



Replacement of Failed Corrugated Metal Pipe (CMP)



Replacement of Failed CMP

- South Burlington – Colchester IM CULV
- XUMU 17-1098B1 2018 Coast Road Culvert Repair
- Storm Damage Repair to Patricks Point Drive (3N010) PM 1.90



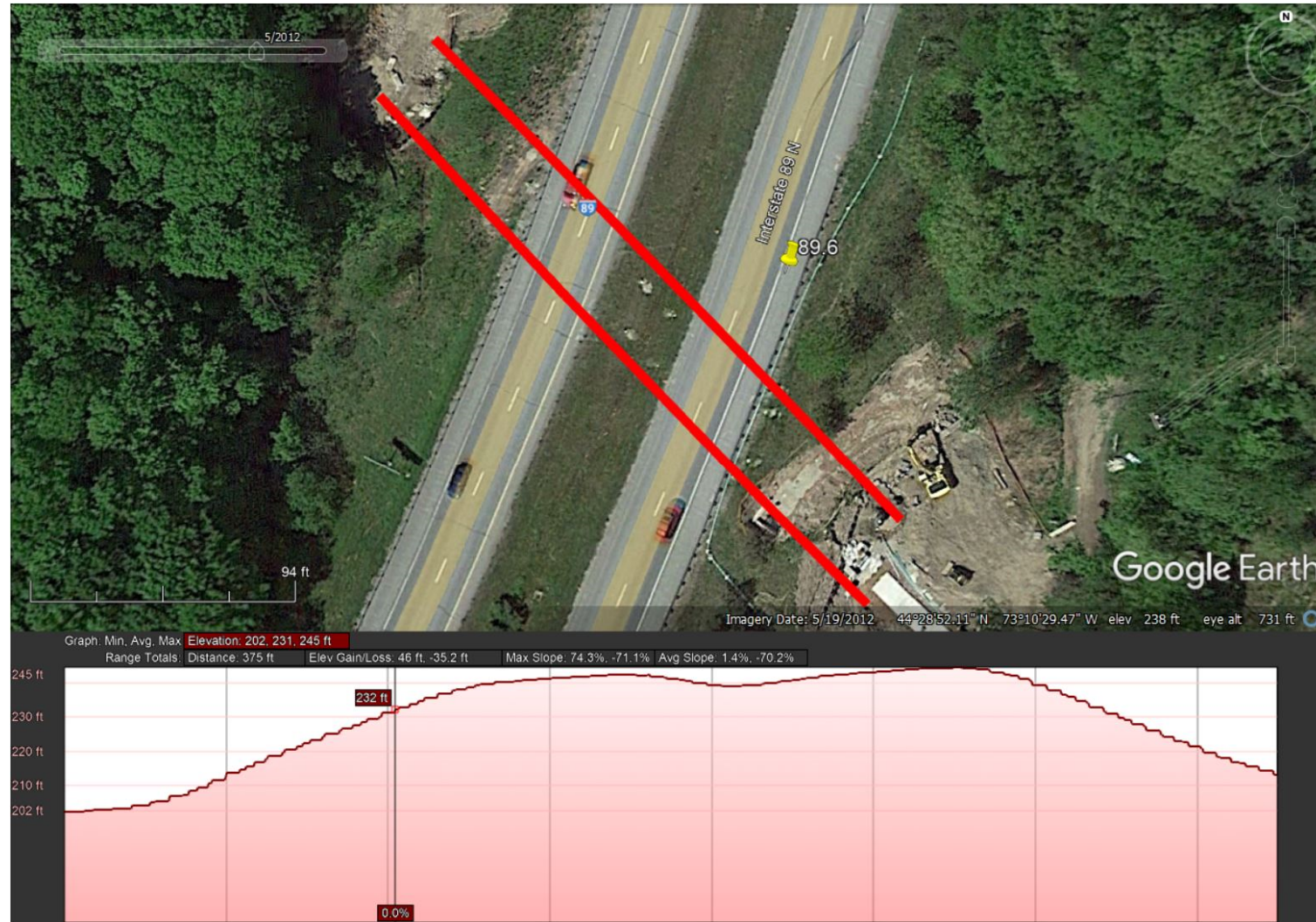
South Burlington – Colchester IM CULV

- No Impact to I-89
- Increased Storm Water Capacity
- 300 feet of 60-inch CMP within Artificial Fill
- Rehab existing 60-inch CMP using Profile HDPE pipe
- Install New Culvert to line and grade



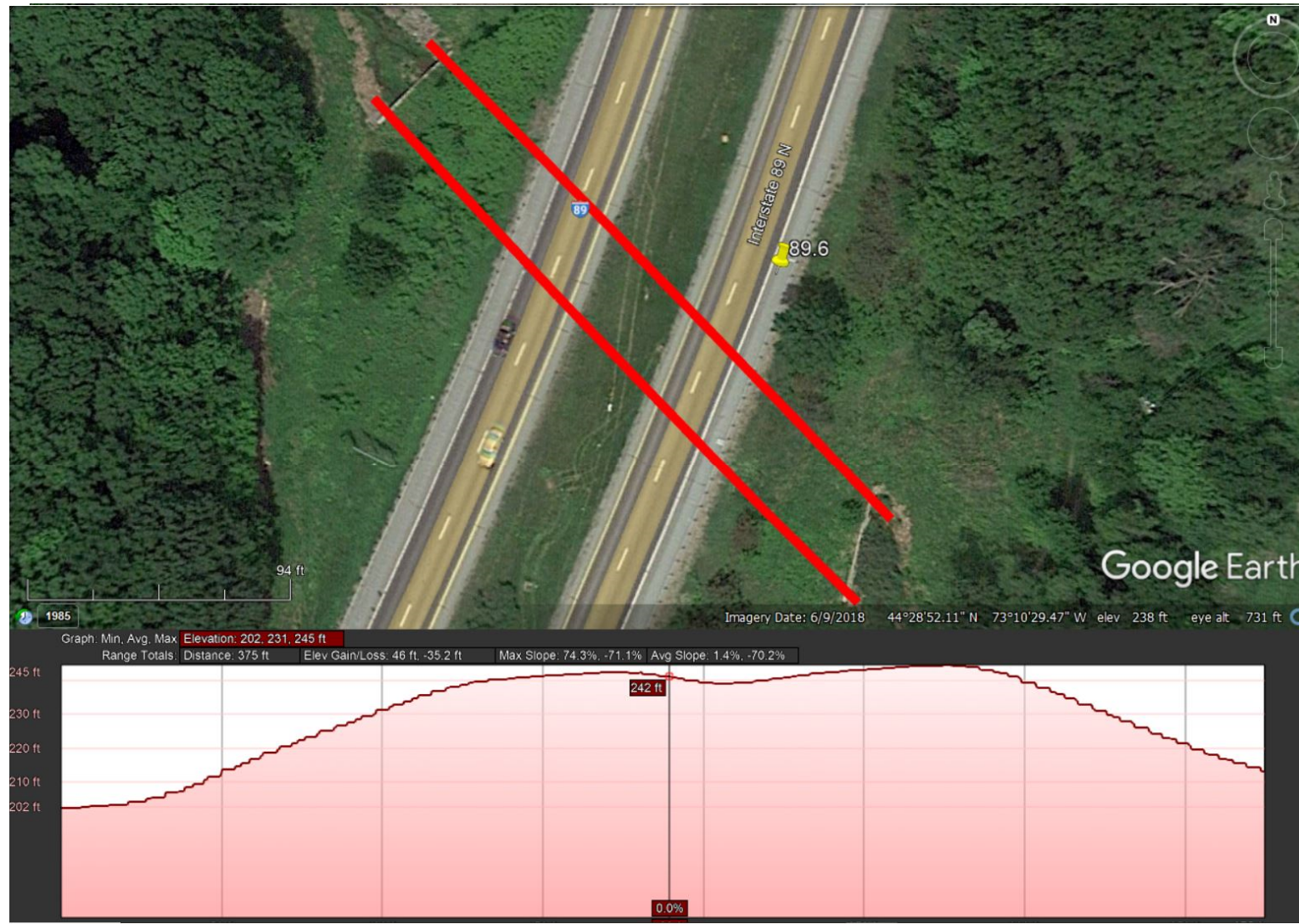
UNDERGROUND CONSTRUCTION TECHNOLOGY

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Present 2021





Project Data

- No Impact to I-89
- Construction Value \$2.4 million
- Increased Storm Water Capacity
- Existing Culvert Successfully Relined
- HDD as Pilot for Line and Grade Control
- Pipe Rammed through fill
- New Culvert Successfully Installed



XUMU 17-1098B1 2018 Coast Road Culvert Repair

- Vandenberg Village, California
- 270 feet of failed CMP
- Terminated 50 feet below existing grade at concrete retaining wall
- Retaining wall at railroad ROW
- Sink Hole 1 in critical access roadway
- Sink Hole 2 near overhead power line pole
- 110-foot Radius Curve
- 94 feet Arc Length

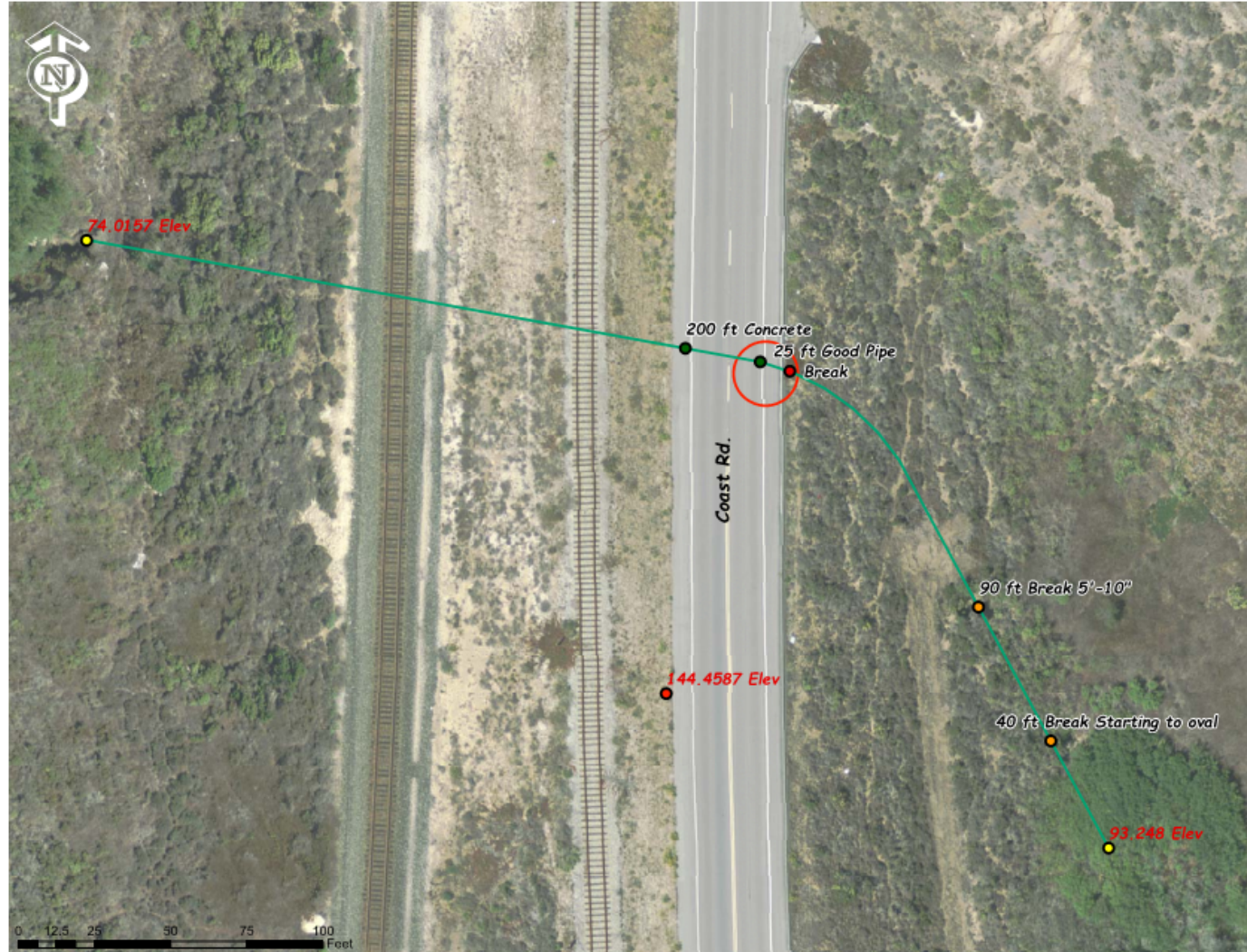


Requirements

- August 2017 to November 2018 to design and construct
- Cannot further impact roadway, critical and limited access
- Cannot impact environmentally sensitive habitat
- Three grade breaks of approximately 2 feet fall over 2 feet run
- CMP had various profiles before failure, largest 7-ft diameter
- Failure required a minimum of 84-inch ID excavation
- Zinc and Bitumen Coating and Lining (hazardous and flammable)
- CMP had a cast concrete invert as temporary repair - Not shown
- Twin HDPE pipelines installed to limit further failure - Not shown



CMP and Tunnel Plan View





First Sinkhole





UNDERGROUND CONSTRUCTION TECHNOLOGY

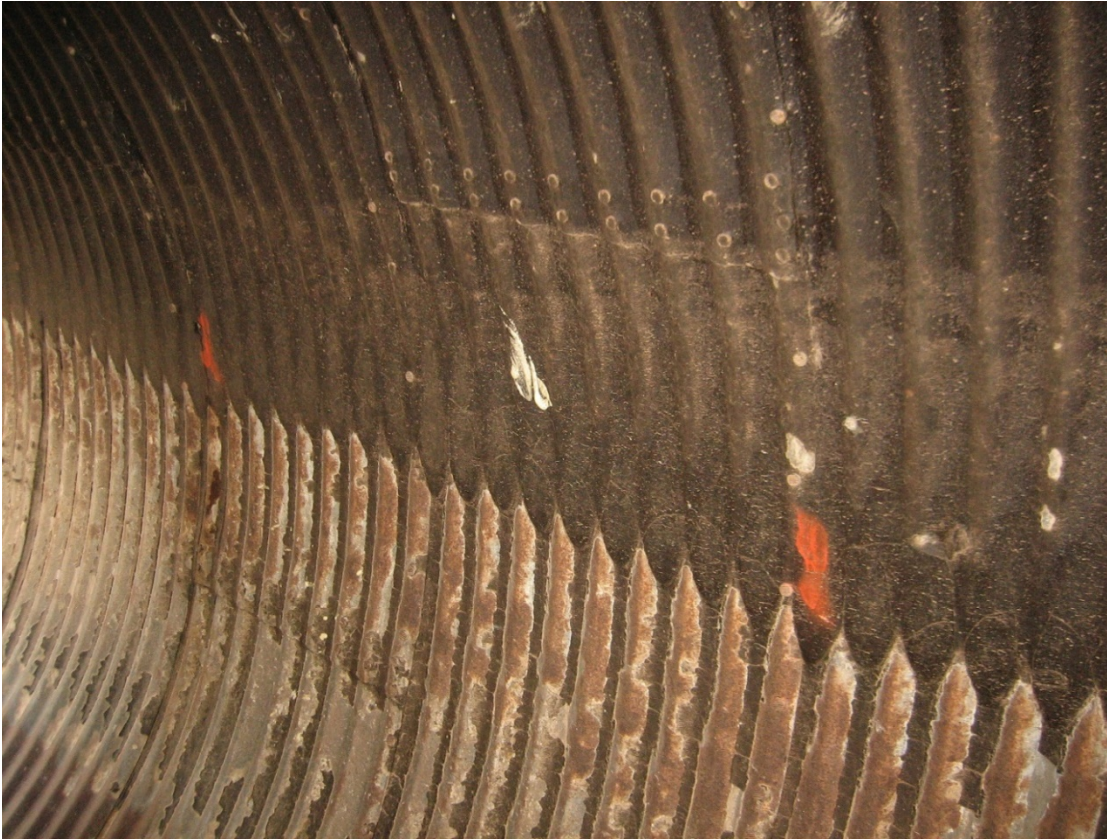
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Second Sinkhole



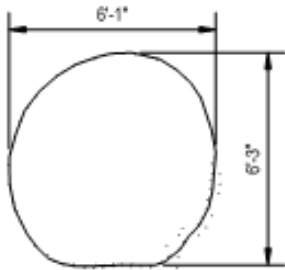


Existing CMP Condition

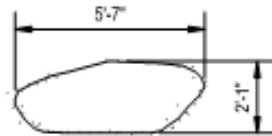




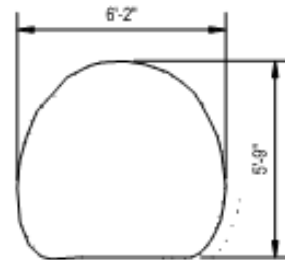
Existing CMP: Profiles



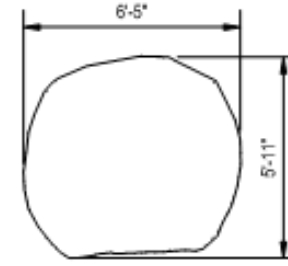
Sta 3+25



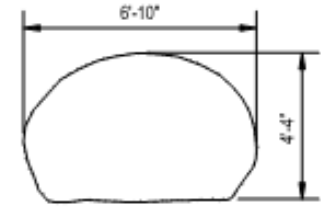
Sta 3+46



Sta 3+50



Sta 3+78



Sta 3+33

COAST RD CULVERT LIDAR CROSS SECTIONS

SCALE: 1/4"=1'-0"





Design

- 1 year to design and construct
- Culvert Mitigation measures performed during Design
- Bidding and Construction Commenced Immediately upon Bid
- 24-hour Construction



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Launch





Tunneling – Grade Break





Tunnel – Elliptical Failed CMP





Rib & Lag Circular Tunnel with Horizontal Curve





Tunnel – Concrete Headwall at Railroad ROW





Tunnel Prepared for Carrier Pipe





Tunnel – Carrier Pipe





New Storm Drain





Project Data

- Value was \$4 million successful low bid
- 1 RFI
- Discovery of Sink hole winter 2017
- Base issued RFP with proposals due August 2017
- Repair design upon award
- Construction commenced in April 2018
- Completion in November 2018

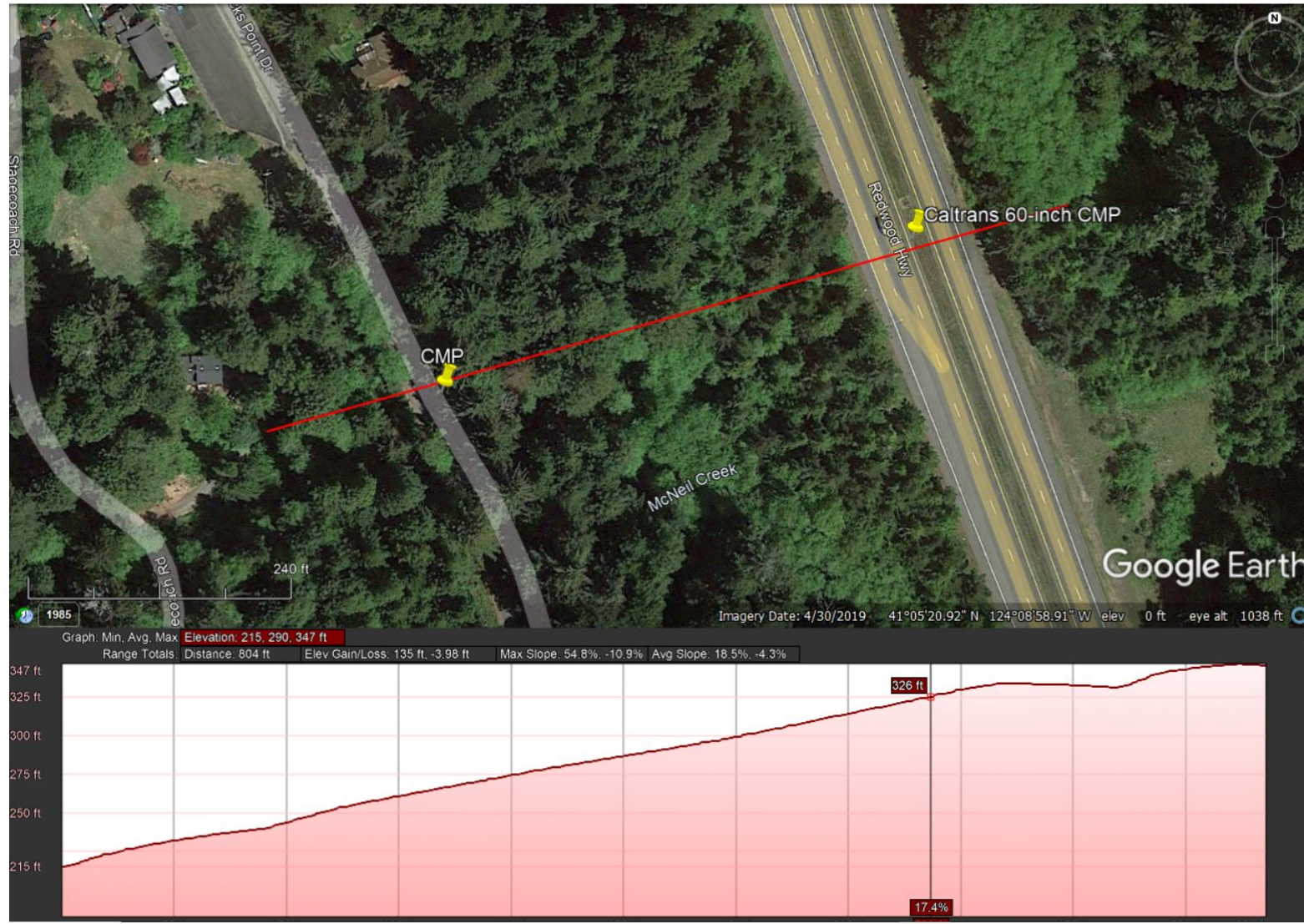


Storm Damage Repair to Patricks Point Drive

- No impact to Patricks Point Drive
- Culvert immediately upstream is 60-inch CMP
- Increase capacity of failed 48-inch CMP
- Existing CMP within artificial fill
- Possible Redwood tree stumps along alignment, outside CMP
- Recent massive wildfires in Northern California
- Rural County with very limited financial resources

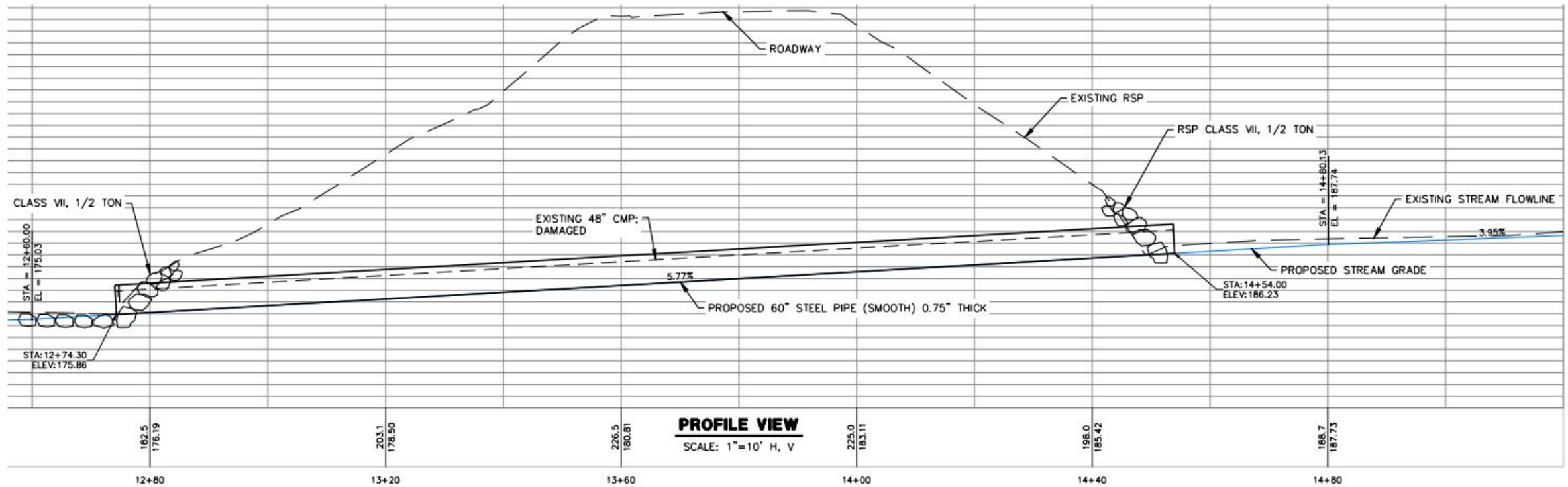


Patricks Point Drive





Patricks Point Drive - Elevation





Replacement

- Replace with 60-inch welded steel casing with 1.0-inch sidewall
- No additional corrosion protection currently proposed, 100-year life
- Steel casing is at a steeper slope than upstream CMP
- Allowed Pipe Ramming or Tunneling over CMP
- No torch cutting of CMP due to zinc coating
- Project bid with construction to commence shortly



Thank You

Questions?

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