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August 4, 2023

Attn: Lisa Ramundo, PE
Albany County Department of Public Works
449 New Salem Road
Voorheesville, New York 12186

Albany County Rail Trail Over New Scotland Road
Project Reference 18-C541
Colliers Engineering & Design Project No. 23010308P

Dear Ms. Ramundo,

Colliers Engineering & Design was requested by Albany County to perform the following investigative tasks in conjunction with the recent failure of the rail trail bridge over New Scotland Road:

1. Visually inspect the bridge superstructure prior to demolition/removal.
2. Review available contract documents and construction phase submittals
3. Provide a preliminary engineering opinion as to the source of the bridge girder failure.

Task 1: A visual inspection at the above referenced project site was performed by Brett Reynolds, PE of Colliers Engineering & Design on July 25, 2023 and July 27, 2023. Albany County (Lisa Ramundo and George Penn) was present and discussed the project prior to the first inspection. The scope of our inspection was limited to the steel bridge through girders, steel floor beams, concrete deck, bearings, and concrete abutments.

Photographs were taken at points of interest, some of which are included in this report.

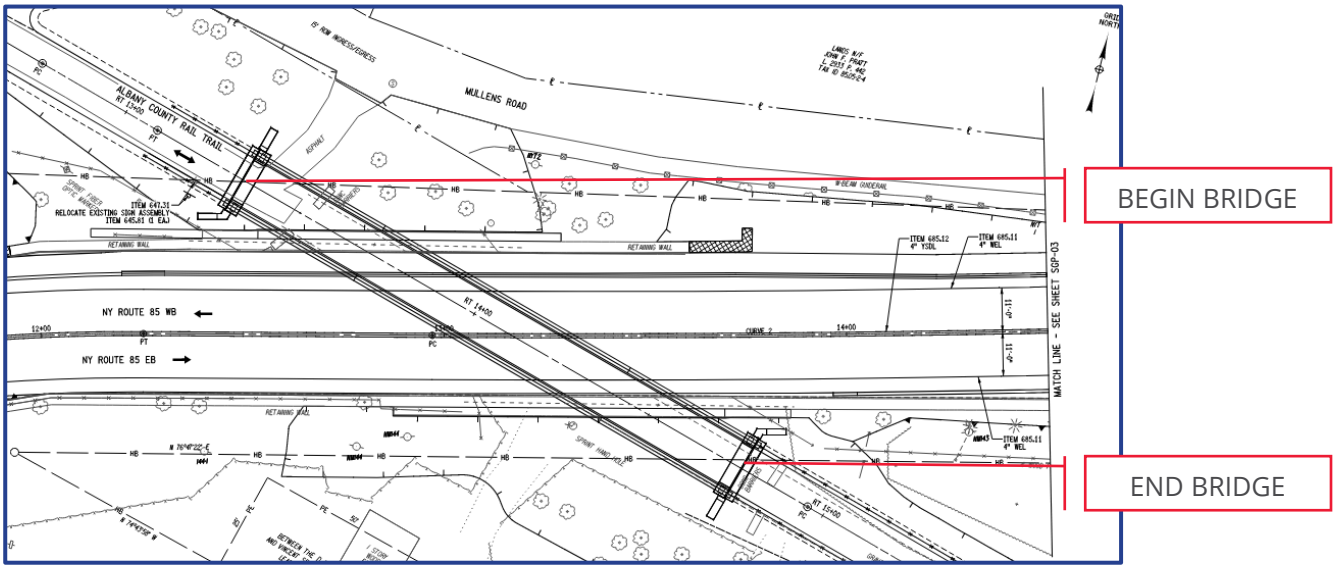

Figure 1 - General Plan View

- **Photograph 1:** Severe web buckling, top flange distortion and permanent girder deflection was noted on both through girders at the location of the girder depth transition. Web buckling occurred over a length of approximately 52" and is full height of the web.

- **Photograph 2:** Lateral buckling of the web and top flange distortion

- **Photograph 3:** View along the bridge girder G2, slight lateral shift noted in the through girders. Concrete deck placement was progress to approximately midspan

- **Photograph 4:** Web buckling also observed at Girder G1 near the "End" top flange transition. The “End” side of G1 was also showing signs of early buckling (G2 “End” did not show any signs).

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Task 2: The following documents were made available after the field inspection, and were reviewed as part of our investigative work:

- 2021_12_06_18-C541_Full Plan Set
- 2021-12-03_DRAFT_Project Manual
- Site Photographs from July 12, 2023
- Site Photographs from July 13, 2023
- Drone Concrete Pour Footage (prior to girder failure)
- Shop Drawings
  - AMSCOT Approved Submission
  - Casco Bay Steel #922 Submittal 5-11-22_Approved
  - Albany Rail Trail Erection Calcs and Plans_Approved
  - Constructability Review Calculations
  - Concrete Deck Pour Pre-Placement
  - Steel Shop Inspection
  - Steel MTR's

Task 3: Based on our field observations and review of the available documentation provided to us we offer the following engineering opinions as to the cause of the bridge collapse. It should be noted that the full set of bridge design computations was not available for our review at the time of authoring this letter and our opinions are based on limited information and engineering judgement. We reserve the right to modify these opinions upon further discovery.

The bridge superstructure is highly unique with a variable depth through girder configuration with each girder featuring two locations where the top flange transitions from the deeper to shallower web sections. This top flange transition occurs instantaneously in a "step" configuration from horizontal to vertical. It is our understanding that this variable depth girder configuration was implemented to "mimic" the original bridge which featured 3 separate spans with the middle span being deeper than the two flanking spans.

The failure of the bridge appears to have originated in the webs of the girders at the location of the top flange transitions. The girder webs at this location appear to have buckled under the loading of the deck placement causing the girders to "hinge" and collapse in on themselves at this location and then deflect downward until resting on the retaining walls below.

The top compression flange at the step transition locations was detailed in the contract plans to run from horizontal to vertical and back to horizontal. Typically, these types of girder depth transitions are done gradually over a longer length with a haunch or "fish belly" configuration. The abrupt compression flange transition in the step pattern at the bridge can result in a concentration of stresses being imparted into the web at the location of the transition. This often requires a detailed analysis along with providing additional strengthening of the girder web – either through the placement of additional web stiffeners in the step area (e.g. radial, vertical or horizontal) and/or providing additional web thickness. It does not appear this additional stress concentration in the webs at the transition locations were considered. As the web and vertical stiffeners are consistent across the entire length of the girder, it does not appear that the design accounted for this additional stress concentration at the webs at the step location.

From our review of the available construction related documentation, it does not appear that the particular construction means and methods were at the root cause of the collapse.

- It appears that the shop inspection identified geometry issues during the fabrication of the girders. Additional stresses from beam fabrication (eventually approved by designer) could have contributed to the overall stresses that eventually led to the failure.

If you have any questions or require additional information, please do not hesitate to call our office.

Sincerely,

Colliers Engineering & Design CT, P.C.
(DBA Maser Consulting Engineering & Land Surveying)

Brett Reynolds, P.E.
Geographic Discipline Leader

Disclaimer
Colliers Engineering & Design, CT, P.C.'s scope of work was limited to conducting a cursory field inspection of the above-referenced project in order to visually observe the bridge's physical condition as of the date of the inspection, notwithstanding any other terms to the contrary set forth in any other agreements beyond the scope of work. It is understood that Colliers Engineering & Design, CT, P.C's conclusions are based upon its professional opinion as a design professional familiar with the construction industry and that Colliers Engineering & Design, CT, P.C. makes no representations or warranties with respect to its professional opinions. Any reliance, use, or reuse of Colliers Engineering & Design, CT, P.C's Inspection Report will be at the user's sole risk and without any liability or legal exposure to Colliers Engineering & Design, CT, P.C.. and such reliance, use, or reuse will be deemed acceptance of these terms.

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