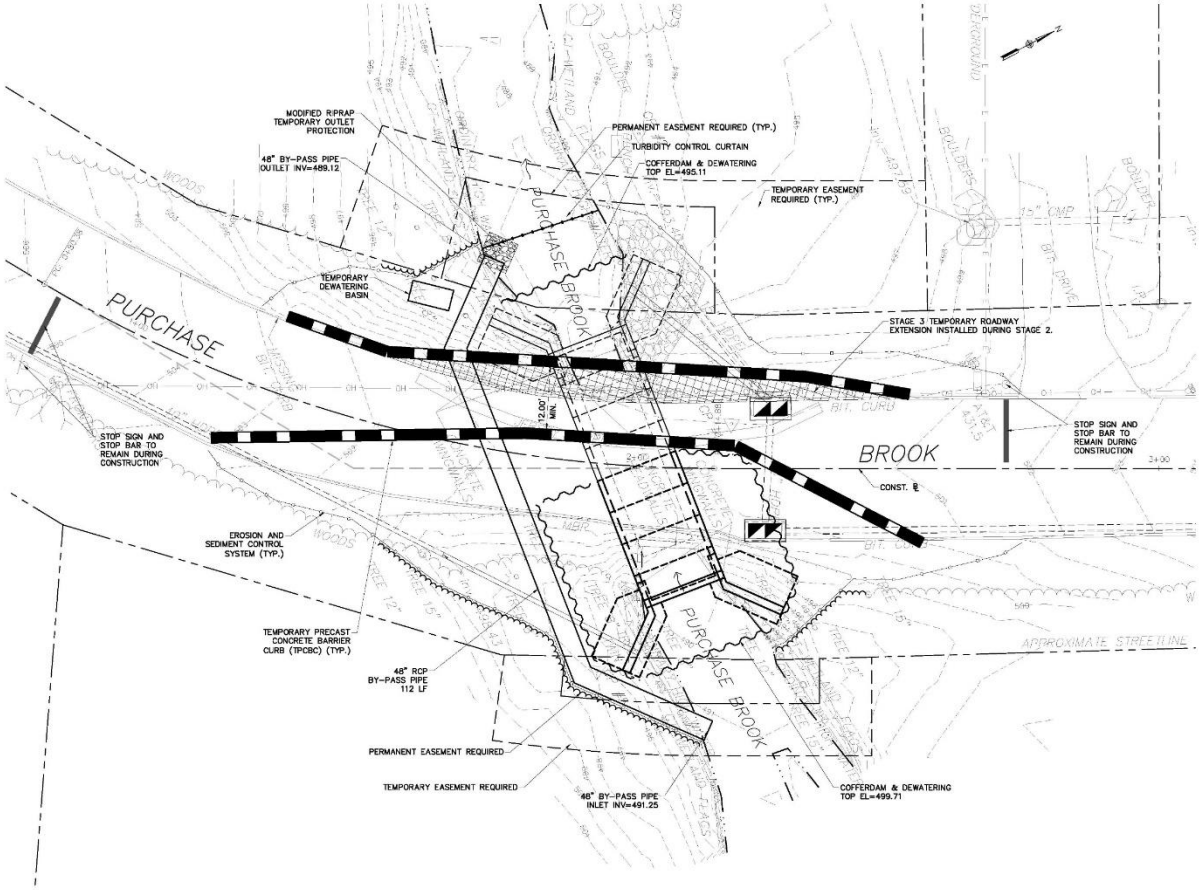
Water Handling Plan – Phase III



STAGE 3 PLAN
SCALE: 1"=10'

STAGE 3 - SUGGESTED CONSTRUCTION SEQUENCE

1. RELOCATE TEMPORARY PRECAST CONCRETE BARRIER.
2. REMOVE THE REMAINING EXISTING CULVERT, HEADWALL & WINGWALLS.
3. INSTALL STAGE 2 CUTOFF WALLS, RETURN WALLS & PRECAST BOX CULVERT SEGMENTS.
4. INSTALL STAGE 2 WINGWALL FOOTINGS & WINGWALL STEMS.
5. BACKFILL BOX AND WINGWALLS, GRADE CHANNEL.
6. REMOVE COFFERDAMS AND DIVERT FLOW INTO NEW CULVERT.
7. REMOVE BY-PASS PIPE USING TEMPORARY ALTERNATING ONE WAY TRAFFIC PATTERN AS NECESSARY.
8. RELOCATE TEMPORARY PRECAST BARRIER CURB AS NEEDED TO PROTECT WORK AREAS FOR INSTALLATION OF HEADWALLS.
9. INSTALL PAVEMENT & GUIDERAIL, PLACE BARRICADES, SAND BARREL ARRAY AND TRAFFIC DRUMS AS NECESSARY TO PROTECT THE REMAINING WORK AREAS ON THE BRIDGE AND REDIRECT TRAFFIC.
10. OPEN ROADWAY, CONSTRUCT REMAINING BRIDGE ELEMENTS (ALTERNATING ONE-WAY TRAFFIC IF REQUIRED).
11. CONSTRUCT THE REMAINING ROADWAY AND CULVERT IMPROVEMENTS UTILIZING ALTERNATING ONE-WAY TRAFFIC AS REQUIRED.

LEGEND

- TEMPORARY PRECAST CONCRETE BARRIER CURB (TPCBC)
- COFFERDAM
- EROSION AND SEDIMENT CONTROL SYSTEM
- TURBIDITY CONTROL CURTAIN
- TEMPORARY EASEMENT

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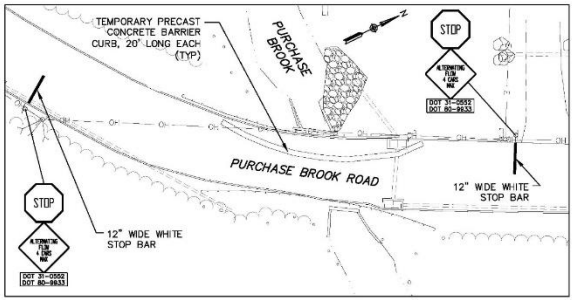
Detour Plan



CONSTRUCTION AREA PLAN
SCALE: 1" = 20'

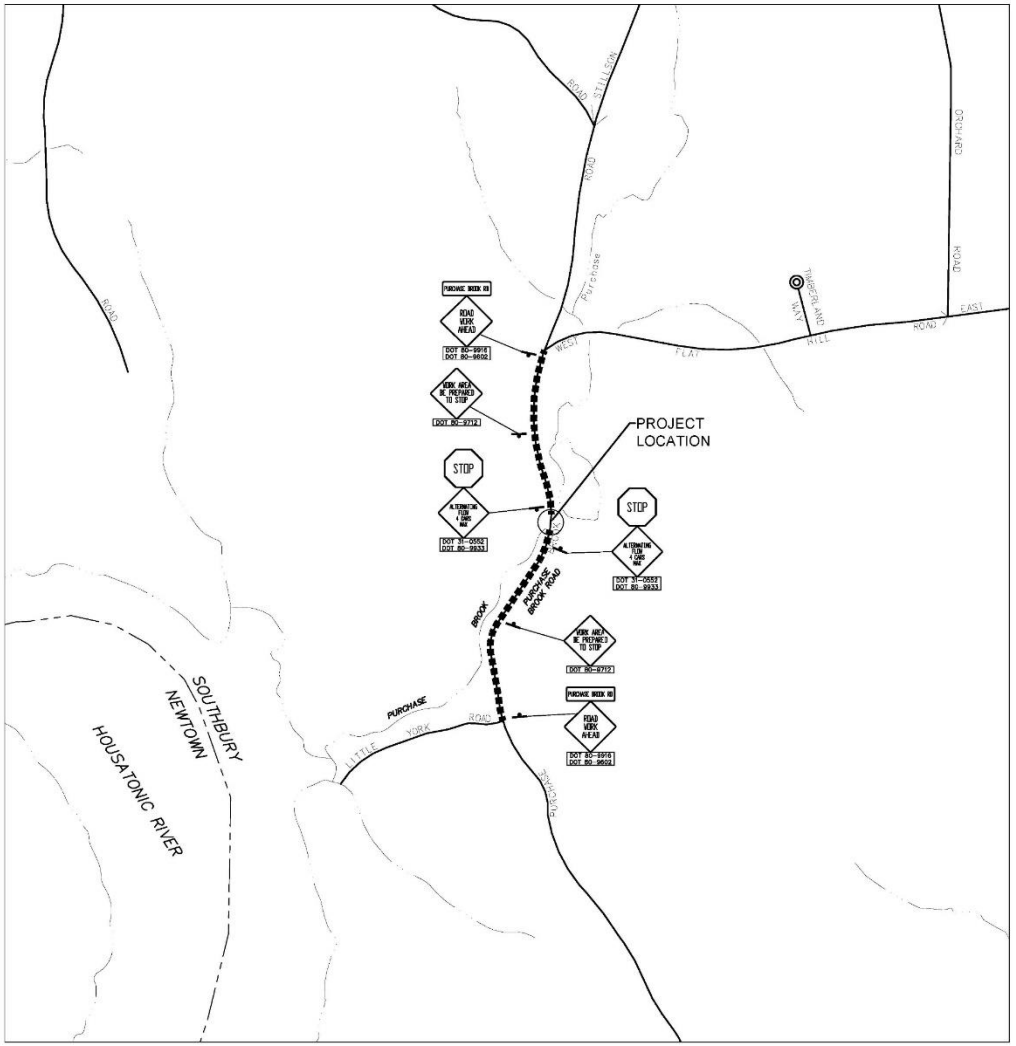
GENERAL NOTES:

1. ALL TRAFFIC CONTROL DEVICES AND SIGNS SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION. ADJUST ALL SIGN LOCATIONS IN THE FIELD AS DIRECTED BY THE ENGINEER.
2. THE CONTRACTOR SHALL REMOVE OR COVER EXISTING SIGNS WHICH ARE IN CONFLICT WITH THE TRAFFIC CONTROL PLAN, AS DIRECTED BY THE ENGINEER.
3. UPON COMPLETION OF THE PROJECT, ALL EXISTING SIGNS AND PAVEMENT MARKINGS WHICH ARE REMOVED IN ADVANCE OF STAGE CONSTRUCTION SHALL BE RE-ESTABLISHED AS DIRECTED BY THE ENGINEER.
4. TEMPORARY SIGNS AND OTHER TEMPORARY TRAFFIC PROTECTIVE DEVICES SHALL REMAIN IN PLACE AS SHOWN THROUGHOUT THE FULL DURATION OF EACH STAGE OF CONSTRUCTION. TRAFFICMEN SHALL BE REQUIRED WHEN DEVICES SHOWN ARE INSTALLED, RELOCATED, OR REMOVED.
5. ALL SIGNS SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), 2009 EDITION, LATEST REVISION.
6. TEMPORARY PRECAST CONCRETE BARRIER CURB SHALL BE IN PLACE WHENEVER WORK HAS BEGUN AND THE CONTRACTOR IS NOT ACTIVELY WORKING AT THE SITE. THE CONTRACTOR IS RESPONSIBLE FOR SAFETY OF THE WORK SITE. SEE SPECIFICATIONS.

LEGEND

CONSTRUCTION ROAD

CONSTRUCTION SIGN



TRAFFIC PLAN
SCALE: 1" = 400'

PURCHASE BROOK ROAD OVER PURCHASE BROOK

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Questions/Concerns?

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