STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Colchester IM 089-3(69)

I-89 Bridges 76 N&S over Bay Rd (TH 1) and I-89 Bridges 77 N&S over Mallett's Creek

January 16, 2015

Bridge 76 North

Bridge 76 South

Bridge 77 North

Bridge 77 South

I. Contents

I. Site Information 3

Need 3

Traffic 3

Design Criteria 3

Inspection Report Summary 4

Hydraulics 5

Utilities 5

Right Of Way 6

Resources 6

Archaeological: 6

Historic: 6

Natural Resources: 6

Hazardous Materials: 7

Stormwater: 7

III. Maintenance of Traffic 8

Option 1: Off-Site Detour 8

Option 2: Temporary Bridges 11

Option 3: Phased Construction 12

Option 4: On-Site Detour with Crossovers 13

IV. Alternatives Discussion 13

No Action 13

Alternative 1: Rehabilitation 14

Alternative 2: Deck Replacement 14

Alternative 3: Superstructure Replacement 15

Alternative 4: Complete Replacement 16

V. Contracting Methods 16

VI. Alternatives Summary 17

User Costs 17

Maintenance of Traffic Costs 17

Alternative Comparisons 17

VII. Bridge 76 Cost Matrix 19

VIII. Bridge 77 Cost Matrix 20

IX. Conclusion 21

X. Appendices 22

I. Site Information

Bridges 76 N&S and 77 N&S are located along Interstate 89 (I-89) between exits 16 and 17. Bridges 76 N&S are approximately 3.8 miles north of exit 16 at mile marker 95.3 and cross over Bay Rd in Colchester. The bridges are just south of a weigh station on I-89 and the Lone Pines Campsite off Bay Rd. Bridges 77 N&S are approximately 1.3 miles south of exit 17 at mile marker 96.6 over Mallett's Creek. Bridges 76 N&S and Bridges 77 N&S are approximately 1.3 miles apart from each other. These bridges are in a less thickly settled area surrounded by wetlands. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and Orthophotos. See correspondence in the Appendix for more detailed information.

Roadway Classification	Urban Principal Arterial – Interstate
Bridge Type	3 Span Continuous Rolled Beam
Bridge Spans	157' (76 N&S) and 185' (77 N&S)
Year Built	1964
Ownership	State of Vermont

Need

The following are needs of Bridges 76 N&S and 77 N&S along I-89 between exits 16 and 17 over Bay Rd and Mallett's Creek.

1. Bridge 77S is structurally deficient with some heavy deterioration of the deck.

2. The approach rail connections on Bridges 76 N&S and Bridges 77 N&S are substandard and the bridge rails do not meet the latest MASH 350 standards.

3. Bridges 76 N&S and Bridges 77 N&S are too narrow for the roadway classification and traffic volumes.

4. Bridges 76 N&S have insufficiently protected piers.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2016 and 2036.

Section	AADT		DHV		%T		%D		ADTT		ESALs	
	2016	2036	2016	2036	2016	2036	2016	2036	2016	2036	(2016~2036)	(2016~2056)
1	15,900	19,600	2500	3100	6.4	11.3	100	100	1400	3000	10,531,000	27,291,000
2	15,900	19,600	2900	3600	5.4	9.4	100	100	1300	2900	10,446,000	27,098,000

Section 1 – Bridge 76 & 77 Northbound
Section 2 – Bridge 76 & 77 Southbound

The 2016 AADT on Bay Road (TH 1) under Bridges 76 N&S is 5800.

Design Criteria

The design standards for this project are the Vermont State Standards (VSS), dated October 22, 1997, A Policy on Geometric Design of Highways and Streets (Green Book), 6th Edition, the

VTrans Structures Design Manual, dated 2010, and Interstate Scoping Guidance, dated 2014. Minimum standards are based on the traffic volumes listed above and a design speed of 70 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	Green Book Chapter 8.2	4'-12'-12'-10'	4'-12'-12'-10'	
Bridge Lane and Shoulder Widths	Green Book Chapter 8.2	3'-12'-12'-3'	16'-12'-12'-10'	Substandard
Clear Zone Distance	VSS Table 3.4	Clear or Shielded	26' fill / 20' cut	
Banking	VSS Section 3.13	Normal Crown	8% (max)	
Speed		65 mph (Posted)	70 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R = ∞'	R_{min}= 1810' @ 8%	
Vertical Grade	AASHTO Green Book Table 8-1	2.3% (max)	4% (max) for rolling terrain	
K Values for Vertical Curves	AASHTO Green Book Table 3-34	Tangent (76N&S) 400 Crest (77N&S)	247 crest / 181 sag	
Vertical Clearance Issues	AASHTO Green Book 8.2.9	16'-2" below (76N) 19'-3" below (76S)	16'-3" (min)	Within tolerance
Stopping Sight Distance	AASHTO Green Book Table 3-34	2000+'	730'	
Bicycle/Pedestrian Criteria		None	N/A	Limited Access
Bridge Railing (and Approach Railing)	Structures Design Manual Section 13.2	2 Tube Bridge Rail w/ w-beam approach	TL-5	Substandard
Hydraulics	VTrans Hydraulic Section	Meets standard	Pass Q_{50} storm event with 1.0' of freeboard	
Structural Capacity	Structures Design Manual Section 3.4.1	Structurally Deficient (77S) Sufficient (76N&S & 77N)	Design Live Load: HL-93	Substandard

Inspection Report Summary

Bridge	Deck Rating	Superstructure Rating	Substructure Rating	Channel Rating
76 N	5	6	6	N/A
76 S	5	6	6	N/A
77 N	5	6	6	8
77 S	4	6	6	8

<u>Bridge 76 N:</u> 06/12/2014 - Bridge deck has advancing deterioration and needs to be programmed for replacement within the next 10 years. Sliding plate joint leaks heavily at the southern abutment and is causing deterioration along the steel superstructure and substructure. Plate joint is secure for now, but consider removing completely, as it may come loose again before the deck is replaced. South abutment bearing seat and the northern pier cap needs some concrete repair work. Standard heavy guard rail along the outside of the corner to protect the northern pier columns from impact is needed. ~ MJ/JS

Bridge 76 S: 06/12/2014 - Bridge deck has advancing deterioration and needs to be programmed for replacement within the next 10 years. Sliding plate joint leaks heavily at the southern abutment and is causing deterioration along the steel superstructure and substructure. Standard heavy guard rail along the outside of the corner to protect the northern pier columns from impact is needed. ~ MJ/JS

Bridge 77 N: 06/18/2014 - Bridge could use reconstruction when the southbound bridge is done which has a poor deck. The steel (if intended to be retained) needs extensive cleaning and painting. ~ MJ/JS

Bridge 77 S: 06/18/2014 - Bridge deck is rated as poor and is checked every 12 months for changes. Bridge needs reconstruction with a new deck. The steel (if intended to be retained) needs extensive cleaning and painting. ~ MJ/JS

Hydraulics

Bridge 76 N&S is a dry crossing, so hydraulics is not applicable.

From preliminary hydraulics report for Bridges 77 N&S:

Based on record plans, the bottoms of beams are above elevation 110'. That is well above the Q100 water surface elevation of the lake. Based on some very approximate preliminary calculations, the bridges have adequate capacity to convey the water flowing down Mallets Creek. District 5 personnel confirmed there have been no hydraulic problems with these bridges and water has not been up to the beams or overtopped the roadway as far as they are aware.

Utilities

The utility information is shown in the Appendix.

Bridges 76 N&S

There is a VAOT Traffic Recorder (Weigh – in – motion) (WIM) near the northwest end of BR 76 S. There is an aerial electric line (3 phase) which crosses both lanes of I-89 approximately 160 feet north of the existing bridges. There are 3 buried fiber optic cables which begin at the pole just to the east of BR 76 S, on the south side of Bay Road, which travel along the south side of Bay Road to the east. All three of these cables pass under the I-89 bridges. There is an 8" VCP water main along the northern side of Bay Road which is directly under the 5 foot paved shoulder (approximately 5.5' deep).

Bridges 77 N&S

There are no existing utilities within close proximity to Bridges 77 N&S. The bulk of the utilities within this area (Buried Fiber Optic Cable, Water Mains, Sewer Mains and Gas Mains) run along U.S. Route 7 which parallels I-89, a substantial distance to the east.

Utilities should be located with Dig Safe before any work on Bridges 76 N&S. If excavation is not included in the scope of work, utility relocation will not be necessary.

Right Of Way

The existing Right-of-Way is shown on the Layout sheet. There is a large but irregular shaped piece of Right-of-Way held by the State of Vermont surrounding Bridges 76 N&S. The parcel is pinched at the northwest corner and the closest distance to the centerline of the southbound lanes is approximately 95 feet in this location. The Right-of-Way held by the State surrounding Bridges 77 N&S is approximately 300 feet wide and centered on the north and southbound lanes.

It is anticipated that no Right of Way acquisitions will be required for any work associated with this project.

Resources

The resources present at this project are shown on the layout sheets.

Archaeological:
Archaeologically sensitive areas exist within the NE and SE quads of the project area at Bridges 76 N&S. The sensitive area in the NE quad contains two known pre-contact (Native American) sites (VT-CH-52 and VT-CH-768). Most of the area directly surrounding Bridges 77 N&S contains wetlands and existing water courses. There were no sensitive areas directly within the project area; however, there are two known sites outside the project area. One site is located within an area in the NW quad.

Historic:
There are no historic resources in the area of the project, but a Section 4(f) qualifying path does cross under Bridges 76 N&S.

Natural Resources:

<u>Wetlands/Watercourses</u>

Bridges 76 N&S

There are wetlands within the southwest quadrant of the project area of Bridges 76 N&S. This wetland is considered class II and therefore, a 50' regulatory buffer applies. Wetlands in the project area are palustrine scrub-shrub wetlands adjacent to the unnamed tributary to the west of the project area.

There is an unnamed tributary to the Lake Champlain (Mallets Bay) which flows westerly through the project area of Bridges 76 N&S. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

Bridges 77 N&S

There are wetlands adjacent to Bridges 77 N&S in all quadrants. The wetlands are associated with the confluence of several streams. The wetland complex is large and defined as broad bottomland wetlands composed of deep emergent marsh, floodplain forest and red maple swamp. The wetland is classified as class II and has a regulated 50' buffer. As noted in the resource identification, "As this is a highly functional wetland complex almost all functions and values would exist within this wetland complex."

Several stream confluences (Pond Brook, Allen Brook, Mallets Brook, and Indian Brook) enter Lake Champlain near Bridges 77 N&S. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward. Due to the sensitivity of the area it is highly recommend to phase this project to avoid any new alignments or temporary bridge requirements. In-stream timing restrictions (early spring) will likely be required due to spawning of a variety of fish species.

Wildlife Habitat

According to latest VT Fish and Wildlife mapping, the area around Bridges 76 N&S is mapped as low importance with regards to wildlife movement importance. The wetlands within the south western quadrant would have the most diversity of habitat for wildlife.

Exceptional wildlife habitat exists within the area/corridor adjacent to Bridges 77 N&S. This area has large wetland complexes that would support fisheries, migratory birds, aquatic species, small and large mammals, etc. Further evaluation of conceptual plans will determine potential impacts to species.

Rare, Threatened and Endangered Species (R/T/E)

There are no mapped state threatened species within the area adjacent to Bridges 76 N&S. According to the US Fish and Wildlife Service mapping, no federally listed species are present within the project area.

There are several rare, threatened and endangered species within the corridor adjacent to Bridges 77 N&S. However, if there are no waterway/wetland impacts, there should be no species impacts. If conceptual plans indicate the need for in water/wetland work, a specialist will need to be contracted to confirm the presence of any rare, threatened or endangered plants/animals that would require avoidance, minimization, or mitigation. Procuring a detailed survey may be restricted to certain times of year, and thus may impact the project development schedule.

According to the VT Fish and Wildlife Natural Heritage Database there are no federal or state listed mapped threatened or endangered non-aquatic plants or animals within the project corridor, therefore, no impacts are anticipated above the waterway/wetland boundaries.

Agricultural Soils

There are several soil types mapped around Bridges 76 N&S. Winooski very fine sandy loam soils are mapped and are considered prime agricultural soils.

There are no prime agricultural soils around Bridges 77 N&S.

Hazardous Materials:
There are no known hazardous waste sites near this project.

Stormwater:
No known issues.

III. Maintenance of Traffic

The Vermont Agency of Transportation developed an Accelerated Bridge Program in 2012, which focuses on expedited delivery of construction plans, permitting, and Right-of-Way, as well as accelerated construction of projects in the field. One practice that will help in this endeavor is closing bridges for portions of the construction period, rather than providing temporary bridges. In addition to saving money, the intention is to minimize the closure period with accelerated construction techniques and incentives to encourage contractors to complete projects early. The Agency will consider the closure option on projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements and systems for new bridges will also expedites construction schedules. This can apply to decks, superstructures, and substructures. Accelerated Bridge Construction should provide enhanced safety for the workers and the travelling public while maintaining project quality.

Based on the Directional Design Hourly Volume between exits 16 and 17 on I-89, it is recommended that any long term maintenance of traffic options provide two lanes of traffic in each direction to prevent unacceptable levels of service during peak hours.

The following options have been considered:

Option 1: Off-Site Detour

This option would close the section of I-89 between exits 16 and 17 for a limited time during construction. The detour would utilize US Route 7 from exit 16 to 17 for traffic traveling north and south along I-89. The through distance on this detour is almost identical at 6.2 miles versus the 6.8 miles on I-89, with travel times estimated between 7 and 9 minutes for each route under normal driving conditions.

This option would not maintain two lanes of traffic in each direction, but it would only be utilized for brief closure periods during off peak hours, such as nights or weekends, in order to rapidly replace the deck or superstructures. The methods available to replace a deck or superstructure during a short closure period include: lateral slide, self-propelled modular transporters (SPMTs) for Bridges 76 N&S, SPMTs on barges for Bridges 77 N&S, and prefabricated bridge elements. Each of these methods will be discussed briefly below.

Lateral Slide

A lateral slide consists of constructing an entire superstructure adjacent to the location where it is intended and physically pushing or pulling the structure into its design location along lubricated rails. This allows traffic to be maintained on the existing bridges while construction of the bridges takes place. Traffic would then be detoured for approximately 3 days while the existing bridge is removed and the new bridge is moved into place. There is room to the east of the northbound bridges and to the west of the southbound bridges to construct the new bridges for a lateral slide.

Figure 1: Lateral Slide

[Images from "Accelerated Bridge Construction - Experience in Design, Fabrication and Erection of Prefabricated Bridge Elements and Systems" from FHWA (2011).]
One of the disadvantages of utilizing a lateral slide for Bridges 76 N&S is that the construction still needs to take place over Bay Rd. There are some height restrictions and worker safety issues when construction occurs over busy roadways.

Self-Propelled Modular Transporters (SPMT)
There are several methods of constructing the bridge in a safer, less restricted environment before moving it into place. One of those methods utilizes SPMTs. Similar to a lateral slide, SPMT placement requires that the entire superstructure is constructed near but not in its intended location, allowing traffic to be maintained on the existing bridges while the new bridges are constructed. Instead of sliding the superstructure into place, it is lifted off its temporary blocking, moved a short distance to its design location, and lowered into place. This method can also be used in reverse to remove the existing superstructure.

Superstructures have been removed and replaced utilizing SPMTs during 12 hour stretches overnight. This type of technology has been used in several states, including Florida, Louisiana, Minnesota, Rhode Island, New York, Illinois, Washington, and Utah. It is reasonable to assume that the I-89 closure period would be similar to that for a lateral slide to incorporate the site preparation work, the clean up and backfilling that may be required after the superstructure has been replaced. One of the disadvantages of using SPMTs is that Bay Rd, in addition to I-89, needs to be closed to traffic while the move is taking place. While this is an additional inconvenience, it does not rule out the use of SPMTs because there are alternate methods for traffic to get to the other side of I-89 on Bay Rd.

Figure 2: SPMT transporting a bridge superstructure

Float-In - SPMTs on Barges

Rather than transporting the bridges on Bay Rd, barges can be used to float the bridges into place over Mallet's Creek. Once again, the entire superstructure is constructed near but not in its intended location; then the bridge is lifted off its temporary blocking, moved up Mallett's Bay, and lowered into place.

Figure 3: SPMT transporting a bridge superstructure on barges

Prefabricated Bridge Units (PBU)

Another method of constructing the bridge in a safer and less restricted environment over Bay Rd is to prefabricate portions of the bridge structure and deliver those pieces to the construction site to be joined together to form the bridge. These bridge superstructure pieces are referred to as Prefabricated Bridge Units, or PBUs. Many substructure pieces can be prefabricated as well and

lifted into place before the PBUs are placed. Using rapid setting concrete for the joint closure pours, the closure period can be reduced to 3 days per bridge for this method of superstructure replacement as well.

Figure 4: PBU being lifted into place

Installation Costs

The baseline method of installing the superstructure is using a crane to lift the PBUs into place. These costs are included in the baseline bridge costs. The extra engineering and temporary supports required for a lateral slide are approximately $100,000 per bridge, and the costs paid to an SPMT subcontractor would be around $150,000 per bridge for a dry crossing and slightly more for a lift from a barge.

A map of the detour route can be found in the Appendix.

Advantages: The costs associated with signing the detour are much lower than the construction costs associated with the other maintenance of traffic options. By detouring traffic away from construction activities, it creates a safer working environment for the construction workers. By not constructing the structure in phases, there will be no vibrations or deflections from adjacent traffic to affect the quality of the closure pours joining the phases. By not requiring the construction and removal of temporary approaches, temporary bridges and temporary crossovers, the length of construction can be reduced over those other options.

Disadvantages: Traffic will not be maintained along the existing corridor for a limited portion of construction. Through traffic will see an increase in travel times during the closure period.

Option 2: Temporary Bridges

The standard maintenance of traffic option based on the length of the bridges and the traffic volumes at these locations would be two lane temporary bridges. There is sufficient Right-of-Way located along this section of I-89 that a temporary bridge could be located east of the existing bridges while the northbound bridges are under construction and west of the existing bridges while the southbound bridges are under construction. However, there are sensitive resources surrounding these bridges which would make permitting the placement of temporary bridges outside the corridor difficult. There are known archaeological sites to the east of Bridges

76 N&S and there is a wetland and road access to the west. There are class II wetlands in all four quadrants surrounding Bridges 77 N&S.

A two lane Mabey bridge is approximately 33' wide. The distance between the northbound and southbound bridges is approximately 39'. Thus, it would seem that a temporary bridge could be launched between the north and south bound bridges to be utilized in turn for both the north and southbound traffic without being moved while work is being performed on each bridge. If the bridges are widened with the project, some of the widening work may need to be done in phases after the temporary bridge is removed.

This is the configuration shown in the Appendix and considered further in this report.

Advantages: A temporary bridge maintains traffic along the existing corridor during construction.

Disadvantages: There are extra costs associated with constructing or launching temporary bridges, especially in a narrow median. Changes in traffic patterns can increase the probability of accidents and the increased time associated with constructing temporary approaches and launching the temporary bridges puts the construction workers at increased risk for accidents. In order to minimize the length of median affected by the temporary roadwork, the design speed should probably be reduced to more safely allow vehicles to navigate the temporary roadway. This decrease in speed would cause slight traffic delays.

Option 3: Phased Construction

Another method of maintaining traffic along the corridor during construction is to build a new structure one lane at a time, or in phases. Unfortunately, the existing bridges are too narrow to maintain two lanes of traffic in each direction during construction while removing a portion of the existing bridges. Construction activities could be phased if a temporary structure were used, as mentioned previously, or if the bridges were widened as part of the construction project.

If the existing bridges were widened toward the inside of the corridor, then two lanes, one in either direction, could be constructed between the bridges, similar to a temporary bridge, and the traffic could be detoured on to those two lanes while work was being performed on the other lanes on the existing structures. If the structures were widened toward the outside of the corridor, then one lane would need to be constructed outside the existing bridges. Traffic would be split south of the northbound bridges and north of the southbound bridges to take advantage of one lane on the existing bridge and one lane off the bridge during phased construction. As per the Interstate Scoping Guidance, bridges should be widened to the inside. See the Appendix for recommended phasing plans. This method of maintaining traffic is only appropriate for scopes of work that include widened bridges.

Advantages: This would provide the advantage of a temporary bridge by maintaining traffic along the existing corridor during construction. In addition, the costs of maintaining traffic during phasing should be less expensive than maintaining traffic with a temporary bridge.

Disadvantages: While the time and cost required to construct a phased project may be less than that required to construct a project with a temporary bridge, the time required to construct a phased construction project is still longer than a project constructed without phasing, because some of the construction tasks have to be performed multiple times and cannot be performed concurrently. The costs of construction also increase over unphased work because of this increase in the length of time, the additional inconvenience of working around traffic, and the effort

involved in coordinating the joints between the phases. Once again, while the corridor will be open to traffic during construction, traffic will still be delayed and disrupted by the shifting of lanes and by construction vehicles and equipment entering and exiting the site. The construction workers and equipment will still be in close proximity to vehicular traffic increasing the probability of accidents.

Option 4: On-Site Detour with Crossovers

Another method for maintaining traffic on parallel structures with multiple lanes of unidirectional traffic is creating a crossover in the median before and after the structures to get all traffic off one structure and on to the parallel structure. This option is rarely available for most projects, because most non-interstate structures in Vermont do not have parallel bridges. The possibilities on interstates may even be limited based on site distance, traffic patterns or obstructions in the median.

Because of the requirement to maintain two lanes of traffic in each direction and narrow width of the existing structures, it is not possible to maintain traffic in these locations with crossovers utilizing the existing width bridge. This option will not be considered further in this report.

IV. Alternatives Discussion

Bridge 77S is structurally deficient with some heavy deterioration of the deck. The approach rail connections are substandard and the bridge rails do not meet the latest MASH 350 standards on all four bridges, and the bridges are too narrow for the roadway classification. Bridges 76 N&S have insufficiently protected piers.

<u>Maintenance Schedule:</u>
It is desired to keep the northbound and southbound direction for each bridge on the same maintenance cycle. Therefore, the recommended scope for Bridge 76N should be the same for Bridge 76S. And similarly for Bridges 77N and 77S, it is desired to have the same scope of work for both bridges.

No Action

This alternative would involve leaving the bridges in their current condition. A good rule of thumb for the “No Action” alternative is to determine whether the existing bridge can stay in place without any work being performed on it during the next 10 years. This is probably only a possibility for Bridge 77N. Bridges 76 N&S have a critical maintenance request which require at least a minimal amount of work in the near future. Bridge 77S is structurally deficient and needs work on the concrete deck. While Bridge 77N has a deteriorating deck and steel which needs paint, work was done on it recently such that it could last another 10 years without incident.

Since some work on three of the four bridges is required within the next 10 years, the complete No Action alternative will not be considered further in this report. An option considering the minimal amount of work necessary will be included.

Alternative 1: Rehabilitation

Bridge 77S is in poor condition. It should be assumed that a "patch" would be so extensive for this bridge, that a deck replacement would be more economical. Therefore, the rehabilitation alternative will only be considered for Bridge 76N and Bridge 76S.

This rehabilitation option includes the minimal amount of work necessary to extend the useful lives of the bridges. Appropriate guardrail would be installed under Bridges 76 N&S to protect the piers from vehicular impact. The loose concrete on the underside of Bridges 76 N&S would be removed and replaced.

After removing the deteriorated and loose concrete from the structure, forms are constructed such that a thin layer of new concrete can be placed to replace this removed concrete. There are several disadvantages with this method of rehabilitation in this situation. The first is that most of the patching is overhead; this requires the work to take place in difficult circumstances, where the work is taking place over Bay Rd, and the new concrete must be placed from underneath the bridge. Second, having newer non-chloride laced concrete adjacent to the existing concrete usually exacerbates the rate of deterioration of the remaining concrete which surrounds the patch. This can be mitigated for approximately 20 years with the addition of sacrificial anodes into the patched structure.

Any bridge seat repairs and substructure patching would be included on both bridges. All of the metallic bridge deck joints would be replaced with flexible joint material. Bearings would be evaluated and replaced as necessary.

Most of this work can be accomplished without impacting traffic on I-89. Individual lanes on Bay Rd may need to be closed while substructure and overhead repair work is occurring. Short-term lane closures on I-89 could be tolerated while the expansion joints are replaced.

This alternative will address the deterioration issues of the existing bridges. However, the structures will continue to be classified as functionally deficient because the curb to curb widths are less than 34'.

Alternative 2: Deck Replacement

Any bridge seat repairs and substructure patching would be included on all bridges. All of the metallic bridge deck joints would be replaced with flexible joint material. Bearings would be evaluated and replaced as necessary.

Short-term lane closures on I-89 could be tolerated while the expansion joints are replaced. The deck replacements would require the implementation of maintenance of traffic for I-89 traffic above and beyond short-term lane closures. The length of time required to remove and replace the entire concrete deck exceeds the length of time allowable for an off-site detour, and the deck replacement would not widen the superstructure enough to allow phased construction or cross-overs to accommodate two lanes of traffic in each direction. Thus, the replacing the entire deck at one time would require the installation of a two lane temporary bridge over Mallet's Creek.

However, another method of replacing the deck involves removing 8' sections of deck the entire width of the superstructure and replacing them with precast concrete deck panels. The deck sections could be replaced during nighttime construction while traffic is maintained on the off-site detour and the bridge could be opened to two lanes of traffic during each day. Assuming that 2

sections of precast deck panels could be installed on both bridges during the course of one night, this would require traffic to be maintained on US Route 7 during each night for 12 nights for each direction. Therefore, southbound traffic would be detoured onto US Route 7 for 12 nights while the decks on bridges 76 S and 77 S were replaced, then northbound traffic would be detoured onto US Route 7 for 12 nights while the decks on bridges 76 N and 77 N were replaced.

Before the closures, the existing bridge railing would be removed and temporary barrier would be installed. During each closure, the concrete deck would be cut, the sections of existing deck would be removed, and precast deck panels would be placed and grouted on to the girders. After the closures, a concrete bridge rail would be cast on the bridge deck before the temporary barrier is removed. In order to get the concrete truck on the bridge, the railing would need to be cast during the night, so the bridge could be reduced to one lane of traffic in that direction.

This alternative would remove the structurally deficient designation from Bridge 77S and address the deterioration issues of the other bridge. However, the structures will continue to be classified as functionally deficient because the curb to curb widths are less than 34'. In addition, appropriate guardrail would be installed under Bridges 76 N&S to protect the piers from vehicular impact.

Alternative 3: Superstructure Replacement

The inspection reports for all four bridges indicate that the decks are showing signs of advanced deterioration and the superstructure steel needs extensive cleaning and painting. The cleaning, surface preparation, containment and field painting of steel beams are much more difficult and expensive in the field than in the shop. Removing the deck from the existing beams without damaging the beams is difficult and the contractor is not able to reduce the cost of the demolition by salvaging the existing beams; this causes the demolition costs to be comparable between deck removal and superstructure removal as well. In addition, the length of time that the contractor needs to be at the site working on the bridge is longer for a deck replacement than for a complete superstructure replacement. Given all of these factors, when a bridge needs both a deck replacement and superstructure painting, it is sometimes more cost-effective to replace the entire superstructure.

This alternative would also include any bridge seat repairs and substructure patching required for all of the bridges. In addition, appropriate guardrail would be installed under Bridges 76 N&S to protect the piers from vehicular impact.

Traffic could be maintained at these sites with either a two lane temporary bridge or short-term road closures with off-site detours while utilizing accelerated bridge construction techniques. The superstructures could be widened a foot on each shoulder, but this would not be sufficient to accommodate cross-overs or phased construction while maintaining two lanes of traffic in each direction on I-89 during construction.

The work performed under this option would rectify all of the deficiencies of these sites except that the structures will continue to be classified as functionally deficient because the curb to curb widths are less than 34'.

Alternative 4: Complete Replacement

In order to rectify the substandard bridge widths, the bridges would need to be widened approximately 18 feet each, which would require new substructures. This alternative will examine bringing the bridges up to all geometric standards, by replacing all bridge components.

Because the final superstructures will be wider than the existing, phased construction is an option for maintaining traffic during construction as well as utilizing a temporary bridge. The geometry and constraints of the site do not lend themselves well to rapid construction in such a manner that short-term off-site detours could be utilized to replace the entire bridges.

The bridges should be widened at the left shoulder, as per the Interstate Scoping Guidelines. However, a minimum 15 foot lateral gap between the bridges should be maintained to allow for winter maintenance activities and inspection access with a "Snooper" truck. Additionally, expanding the corridor outside the existing footprint could have an impact on the two known Native American sites near Bridges 76 N&S, and will have a larger impact to the wetlands and watercourse surrounding Bridges 77 N&S. In addition, the weigh stations to the north of Bridges 76 N&S may need to be reconfigured if the corridor was widened to the outside of the existing footprint. With this configuration, the only method of maintain traffic during construction that will be considered with this alternative is phasing the construction activities, since there would not be enough room to place a two-way temporary bridge in the median.

This alternative would leave the sites with all features meeting the current standards when done.

V. Contracting Methods

Another method to accelerate bridge construction is to reduce the time it takes to plan, design, and bid a project. By using alternative contracting practices, the design and construction of a bridge can take place simultaneously. It the past, using traditional contracting methods, construction activities would not be able to start until after the design phase had ended. The following contracting methods have been considered:

Design/Bid/Build (DBB)

Design-Bid-Build is the conventional contracting method. A project is designed by the owner agency and once complete, is advertised for bidding and is awarded to the contractor with the lowest bid. This method of contracting can me more time consuming, since a contractor does not start any of the construction activities until after the low bid award process. DBB projects may have a higher incidence of change orders and claims due to concerns with constructability and a disconnect between the designers and the contractor.

Design/Build (DB)

Design-Build is a contracting method that is best to use when the project schedule is of upmost importance. A project is initially put out for bid to a designer/contractor team before the design process. The designer/contractor team is selected with consideration to both price and highest quality. Project delivery times are shortened since the final bid process is avoided and the contractor can engage in construction activities such as construction schedules and fabrication drawings concurrently with design. The Agency relinquishes control of design and construction practices, so DB can often lead to a more expensive construction project compared to the traditional DBB.

Construction Manager/General Contractor (CM/GC)

The Construction Manager / General Contractor (CM/GC) project delivery method allows an owner to engage a construction manager during the design process to provide constructability input. The CMGC contracting method is typically used to successfully implement new innovations in transportation construction. It is similar to DB as the contractor is part of the design team; the biggest difference is that the Agency would be part of the designer/contractor team. Additionally, the designer and contractor are chosen solely based on qualification rather than lowest price, which can lead to a more expensive project. Costs are also increased during the design phase due to collaboration with the construction manager. A higher preliminary design cost is justified by mitigating risks for high risk projects.

VI. Alternatives Summary

There are four options for maintaining traffic during this project and four alternatives for addressing some of the deficiencies at these sites. With the off-site detour option, there are also at least 3 methods of getting superstructures into their final location. Trying to turn all of these alternatives and options into an all-inclusive cost matrix would get overwhelming. Thus, some of the combinations will be eliminated before developing the matrix.

User Costs

The user costs associated with various maintenance of traffic alternatives have been developed based on the current traffic volumes at these sites and the current transportation costs. If the travel way is narrowed through the work zone during construction and the posted speed limit is changed from 65 mph to 55 mph, the cost incurred by the traveling public would run about $850 per day per direction of traffic. If I-89 is closed between exits 16 and 17 and traffic is detoured on to US Route 7, then the additional user costs are approximately $20,000 per day per direction of traffic for the entire day and $5,000 per day per direction for night time closures.

Maintenance of Traffic Costs

Cross-overs are not being considered for any of the construction alternatives, so only the remaining maintenance of traffic options with their approximate costs are listed below.

Option	Type	Description	Project Specific Construction Costs
1	Temporary Bridge	$500,000 per bridge site	$1,000,000
2	Phased Construction	5% premium on bridge costs @ $2.5 million per bridge plus sign package, UTOs, barrier, etc.	$650,000
3	Off-site Detour	$100,000 ABC premium plus sign package and UTOs, etc	$450,000

Table 1: Ballpark Maintenance of Traffic Costs

Alternative Comparisons

Since the user costs are similar for a temporary bridge and phased construction, if one only considers the least cost option, it is always better to phase construction at these sites then to utilize a temporary bridge to maintain traffic during construction. Thus, the alternatives where phasing is an option, temporary bridges will not be considered in the cost matrix.

Additionally, it is more cost effective for this project to close the bridge than it is to phase traffic if the closure periods are less than either 3 days or 12 consecutive nights.

The difference is even more pronounced between using a temporary bridge and night time closure work. Traffic can be detoured for about 100 nights before it is more cost-effective to utilize a temporary bridge to perform the same work.

Based on the previous discussion, existing site conditions, bridge conditions, and recommendations from the various resource groups, the alternatives being considered are:

<u>Bridges 76 North & South</u>
Alternative 1a: Rehabilitation with Traffic Maintained on an Offsite Detour
Alternative 1b: Rehabilitation with Traffic Maintained on a Temporary Bridge
Alternative 2a: Deck Replacement with an Offsite Detour
Alternative 2b: Deck Replacement utilizing a Temporary Bridge
Alternative 3a: Superstructure Replacement with an Offsite Detour
Alternative 3b: Superstructure Replacement utilizing a Temporary Bridge
Alternative 4: Complete Replacement with Traffic Maintained by Phasing

<u>Bridges 77 North & South</u>
Alternative 2a: Deck Replacement with an Offsite Detour
Alternative 2b: Deck Replacement utilizing a Temporary Bridge
Alternative 3a: Superstructure Replacement with an Offsite Detour
Alternative 3b: Superstructure Replacement utilizing a Temporary Bridge
Alternative 4: Complete Replacement with Traffic Maintained by Phasing

VII. Bridge 76 Cost Matrix

Colchester IM 089-3(69): Bridges 76 N&S		Do Nothing	Alt 1a	Alt 1b	Alt 2a	Alt 2b	Alt 3a	Alt 3b	Alt 4
			Rehabilitation		Deck Replacement		Superstructure Replacement		Complete Replacement
			Offsite Detour	Temp Bridge	Offsite Detour	Temp Bridge	Offsite Detour	Temp Bridge	Phasing
COST[1]	Bridge Cost	$0	$572,000	$572,000	$2,162,000	$1,962,000	$2,583,000	$2,547,000	$5,489,000
	Removal of Structure	$0	$0	$0	$330,000	$330,000	$330,000	$363,000	$484,000
	Roadway	$0	$133,000	$187,000	$532,000	$567,000	$574,000	$629,000	$1,352,000
	Maintenance of Traffic	$0	$90,000	$630,000	$180,000	$730,000	$180,000	$730,000	$450,000
	Construction Costs	$0	$795,000	$1,389,000	$3,204,000	$3,589,000	$3,667,000	$4,269,000	$7,775,000
	Construction Engineering + Contingencies	$0	$238,500	$416,700	$961,600	$1,076,700	$1,100,100	$1,280,700	$2,332,500
	Total Construction Costs w CEC	$0	$1,033,500	$1,805,700	$4,165,200	$4,665,700	$4,767,100	$5,549,700	$10,107,500
	Preliminary Engineering[2]	$0	$198,8000	$347,300	$801,000	$897,300	$916,800	$1,067,300	$1,943,800
	Right of Way	$0	$0	$0	$0	$0	$0	$0	$0
	Total Project Costs	$0	$1,232,300	$2,153,000	$4,966,200	$5,563,000	$5,683,900	$6,617,600	$12,051,300
SCHEDULING	Project Development Duration[3]	N/A	2 years	2 years	2 years	2 years	2 years	2 years	4 years
	Construction Duration	N/A	6 months	18 months	9 months	18 months	18 months	24 months	30 months
	Closure Duration (If Applicable)	N/A	N/A	N/A	12 ~ nights	N/A	4 ~ 3 day periods	N/A	N/A
ENGINEERING	Typical Section - Roadway (feet)	4-12-12-10	4-12-12-10	4-12-12-10	4-12-12-10	4-12-12-10	4-12-12-10	4-12-12-10	4-12-12-10
	Typical Section - Bridge (feet)	3-12-12-3	3-12-12-3	3-12-12-3	4-12-12-4	4-12-12-4	4-12-12-4	4-12-12-4	16-12-12-10
	Geometric Design Criteria	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
	Traffic Safety	No Change	No Change	No Change	Slightly Improved	Slightly Improved	Slightly Improved	Slightly Improved	Improved
	Alignment Change	No	No	No	No	No	No	No	No
	Bicycle Access	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
	Hydraulic Performance	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
	Pedestrian Access	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
	Utility	No	No	No	No	No	No	No	Yes
OTHER	ROW Acquisition	No	No	No	No	No	No	No	No
	Road Closure	No	No	No	Yes	No	Yes	No	No
	Design Life	<10 years	15 years	15 years	40 years	40 years	40 years	40 years	100 years

[1] Costs are estimates only, used for comparison purposes.
[2] Preliminary Engineering Costs are estimated starting from the end of the Project Definition Phase.
[3] Project Development Durations start from the end of the Project Definition Phase.

VIII. Bridge 77 Cost Matrix

Colchester IM 089-3(69): Bridges 77 N&S		Do Nothing	Alt 1a	Alt 1b	Alt 2a	Alt 2b	Alt 3a	Alt 3b	Alt 4
			Rehabilitation		Deck Replacement		Superstructure Replacement		Complete Replacement
			Phasing	Temp Bridge	Offsite Detour	Temp Bridge	Offsite Detour	Temp Bridge	Phasing
COST[4]	Bridge Cost	$0	Rehabilitation option is not		$2,456,000	$2,256,000	$3,006,000	$3,013,000	$6,517,500
	Removal of Structure	$0			$389,000	$389,000	$389,000	$428,000	$570,000
	Roadway	$0	being considered for		$677,000	$723,000	$732,000	$802,000	$1,564,000
	Maintenance of Traffic	$0			$180,000	$838,000	$180,000	$838,000	$450,000
	Construction Costs	$0	Bridges 77 N&S due to the		$3,702,000	$4,206,000	$4,307,000	$5,081,000	$9,101,500
	Construction Engineering + Contingencies	$0			$1,110,060	$1,261,800	$1,292,100	$1,524,300	$2,730,500
	Total Construction Costs w CEC	$0	poor deck condition of		$4,812,600	$5,467,800	$5,599,100	$6,605,300	$11,832,000
	Preliminary Engineering[5]	$0			$925,500	$1,051,500	$1,076,800	$1,270,300	$2,275,400
	Right of Way	$0	Bridge 77S		$0	$0	$0	$0	$0
	Total Project Costs	$0			$5,738,100	$6,519,300	$6,675,900	$7,875,600	$14,107,400
SCHEDULING	Project Development Duration[6]	N/A	N/A		2 years	2 years	2 years	2 years	4 years
	Construction Duration	N/A	N/A		9 months	18 months	18 months	24 months	30 months
	Closure Duration (If Applicable)	N/A	N/A		12 ~ nights	N/A	4 ~ 3 day periods	N/A	N/A
ENGINEERING	Typical Section - Roadway (feet)	4-12-12-10	N/A		4-12-12-10	4-12-12-10	4-12-12-10	4-12-12-10	4-12-12-10
	Typical Section - Bridge (feet)	3-12-12-3	N/A		4-12-12-4	4-12-12-4	4-12-12-4	4-12-12-4	16-12-12-10
	Geometric Design Criteria	No Change	N/A		No Change	No Change	No Change	No Change	No Change
	Traffic Safety	No Change	N/A		Slightly Improved	Slightly Improved	Slightly Improved	Slightly Improved	Improved
	Alignment Change	No	N/A		No	No	No	No	No
	Bicycle Access	No Change	N/A		No Change	No Change	No Change	No Change	No Change
	Hydraulic Performance	No Change	N/A		No Change	No Change	No Change	No Change	No Change
	Pedestrian Access	No Change	N/A		No Change	No Change	No Change	No Change	No Change
	Utility	No	N/A		No	No	No	No	Yes
OTHER	ROW Acquisition	No	N/A		No	No	No	No	No
	Road Closure	No	N/A		Yes	No	Yes	No	No
	Design Life	<10 years	N/A		40 years	40 years	40 years	40 years	100 years

[4] Costs are estimates only, used for comparison purposes.
[5] Preliminary Engineering Costs are estimated starting from the end of the Project Definition Phase.
[6] Project Development Durations start from the end of the Project Definition Phase.

IX. Conclusion

Bridge 76 N&S: The recommendation is to proceed with Alternative 2a: Deck Replacement with Night Time Closures and Traffic Maintained on an Off-site Detour.

Bridge 77 N&S: The recommendation is to proceed with Alternative 2a: Deck Replacement with Night Time Closures and Traffic Maintained on an Off-site Detour.

Discussion:
The superstructures and substructures are rated in satisfactory condition and it is reasonable to assume that these components can last another 40 years. All four decks however are in poor to fair condition and, as such, the decks should be addressed for this project. The decks are leaking as evident by water staining on the deck soffits. Deck patching was only considered for bridges 76N and 76S due to the poor deck condition of bridge 77S. There are portions of bridge 76N and 76S that appear to be at a risk for full depth pop outs, and the inspection report indicated that rapid deterioration is taking place; if a deck patching project were pursued it is possible that more concrete would need to be replaced than expected. Additionally, there are savings to be found by replacing all four decks through economy of scale. All four bridge decks are proposed to have the same deck widths; therefore, the same forms for the precast deck panels can be used for all four bridges.

Construction Methods
Replacing the deck involves removing 8' sections of deck at a time, the entire width of the superstructure, and replacing them with precast concrete full width deck panels. By constructing the bridges in piecemeal like this, the closure durations can be limited to off peak night hours. The bridges will be closed at night, and part of the deck will be removed and replaced; the bridges would then be opened in the morning for traffic and closed again in the evening to remove and replace more sections of the decks. During the night time closures, traffic will be maintained on the off-site detour and the bridges will be opened to two lanes of traffic during each day. Assuming that 2 sections of precast deck panels could be installed during the course of one night, this would require traffic to be maintained on US Route 7 during each night for 12 nights. It is recommended that a traffic control study be done prior to any closures to assess the impact that detouring off peak interstate traffic onto US Route 7.

Before the closures, the existing bridge railing would be removed and temporary barrier would be installed. During each closure, the concrete deck would be cut, the sections of existing deck would be removed, and precast deck panels would be placed and grouted onto the girders. After the closures, a concrete bridge rail would be cast on the bridge deck before the temporary barrier is removed. In order to get the concrete truck on the bridge, the railing would need to be cast during the night, so the bridge could be reduced to one lane of traffic in that direction. Once all precast panels are placed, they should be longitudinally post-tensioned.

Traffic Maintenance
In order to replace the decks, traffic will be detoured off I-89 onto US Route 7 during several weeks of night time work. Another advantage to replacing all four decks for this project is that the closure duration will remain unchanged by replacing the decks on bridges 76 N&S as well. It is proposed the once the southbound segment is closed, that both 76S and 77S are worked on simultaneously, and vice versa for when the northbound segment is closed. By doing this, the traffic impacts by closing this section of road are only felt once by the traveling public. If the

patching option were chosen for bridges 76N and 76S then the public would be subjected to another closure, or a temporary bridge would have to be placed in 15 years, when the deck patching fix comes to the end of its useful design life.

Based on the traffic volumes of both I-89 and US Route 7, it is recommended that southbound Interstate traffic be detoured between 8^{PM} and 5^{AM} Monday thru Friday and between 8^{PM} and 7^{AM} Weekends. It is recommended that northbound Interstate traffic be detoured between 9^{PM} and 6^{AM} Monday thru Friday and between 8^{PM} and 8^{AM} Weekends. These are initial estimates of closure timeframes; a detailed traffic study should be done prior to any closures, in order to confirm these time windows.

During the removal and replacement of deck sections over traffic lanes on Bay Road, traffic on Bay road will be reduced to one lane to avoid overhead work. Bay road would likely be reduced to one lane for 3 nights for work on 76N and 3 nights for work on 76S.

Contracting

It is recommended that the project is designed using conventional methods, and that Design/Build not be used. Additionally, because of the high risk and innovative nature of the project: using deck panels, which have not been widely used for construction in Vermont, as well as the potentially high impact to traffic if the bridges are not opened by the required time each day, construction can be better managed by using the Construction Manager/General Contractor (CM/GC) process.

Summary

In many situations, the deterioration is significant enough that rehabilitation is not an option, or the costs for mobilization and traffic control make the option cost prohibitive. In this case, the rehabilitation work can be done now for a reasonable cost and the superstructures or complete bridges can be replaced in about 40 years. When the bridges are replaced in the future, they could be brought up to the current design standards in regards to width. In addition to the deck replacement and substructure patching, the superstructure steel needs extensive cleaning and painting. The steel beams should be cleaned and painted at a later date as part of a separate corridor painting project. Additionally, as part of the deck replacement project, appropriate guardrail will be installed under Bridges 76 N&S to protect the piers from vehicular impact, and each of the bridge bearings will be evaluated and replaced as necessary.

X. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Reports and Critical Maintenance Requests
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Hazardous Waste Sites
- Archaeology Memo
- Historic Memo
- Utility Information

- Local Input
- Crash Data
- Traffic Data
- Detour Route
- Plans
    - Existing Conditions
    - Proposal
        - Typical Sections
        - Layout
        - Profile
    - Temporary Bridge Layout

Deck Deterioration Bridge 76N

Deck and Pier Deterioration Bridge 76S

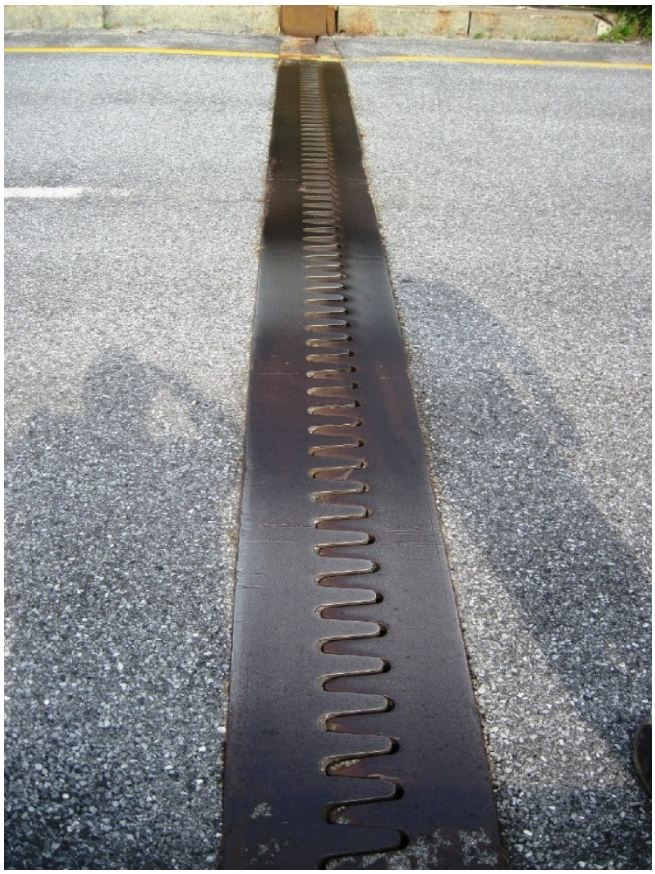
Deck Deterioration Bridge 77N

Deck Deterioration Bridge 77S

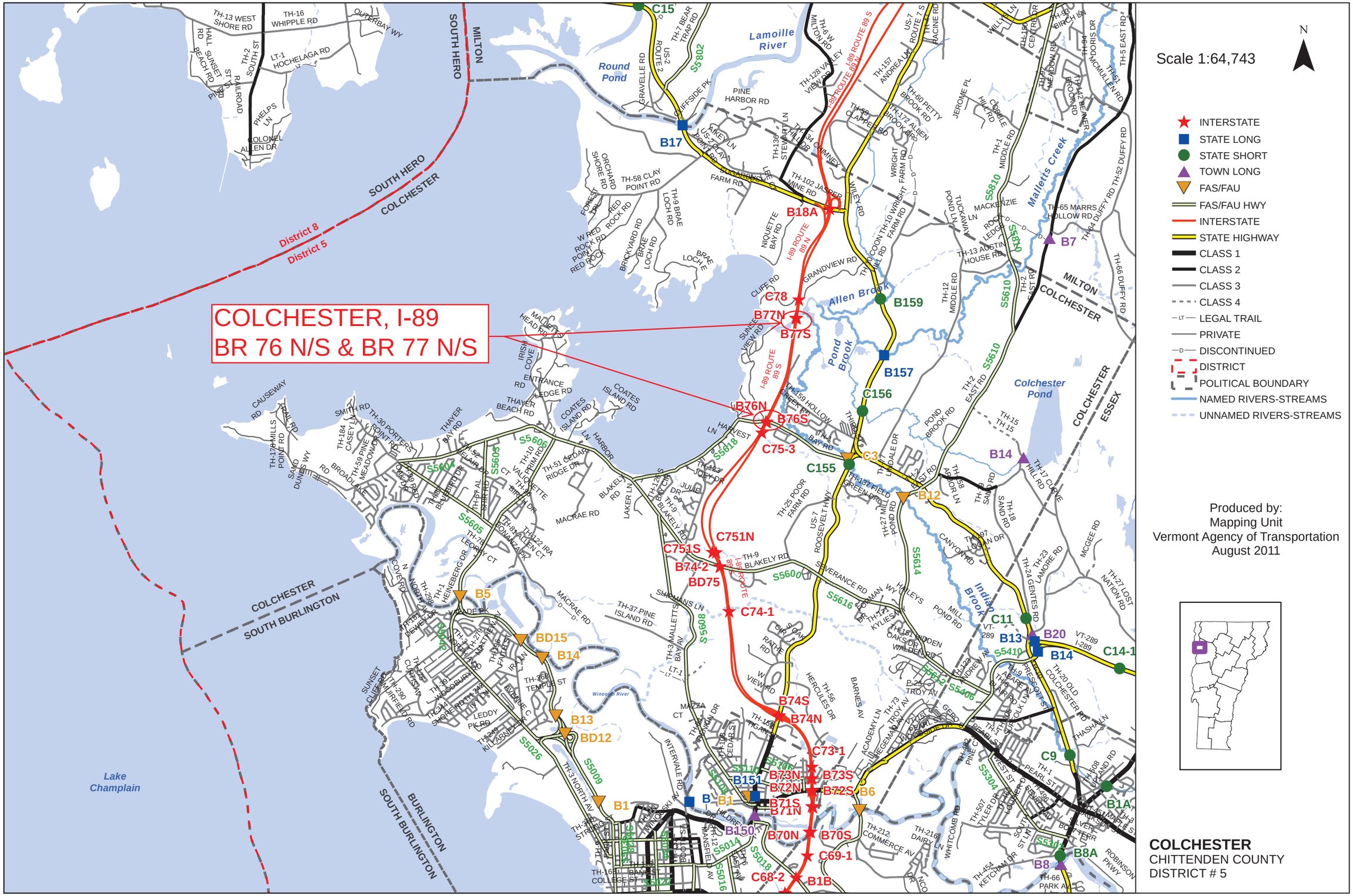
Looking east under Bridge 76 N&S

Looking north along Bridge 77S

Broken Vermont Joint Bridge 76N



Pinched Finger Plate Joint Bridge 77N


COLCHESTER, I-89
BR 76 N/S & BR 77 N/S
Scale 1:64,743
N
INTERSTATE
STATE LONG
STATE SHORT
TOWN LONG
FAS/FAU
FAS/FAU HWY
INTERSTATE
STATE HIGHWAY
CLASS 1
CLASS 2
CLASS 3
CLASS 4
LEGAL TRAIL
PRIVATE
DISCONTINUED
DISTRICT
POLITICAL BOUNDARY
NAMED RIVERS-STREAMS
UNNAMED RIVERS-STREAMS
Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011
COLCHESTER
CHITTENDEN COUNTY
DISTRICT # 5
Lake Champlain
Round Pond
Lamoille River
Allen Brook
Pond Brook
Colchester Pond
Mallets Creek
Indian Brook
SOUTH HERO
MILTON
COLCHESTER
District 8
District 5
SOUTH BURLINGTON
BURLINGTON
ESSEX
C15
B17
B18A
C78
B77N
B77S
B76N
B76S
C75-3
C751N
C751S
B74-2
BD75
C74-1
B74S
B74N
C73-1
B73N
B73S
B72N
B72S
B71S
B71N
B70N
B70S
C69-1
C68-2
B1B
B159
B157
C156
C155
C3
B12
B14
B7
B20
B13
C11
C14-1
C9
B1A
B8A
B8
B5
BD15
B14
B13
BD12
B1
B151
B150
B6

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for COLCHESTER **bridge no.:** 0076N **District:** 5

Located on: I 00089 ML **ove** I 89 OVER TH NO 1 **approximately** 2.6 MI S EXIT 17 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 5 FAIR

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 6 SATISFACTORY

Channel Rating: N NOT APPLICABLE

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200089076N04052

Federal Sufficiency Rating: 074.1

Deficiency Status of Structure: FD

AGE and SERVICE

Year Built: 1964 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 1 HIGHWAY

Lanes On the Structure: 02

Lanes Under the Structure: 02

Bypass, Detour Length (miles): 01

ADT: 013350 **% Truck ADT:** 08

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0068

Structure Length (ft): 000157

Lt Curb/Sidewalk Width (ft): 0.7

Rt Curb/Sidewalk Width (ft): 0.7

Bridge Rdwy Width Curb-to-Curb (ft): 30

Deck Width Out-to-Out (ft): 35

Appr. Roadway Width (ft): 036

Skew: 19

Bridge Median: 1 OPEN MEDIAN

Min Vertical Clr Over (ft): 99 FT 99 IN

Feature Under: HIGHWAY BENEATH STRUCTURE

Min Vertical Underclr (ft): 16 FT 02 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: 3-SP CONT. ROLLED BM

Number of Approach Spans 0000 **Number of Main Spans:** 003

Kind of Material and/or Design: 4 STEEL CONTINUOUS

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: 6 EQUAL TO MINIMUM CRITERIA

Waterway Adequacy: N NOT OVER WATER

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: N NOT OVER WATERWAY

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 4 H 20

INSPECTION and CROSS REFERENCE

X-Ref. Route: FAS 0223

Insp. Date: 062014 **Insp. Freq. (months)** 24 **X-Ref. BrNum:** 0001B

INSPECTION SUMMARY and NEEDS

06/12/2014 - Bridge deck has advancing deterioration and needs to be programmed for replacement within the next 10 years. Sliding plate joint leaks heavily at the southern abutment and is causing deterioration along the steel superstructure and substructure. Plate joint is secure for now, but consider removing completely, as it may come loose again before the deck is replaced. South abutment bearing seat and the northern pier cap needs some concrete repair work. Standard heavy guard rail along the outside of the corner to protect the northern pier columns from impact is needed ~ MJ/JS

01/06/2012 & 06/19/2012 - Update: Driving lane portion of steel plate joint failed. Cut out and removed by bridge crew and pending repair this coming spring. ~ MJ/DK Deck should be considered for replacement in the next 10 years as the soffit is showing signs of advanced deterioration with progressive contamination. Steel superstructure needs extensive cleaning and painting. The northern pier also needs some concrete repair work to correct pending spalls. Standard heavy guard rail along the outside of the corner to protect the pier columns from impact is needed. CM sent. ~ MJ/DK

The deck is in poor condition with continued deterioration and extensive saturation of the soffit. Beams need cleaning and painting. Abutment 1, pedestal 5's bridge seat needs to be patched. 5/12/10 DCP

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for COLCHESTER **bridge no.:** 0076S **District:** 5

Located on: I 00089 ML **ove** I 89 OVER TH NO 1 **approximately** 2.6 MI S EXIT 17 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 5 FAIR

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 6 SATISFACTORY

Channel Rating: N NOT APPLICABLE

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200089076S04052

Federal Sufficiency Rating: 074.1

Deficiency Status of Structure: FD

AGE and SERVICE

Year Built: 1964 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 1 HIGHWAY

Lanes On the Structure: 02

Lanes Under the Structure: 02

Bypass, Detour Length (miles): 01

ADT: 013350 **% Truck ADT:** 08

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0068

Structure Length (ft): 000157

Lt Curb/Sidewalk Width (ft): 0.7

Rt Curb/Sidewalk Width (ft): 0.7

Bridge Rdwy Width Curb-to-Curb (ft): 30

Deck Width Out-to-Out (ft): 35

Appr. Roadway Width (ft): 036

Skew: 19

Bridge Median: 1 OPEN MEDIAN

Min Vertical Clr Over (ft): 99 FT 99 IN

Feature Under: HIGHWAY BENEATH STRUCTURE

Min Vertical Underclr (ft): 19 FT 03 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: 3 SP CONT ROLLED BM

Number of Approach Spans 0000 **Number of Main Spans:** 003

Kind of Material and/or Design: 4 STEEL CONTINUOUS

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: 6 EQUAL TO MINIMUM CRITERIA

Waterway Adequacy: N NOT OVER WATER

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: N NOT OVER WATERWAY

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 5 HS 20

INSPECTION and CROSS REFERENCE

X-Ref. Route: FAS 0223

Insp. Date: 062014 **Insp. Freq. (months)** 24 **X-Ref. BrNum:** 0001A

INSPECTION SUMMARY and NEEDS

06/12/2014 - Bridge deck has advancing deterioration and needs to be programmed for replacement within the next 10 years. Sliding plate joint leaks heavily at the southern abutment and is causing deterioration along the steel superstructure and substructure. Standard heavy guard rail along the outside of the corner to protect the northern pier columns from impact is needed ~ MJ/JS

06/19/2012 - Deck should be considered for replacement in the next 10 years as the soffit is showing signs of advanced deterioration with progressive contamination. Steel superstructure needs extensive cleaning and painting. The beam ends at the southern abutment need cleaning and painting now as that is where corrosion is the most prevalent and effectual. The piers also needs some concrete repair work to correct pending spalls. Standard heavy guard rail along the outside of the corner to protect the northern pier columns from impact is needed. CM sent. ~ MJ/DK

The deck is in poor condition with continued deterioration and extensive saturation of the soffit. Beams need cleaning and painting. The pedestal 5 bridge seat at abutment 1 needs to be patched. 5/12/10 DCP

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for COLCHESTER **bridge no.:** 0077N **District:** 5

Located on: I 00089 ML **ove** MALLETT'S CREEK **approximately** 1.3 MI S EXIT 17 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 5 FAIR

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 6 SATISFACTORY

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200089077N04052

Federal Sufficiency Rating: 076.4

Deficiency Status of Structure: FD

AGE and SERVICE

Year Built: 1964 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 01

ADT: 013350 **% Truck ADT:** 13

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0085

Structure Length (ft): 000185

Lt Curb/Sidewalk Width (ft): 0.7

Rt Curb/Sidewalk Width (ft): 0.7

Bridge Rdwy Width Curb-to-Curb (ft): 30

Deck Width Out-to-Out (ft): 35

Appr. Roadway Width (ft): 038

Skew: 00

Bridge Median: 1 OPEN MEDIAN

Min Vertical Clr Over (ft): 99 FT 99 IN

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: 3-SP CONT ROLLED BM

Number of Approach Spans 0000 **Number of Main Spans:** 003

Kind of Material and/or Design: 4 STEEL CONTINUOUS

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 9 TAR EMULSION

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 8 SLIGHT CHANCE OF OVERTOPPING ROADWAY

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 5 HS 20

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 062014 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

06/18/2014 - Bridge could use reconstruction when the southbound bridge is done which has a poor deck. The steel (if intended to be retained) needs extensive cleaning and painting. ~ MJ/JS

06/20/2012 - Deck has some progressive deterioration along the underside and the bridge should be scheduled for deck replacement in the next 10 years. Steel needs extensive cleaning and painting now. ~ MJ/DK

The deck continues to deteriorate. The deck needs to be replaced. The abutment 2 bridge seat was patched, the rocker bearings reset, and a new plastic trough added under the finger plate joint. There is a project for painting the beams. The short weep tubes need to be extended. 7/15/10 DCP

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for COLCHESTER **bridge no.:** 0077S **District:** 5

Located on: I 00089 ML **ove** MALLETT'S CREEK **approximately** 1.3 MI S EXIT 17 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 6 SATISFACTORY

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200089077S04052

Federal Sufficiency Rating: 074.3

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1964 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 01

ADT: 013350 **% Truck ADT:** 13

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0085

Structure Length (ft): 000185

Lt Curb/Sidewalk Width (ft): 0.7

Rt Curb/Sidewalk Width (ft): 0.7

Bridge Rdwy Width Curb-to-Curb (ft): 30

Deck Width Out-to-Out (ft): 35

Appr. Roadway Width (ft): 038

Skew: 00

Bridge Median: 1 OPEN MEDIAN

Min Vertical Clr Over (ft): 99 FT 99 IN

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: 3-SP CONT ROLLED BM

Number of Approach Spans 0000 **Number of Main Spans:** 003

Kind of Material and/or Design: 4 STEEL CONTINUOUS

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 9 TAR EMULSION

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 8 SLIGHT CHANCE OF OVERTOPPING ROADWAY

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 5 HS 20

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 062014 **Insp. Freq. (months)** 12 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

06/18/2014 - Bridge deck is rated as poor and is checked every 12 months for changes. Bridge needs reconstruction with a new deck. The steel (if intended to be retained) needs extensive cleaning and painting. ~ MJ/JS

08/09/2013 - 12 month cursory inspection for poor deck condition. No noticeable change from last inspection. Deck condition to remain as rated poor. Bridge needs reconstruction project for new deck. ~ MJ/JS

06/20/2012 - Deck has some progressive deterioration along the underside and the bridge should be scheduled for deck replacement within the next 10 years. Steel needs extensive cleaning and painting now. ~ MJ/DK

The deck continues to deteriorate. The deck needs replacing. The abutment 2 bridge seat was patched, the rocker bearings reset, and a new plastic trough added under the finger plate joint. There is a project for painting the beams. The short weep tubes need extending. 7/15/10 DCP

BRIDGE INSPECTION - CRITICAL MAINTENANCE REPORT

Colchester	I89	76N&S	5	I89 over Bay rd.	Three span rolled beam
TOWN	ROUTE	BRIDGE	DISTRICT	FEATURE CROSSED	TYPE OF STRUCTURE

PROBLEMS FOUND:

Rail protection

1. A lack of guard rail at 76N&S: Along Bay rd. to protect pier #2(N)

Urgency: Needs to be addressed

ACTION TAKEN:

_____

_____

_____

_____

_____

_____

DTA's INITIALS & DATE _____

Note: **Critical** (Immediate action required) **Semi-Critical** (Timely action required) **Needs to be Addressed**

Inspector(s) : **Matt Joy and Dave Kimball**
Inspection Date : **06/19/12**

Inspector(s) Comments : **A lack of guard rail along the northern side of Bay road, adjacent to pier #2 (north), coupled with the piers close vicinity to the edge of the roadway, leaves the pier unprotected from impact. Some standard heavy rail should be installed several feet along the edge of the roadway at each bridge.**

Return a copy of this form to Structures Section and Director of Operations after repairs have been completed.

Signature: _____
Structures Program Manager Date

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Christopher Williams, Structures Project Manager

FROM: David Willey, Hydraulics Project Supervisor

DATE: October 18, 2013

SUBJECT: Colchester IM 089-3(69), I89 Bridges 77 N & S over Mallets Creek
GPS coordinates: N 44.5717° W 73.1779°

We have completed our preliminary hydraulic study for the above referenced site, and offer the following information for your use:

The existing three span bridges were built in 1964. They have trapezoidal waterway openings over Mallets Creek. The piers are in the channel near the banks on each side. Water is often backed up through the site from Mallets Bay downstream. There is a large backwater and wetland area upstream.

Hydraulics at this site is affected by water backing up from Lake Champlain, during high water events on the lake. Based on record plans, the bottoms of beams are above elevation 110'. That is well above the Q100 water surface elevation of the lake. Based on some very approximate preliminary calculations, the bridges have adequate capacity to convey the water flowing down Mallets Creek. District 5 personnel confirmed there have been no hydraulic problems with these bridges and water has not been up to the beams or overtopped the roadway as far as they are aware.

The scope of the project is to replace the decks or superstructures of these bridges. There are no changes planned that would affect the hydraulics. Based on the available information and the project scope, we do not feel a comprehensive preliminary hydraulic study is warranted at this time. The existing bridges appear adequate hydraulically and the proposed project will have no affects hydraulically. A more comprehensive hydraulic study may be needed in the future if the scope of the project changes or if more detailed information is needed.

Please contact us if you have any questions or if we may be of further assistance.

DCW

cc: Hydraulics Project File via NJW
Hydraulics Chrono File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, P.E., Structures Project Manager

MLM CCB

From: Marcy Meyers, Geotechnical Engineer, via Christopher C. Benda, P.E., Soils and Foundations Engineer

Date: August 29th, 2013

Subject: Colchester IM 089-3(69) – BR # 76 N/S & BR 77 N/S Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Bridges 76 N/S and 77 N/S on I-89 in the Town of Colchester, VT. Bridge # 76 crosses over TH 1 (Bay Road) and Bridge # 77 crosses over Mallett's Creek. The subject project consists of replacing the existing three-span continuous steel rolled-beam bridges (total of 4 bridges for the north and southbound lanes). This report documents our initial search of historical information to determine the characteristics of the site. A number of materials were reviewed including: VTrans boring files and record plans, Agency of Natural Resources (ANR) Natural Resources Atlas, USDA Surficial Geologic maps, and VTrans Bridge Inspection Photos.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

Original record plans for the subject bridges, dated in 1964, were found on the DPR website as well as in the Structure's z-drive project folder. Soil information from these plans indicated a mix of clay, sand, and silt for both bridges. Bridge #76 is supported on treated timber piles (approximately 35 feet long for the NB bridge and approximately 30 feet long for the SB bridge) and Bridge #77 is supported on steel 12BP53 piles (approximately 40-55 feet long for the NB bridge and approximately 30-40 feet long for the SB bridge). Bedrock was not encountered for BR #76 during drilling operations, but was encountered for BR #77. However, SPT blow counts were not performed and it is unclear from the existing plans if the 12BP53 piles are driven to bedrock.

Additional surrounding projects were searched for in the Soils & Foundations' GIS based historical record of subsurface investigations which contains electronic records for the majority of borings completed in the past 10 years. An exploration of this map revealed three borings drilled for the South Burlington-Colchester IM CULV(23) project (located approximately 600 feet south of BR # 76 and 1.4 miles south of BR #77). Information from these borings revealed a mix of silty sand, sand, and clay. Bedrock was not encountered in any of these borings. Due to the distance away from BR #77 as well as the variability in exposed bedrock between the two bridges, this soil information should be considered ancillary.

2.2 Water Well Logs & USDA Soil Survey

The Agency of Natural Resources (ANR) documents and publishes all water wells that are drilled for residential or commercial purposes. Based on subsurface information reported by well drilling reports on file at ANR and the USDA web soil survey, the surficial geology in the vicinity of the subject area is expected to consist of a mix of sand, silt, and gravel.

Figure 1 contains the bridges for the subject project, the South Burlington-Colchester IM CULV(23) project, as well as surrounding well locations found using the ANR Natural Resources Atlas. Published online, the logs can be used to determine general characteristics of soil strata in the area. The soil description given on the logs is done in the field, by unknown personnel, and as such, should only be used as an approximation. The specific wells used to gain information on the subsurface conditions are highlighted by a red box. Three water wells within an approximate 2550 ft radius were used to get an estimate of the depth to bedrock likely to be encountered for BR #76 and two water wells within an approximate 1450 ft radius were used to get an estimate of the depth to bedrock likely to be encountered for BR #77.

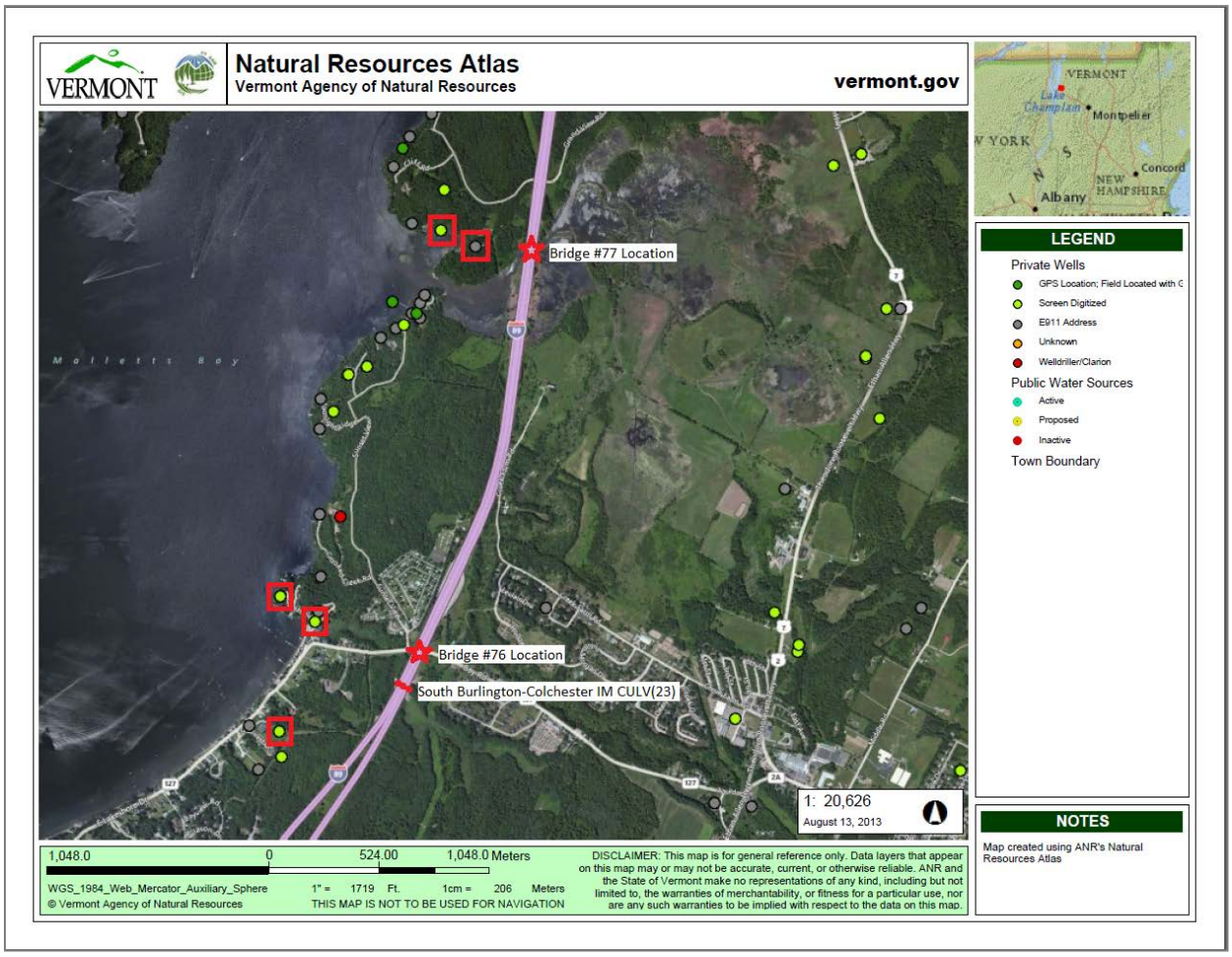


Figure 1. Highlighted Bridge and Well Locations

Table 1 lists the well sites used in gathering the surrounding information, and includes the approximate distance from the bridge project and depth to bedrock for Bridge #76.

Table 1. Well Information Including Depths to Bedrock for BR #76

Well Number	Approximate Distance From Project (feet)	Approximate Depth To Bedrock (feet)
157	1700	114
156	2350	40
85	2550	157

Information from these wells suggests that shallow bedrock may not be encountered during drilling operations. However, information about the bedrock, taken from the ANR Natural Resource Atlas, indicates "reddish-brown, pebbly, thin-to thick-bedded sandstone, orangey-gray-and buff-weathering well-bedded dolostone, and reddish-brown-weathering dolomitic quartzite". Based on the USDA Soil Map, the soils to be encountered at BR #76 are classified as a mix of Adams and Windsor loamy sands and trace escarpments, silty and clayey. The Adams and Windsor loamy sands are classified as somewhat excessively drained with 0-5% slopes, have a depth to bedrock greater than 80 inches, and a depth to groundwater greater than 80 inches. The trace escarpments, silty and clayey have a depth to bedrock greater than 80 inches and a depth to groundwater greater than 80 inches.

Table 2 lists the well sites used in gathering the surrounding information, and includes the approximate distance from the bridge project and depth to bedrock for Bridge #77. It should be noted that bedrock is expected to be encountered at a much shallower depth than for Bridge #76.

Table 2. Well Information Including Depths to Bedrock for BR #77

Well Number	Approximate Distance From Project (feet)	Approximate Depth To Bedrock (feet)
12375	890	10
134	1450	20

Information from these wells suggests the possibility of encountering shallow bedrock for BR #77. Information about the bedrock, taken from the ANR Natural Resource Atlas, indicates similar bedrock to Bridge #76. Based on the USDA Soil Map, the soils to be encountered at BR #77 are classified as a mix of Limerick silt loam, very wet and muck and peat. Both soils have a depth to bedrock greater than 80 inches and 0-1% slopes. The Limerick silt loam, very wet is classified as poorly drained and has a depth to groundwater of 0-18 inches. This soil is also classified as frequently flooding. The muck and peat has a depth to groundwater of around 0 inches and is classified as poorly drained.

2.4 Bridge Inspection Photos

2.4.1 Bridge # 76N: Based on the latest bridge inspection photos for BR # 76N dated June 2012, portions of the concrete have cracked and spalled and the steel beams need cleaning and repainting as seen in Figures 3 and 4.

Figure 3. BR #76N Cracked and Spalled Concrete

Figure 4. BR #76N Steel Beams Requiring Maintenance

2.4.2 Bridge # 76S: Based on the latest bridge inspection photos for BR # 76S dated June 2012, large portions of the steel beams require similar maintenance as BR #76N, as seen in Figure 5. In addition to the beams, the bearings for both bridges have shifted and deteriorated. Figure 6 shows a deteriorated bearing from BR #76N as well as spalled concrete with exposed rebar.

Figure 5. BR #76S Steel Beams Requiring Maintenance

Figure 6. BR #76S Deteriorated and Shifted Bearing with Spalled Concrete

2.4.3 Bridge #77 N: Based on the latest bridge inspection photos for BR # 77N dated June 2012, similar concrete spalling and beam corrosion was evident as seen in Figure 7.

Figure 7. Concrete Spalling and Beam Corrosion

2.4.4 Bridge #77 S: Based on the latest bridge inspection photos for BR #77S, dated June 2012, portions of the concrete deck have deteriorated as can be seen in Figure 8.

Figure 8. BR #77S Concrete Deck Deterioration

3.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on August 6th, 2013 to determine possible obstructions inhibiting boring operations and other site characteristics. Information from this visit indicated no above ground utilities present at the subject project. None of the abutments or piers for either bridge exhibited signs of undermining or erosion. The stream bed for BR #77 was very murky

and no cobbles or boulders were evident in the near vicinity. In addition, no erosion was evident along the banks of the stream bed.

4.0 RECOMMENDATIONS

An initial seismic site analysis was conducted in accordance with AASHTO LRFD Bridge Design Specification Section 3.10.2 using the original boring logs as well as using the "Seismic Hazard for the Burlington and Colchester, Vermont USGS 7-1/2 Minute Quadrangles" Report by John Lens et al. Given the information in the report as well as original boring logs, the subject project is probably classified as Class D/E. However, because the boring information is pretty minimal, we recommend additional borings be sampled using Standard Penetration Testing (SPT) to better facilitate a proper seismic site analysis as well as determine soil strata parameters for the new bridge design.

Depending on the proposed design, it may be feasible to reuse the existing substructures. Based on the most recent bridge inspection reports from June 19th and 20th, 2012, the super and substructure ratings for BR #76 N/S and BR #77S were rated as satisfactory while the super and substructure ratings for BR #77N were rated as good. However, because preliminary designs have not yet been developed, it is too early to determine whether or not the current substructures will meet the design criteria.

If new substructures do need to be built, we recommend integral abutments, stub abutments with spread footings founded on mechanically stabilized earth (MSE) walls, or reinforced concrete abutments on spread footings as possible foundation options. If this is the case, we recommend a minimum of two borings be taken at opposite corners of each bridge, as well as at the pier locations, in order to more fully assess the subsurface conditions at the site including, but not limited to, the soil properties, groundwater conditions, and depth to bedrock. If shallow bedrock is present, borings should be performed at all four corners of the bridge, and both corners of the piers, to get an idea of the bedrock profile across both the abutments and piers.

5.0 CONCLUSION

If you have any questions or would like to discuss this report, please contact us by phone at (802) 828-6911.

cc: WEA/Read File
CCB/Project File
MLM

VERMONT

State of Vermont
Program Development Division
One National Life Drive
Montpelier, VT 05633-5001
www.aot.state.vt.us

[phone] 802-828-3979
[fax] 802-828-2334
[ttd] 800-253-0191

Agency of Transportation

To: Jeff Ramsey, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 10/8/2013

Subject: Colchester IM 089-3(69) - Natural Resource ID

I have completed my natural resource scoping review for the above referenced project. My evaluation has included the following resources: wetlands, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed all existing mapped information and performed a site review of the project area.

The project involves the replacement of bridge 76-1 N&S and 77-1 N&S with new structures. The existing structures are 3 span continuous rolled beam bridges that span TH 1 (Bridges 76 -1N/S) and Mallett's Creek (Bridge 77-1 N/S). At this stage the scope of the project has not been determined although we expect that crossovers will be used to maintain traffic with whatever scope of work is determined. Resources were identified to include an area to accommodate crossovers.

Wetlands/Watercourses

Structure 76-1 N&S

There are wetlands within the project area within the southwest quadrant. Wetlands were identified at a resource ID level. This wetland would be considered class II and therefore, a 50' regulatory buffer would apply. Wetlands in the project area are palustrine scrub-shrub wetlands adjacent to the unnamed tributary to the west of the within the project area. I have identified boundaries with GPS and plotted on mapping. This file can be exported to a dgn file.

There is an unnamed tributary to the Lake Champlain (Mallets Bay) which flows westerly through the project area. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water and to wetlands. Once plans are conceptualized we can evaluate potential impacts on wetlands and waterways and evaluate project permits that will be required.

Structure 77-1 N&S

There are wetlands adjacent to the project area in all quadrants. The wetlands are associated with the confluence of several streams. The wetland complex is large and is defined as broad bottomland wetlands composed of deep emergent marsh, floodplain forest and red maple swamp. The wetland is classified as class II and would have a regulated 50' buffer. As this is a highly functional wetland complex almost all functions and

values would exist within this wetland complex. I have identified boundaries with GPS and plotted boundaries on mapping. This file can be exported to a dgn file and referenced on project plans.

Several stream confluences (Pond Brook, Allen Brook, Mallets Brook, and Indian Brook) enter Lake Champlain at this project location. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water and to wetlands. Once plans are conceptualized we can evaluate potential impacts on wetlands and waterways and evaluate project permits that will be required. Due to the sensitivity of the area I would highly recommend phasing this project to avoid any new alignments or temporary bridge requirements. In-stream timing restrictions (early spring) will likely be required due to spawning of a variety of fish species.

Wildlife Habitat

Structure 76-1 N&S

According to latest VT Fish and Wildlife mapping the area is mapped as low importance with regards to wildlife movement importance. The wetlands within the south western quadrant would have the most diversity of habitat for wildlife.

Structure 77-1 N&S

Exceptional wildlife habitat exists within this project area/corridor. This area has large wetland complexes that would support fisheries, migratory birds, aquatic species, small and large mammals, etc. Further evaluation of conceptual plans will determine potential impacts to species.

Rare, Threatened and Endangered Species

Structure 76-1 N&S

There is no mapped state threatened species within the project corridor. According the US Fish and Wildlife Service mapping, no federally listed species are present within the project area.

77-1 N&S

There are several rare, threatened and endangered species within this project corridor. If there are no waterway/wetland impacts there should not be impacts. If conceptual plans indicate the need for in water/wetland work a specialist will need to be contracted to confirm presence any rare, threatened or endangered plants/animals that locations so that avoidance, minimization, mitigation requirements are needed.

Agricultural Soils

Structure 76-1 N&S

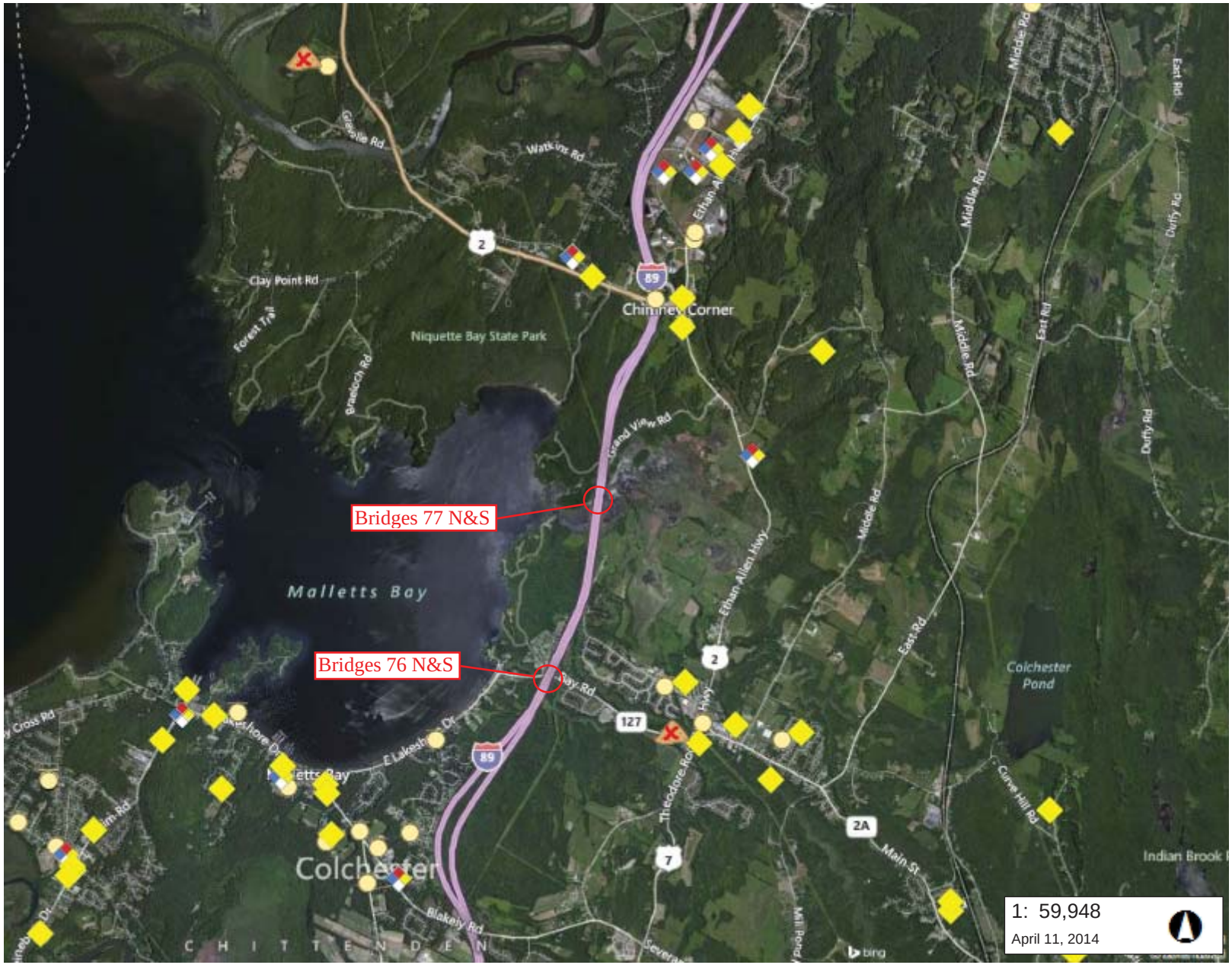
There are several soil types mapped within the project area. Winooski very fine sandy loam soils are mapped and are considered prime agricultural soils.

Structures 77-1 N&S
There are no prime agricultural soils within the project area.

Hazardous Waste Sites

Vermont Agency of Natural Resources

vermont.gov



LEGEND

Landfills
- OPERATING
- CLOSED

Hazardous Waste Site

Hazardous Waste Generators

Brownfields

Underground Storage Tank (w

Waste Water Facilities

NOTES

Map created using ANR's Natural Resources Atlas

3,045.0 0 1,522.00 3,045.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 4996 Ft. 1cm = 599 Meters

© Vermont Agency of Natural Resources

THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.

VERMONT

Jeannine Russell
VTrans Archaeology Officer
State of Vermont
Environmental Section
One National Life Drive
Montpelier, VT 05633-5001
www.aot.state.vt.us

[phone] 802-828-3981
[fax] 802-828-2334
[ttd] 800-253-0191

Agency of Transportation

To: Jeff Ramsey, Environmental Specialist

From: Jeannine Russell, VTrans Archaeology Officer

Date: October 22, 2013

Subject: Colchester IM 089-3(69) – Archaeological Resource ID

The scope of this project has not yet been determined but includes the areas surrounding Bridges 76 N/S and Bridges 77 N/S on I-89. An Archaeological Resources ID was completed on 10-1-13. For the purposes of this resource ID, a 200 foot radius around the bridges was used as the project area.

Bridges 76 N/S: Archaeologically sensitive areas exist within the NE and SE quads of the project area at Bridges 76 N/S. The sensitive area in the NE quad contains two known pre-contact (Native American) sites (VT-CH-52 and VT-CH-768). Please see attached map.

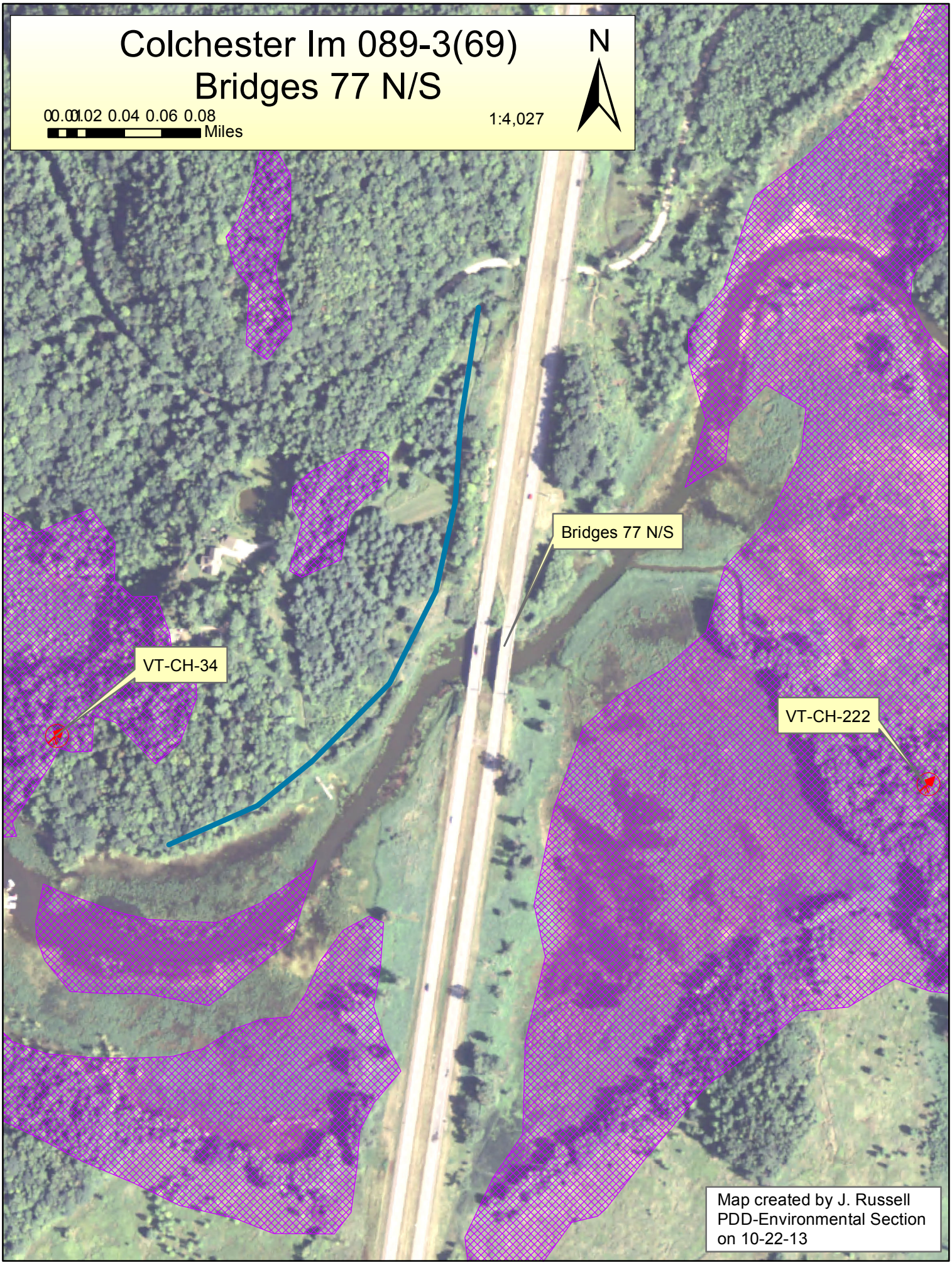
Bridges 77 N/S: Most of the area directly surrounding Bridges 77 N/S contains wetlands and existing water courses. However, higher elevations may contain archaeological sites. There were no sensitive areas directly within the project area; however, there are two known sites outside the project area. One site is located within an area in the NW quad. The area is identified on the attached map as being sensitive but it appears to be outside the immediate project area and should be easy to avoid. Please see attached map for Bridges 77 N/S.

Please contact me if you have any questions.

Thank you,
Jen Russell
VTrans Archaeology Officer

VTrans Working to Get You There
Vermont Agency of Transportation

Colchester IM089-3(69)
N
0.00750.0150.0300.0450.06
Miles
1:3,222
VT-CH-768
VT-CH-52
Map created by J. Russell
PDD-Environmental Section
on 10-16-13


Colchester Im 089-3(69)
Bridges 77 N/S
0 0.01 0.02 0.04 0.06 0.08
Miles
1:4,027
N
Bridges 77 N/S
VT-CH-34
VT-CH-222
Map created by J. Russell
PDD-Environmental Section
on 10-22-13

Colchester IM 089-3(69) Resource ID

Newman, Scott

Sent: Friday, October 04, 2013 10:57 AM
To: Ramsey, Jeff
Cc: Williams, Chris; O'Shea, Kaitlin; Spooner, Karen

Jeff,

I have completed the resource ID for this project and drawn resource boundaries on the ARC GIS layer, bookmarked under the project name.

Note there are no historic resources in the APE, but a Section 4(f) qualifying path does cross under the bridge as noted on the map.

Thanks,
Scott

D. Scott Newman
Historic Preservation Officer
Vermont Agency of Transportation
802.777.1572

Fillbach, Tim

From: Wheeler, Lawrence
Sent: Wednesday, September 11, 2013 10:42 AM
To: Williams, Chris
Cc: Symonds, Wayne
Subject: Colchester IM 089-3(69) - Request for Utility Information - PART # 2 of 2 - Bridges 76 NB & SB
Attachments: colchester [69] br 76 nb and sb sketch 1_0001.pdf; colchester [69] br 76 nb and sb sketch 2_0001.pdf

I have completed my field investigation, research and on-site meetings for the existing utility locations for the bridges in the above referenced project. I would like to report on each set of bridges individually, thus, this is PART # 2 of 2 of my report. I have been in contact with Colchester Public Works, Colchester Fire District # 2, Vermont Gas Systems, Inc. and numerous utility companies to determine location and ownership of the utilities within the project area. This information is summarized below:

Interstate 89 Bridges 76 NB and SB at MM Station 95.32

There is a VAOT Traffic Recorder (Weigh – in – motion) (WIM) near the northwest end of BR 76 S. There is a wired conduit which extends from the Traffic Recorder to and along the shoulder of the SB Lane; this conduit connects to sensors in the SB Lane near the north end of BR 76 S. This is not a utility item but you still need to know it's there.

There are also underground telephone and electric lines which connect into the Traffic Recorder; these underground feeds originate at an electric meter pedestal adjacent to the ROW fence near the Traffic Recorder and from the Utility Pole just across the ROW fence (see sketch #1). According to Green Mountain Power, this electric meter pedestal also provides power to the lights in the weigh station just to the north of the bridges; this electric line will need to be located by Dig-Safe.

There is also an electric meter pedestal near the northeast corner of BR 76 N which, according to GMP is owned by the VAOT and provides service to the street lights in the weigh station just to the north. The exact location of this buried line is unknown and will also have to be located by Dig-Safe.

The VAOT contact for any work involvement with this Traffic Recorder (WIM) is: **Carl Parton**
Telephone: (802)828-6584

carl.parton@state.vt.us

Aerial utilities in the vicinity of Bridges 76 NB and SB include:

- There is an aerial electric line (3 phase) which crosses both lanes of I-89 approximately 160 feet north of the existing bridges. This electric line is owned by Green Mountain Power. This electric utility line provides power to the two electric pedestal meters mentioned above.

- After this electric line crosses over I-89 it entends to a pole just beyond the ROW fence (where it then pole shares with a FairPoint cable) and immediately turns south and crosses over Bay Road, just to the east of BR 76S. From that point the aerial electric and telephone lines proceed to the west along the south side of Bay Road.

Underground utilities along Bay Road (passing under BR 76 N & S)

- There are 3 buried fiber optic cables which begin at the pole just to the east of BR 76 S, on the south side of Bay Road, which travel along the south side of Bay Road to the east. All three of these cables pass under the I-89 bridges.

- One of these cables is owned by Comcast, who in turn, leases fibers within the cable to Level 3 Communications. This cable is under the paved pedestrian/bicycle path a few feet north of the southern bridge piers. This cable location will need to be determined by Dig – Safe.

- The other two cables are owned by FairPoint; these cables pass within a foot or two of the existing southern bridge piers. There is only a 2.5 foot gap between the piers and the edge of bike/ped path and I believe that's where these cables are located. The path of these cables is further identified by the pedestals along the southerly edge of the bike/ped path. These cables will need to be located by Dig – Safe.

- There is an 8'' VCP water main along the northern side of Bay Road which is directly in under the 5 foot paved shoulder (approximately 5.5' deep). This water main is approximately 15 feet from the northern piers. According to Colchester Fire District # 2 there is also an old cast iron pipe which is very close to their water main which they believe is a drain from the junk yard just to the east on Bay Road. This drain pipe empties into the stream just to the west of Sunset View (the camp ground entrance). The Fire District has never been able to find the origin of this pipe but the water from it has an occasional ''gas'' smell.

Following is a list of contacts for this portion of the contract:

Mike Benjamin
Green Mountain Power Corporation

Telephone: (802) 655-8517

mike.benjamin@greenmountainpower.com

Address: 163 Acorn Lane Colchester, VT 05446

Laura Szabelski
FairPoint Communications

Telephone (802) 863-0703

lszabelski@fairpoint.com

Address: 800 Hinesburg Road South Burlington, VT 05403

Conrad Ritchie
Comcast Communications

Telephone: (802) 846-2414

conrad_ritchie@cable.comcast.com

Address: 96 Avenue B Williston, VT 05495

Mike Reilly
Level 3 Communications

Telephone: (802) 846-1666

mike.reilly@level3.com

Address: 120 Kimball Ave. Suite 210 South Burlington, VT 05403-6837

Even though there are no municipal sewer mains or gas mains in close proximity to the bridge I am going to provide the contact information for these utility owners just in case you should need it.

Bryan Osborne
Town of Colchester Public Works Director

Telephone: (802) 264-5625

bosborne@colchestervt.gov

Address: 781 Blakely Road P.O. Box 55 Colchester, VT 05446

Tim Vachereau
Vermont Gas Systems, Inc.

Telephone: (802) 951-0335

tvachereau@vermontgas.com

Address: P.O, Box 467 Burlington, VT 05402-0335

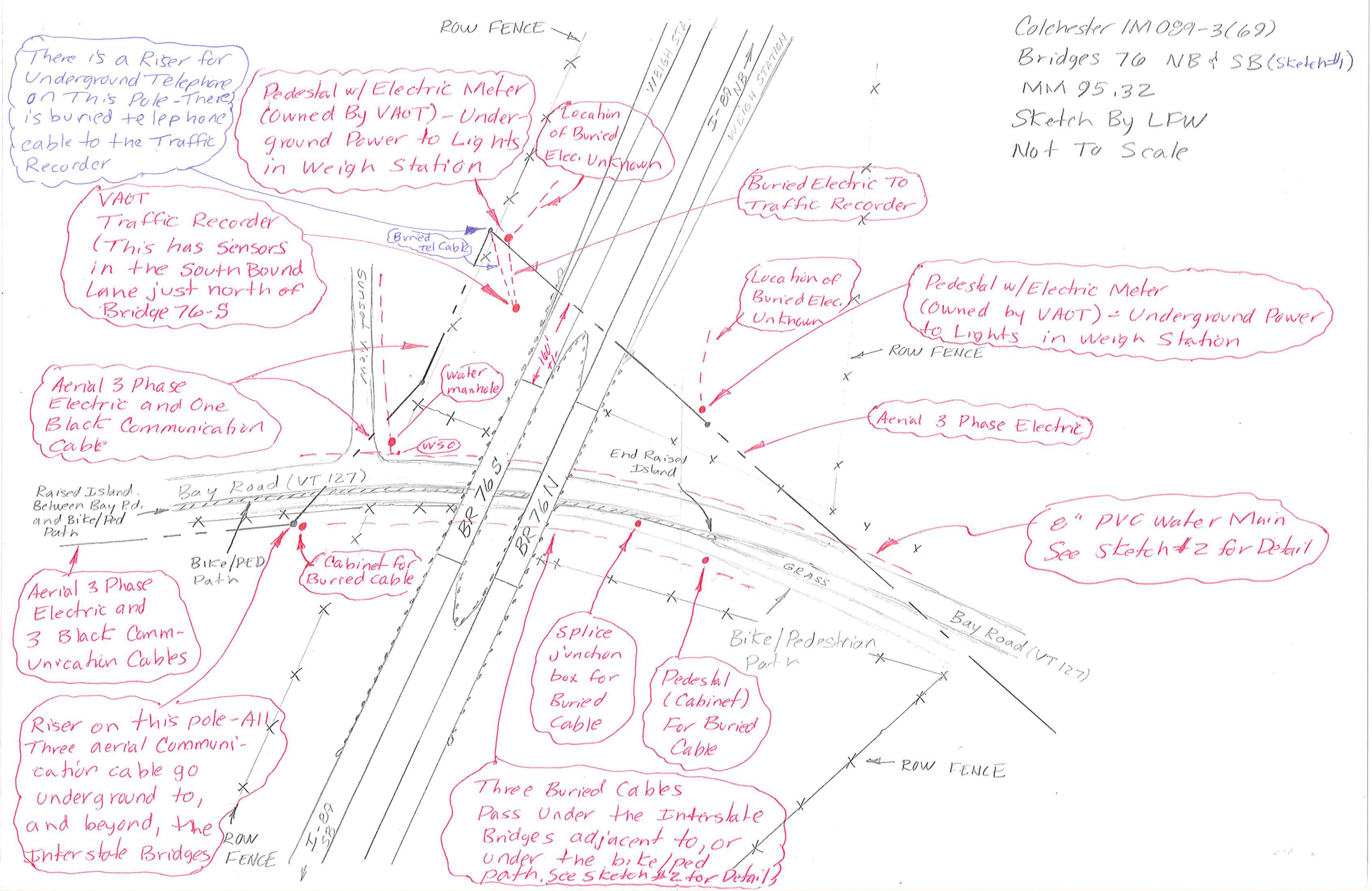
Lawrence Wheeler, Senior Technician

Greenman-Pedersen, Inc.
Engineering and Construction Services

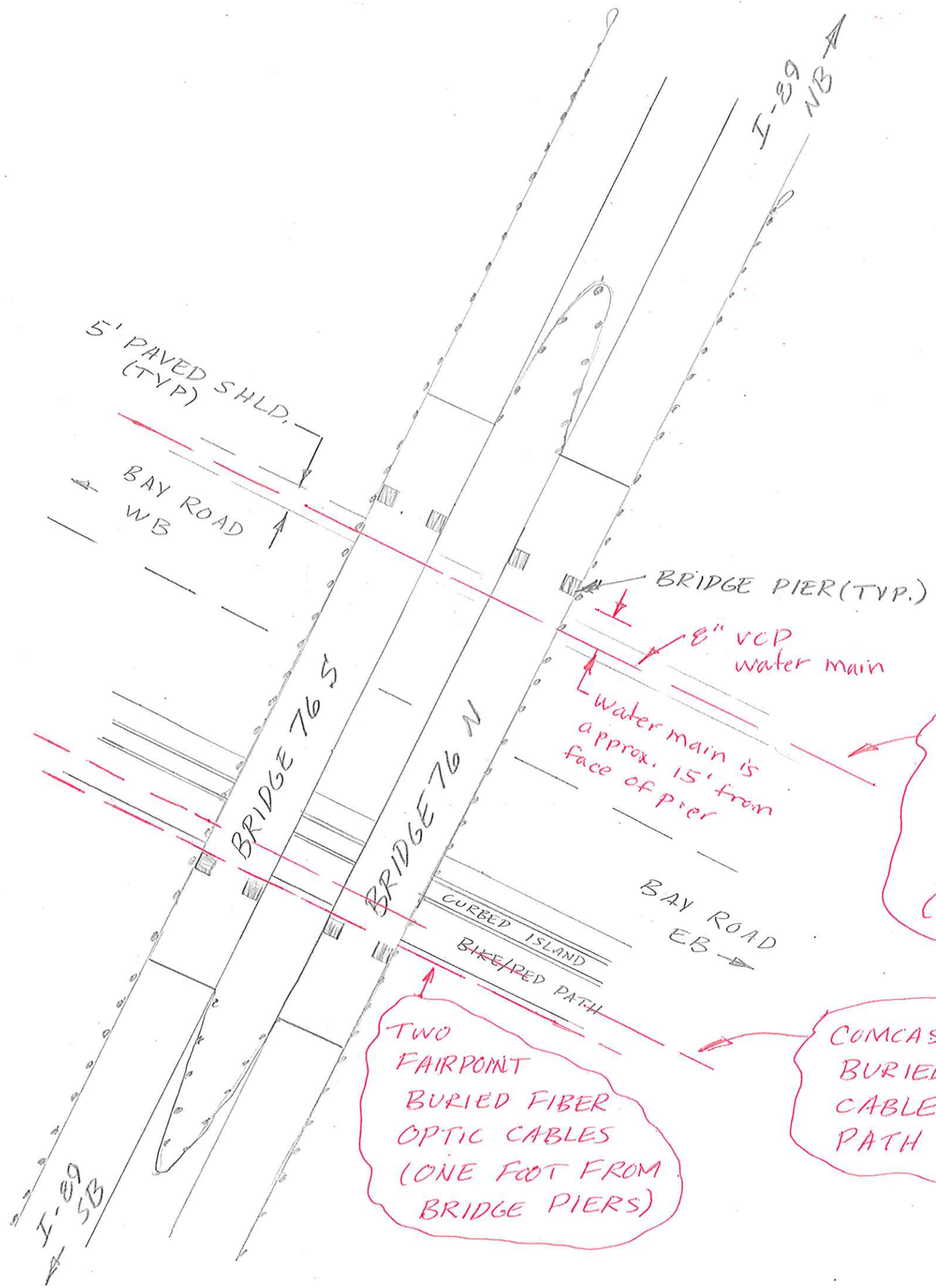
Vermont Agency of Transportation
Structures Section
One National Life Drive
Montpelier, VT 05633-5001

Cell (802) 498-8418
lwheeler@gpinet.com
lawrence.wheeler@state.vt.us

Colchester IM 089-3(69)
Bridges 76 NB & SB (Sketch #1)
MM 95.32
Sketch By LFW
Not To Scale



Colchester
IM089-3(69)
BRIDGES 76NB&SB
(Sketch #2)
MM 95.32
Sketch by LFW
Not To Scale



Fillbach, Tim

From: Wheeler, Lawrence
Sent: Tuesday, September 10, 2013 7:54 AM
To: Williams, Chris
Cc: Symonds, Wayne; Corbett, Shaun
Subject: Colchester IM 089-3(69) - Request for Utility Information - PART # 1 - Bridges 77 NB & SB
Attachments: bridge 77 nb and sb sketch of existing utilities_0001.pdf

I have completed my field investigation and research of the existing utility locations for the bridges in the above referenced project. I would like to report on each set of bridges individually, thus, this is PART # 1 of my report.

Interstate 89 Bridges 77 NB and SB at MM Station 96.6

There are not really existing utilities within close proximity to this bridge. The bulk of the utilities within this area (Buried Fiber Optic Cable, Water Mains, Sewer Mains and Gas Mains) run along U.S. Route 7 which parallels I-89 a substantial distance to the east. I have been in contact with Colchester Public Works, Colchester Fire District # 2 and Vermont Gas Company. None of these parties have any facilities close to the bridges.

In the vicinity of Bridges 77 NB and SB the existing utilities include:

- There is an aerial electric line (3 phase) which crosses both lanes of I-89 at MM Station 96.15, approximately 2,400 feet south of the existing bridges. This electric line is owned by Green Mountain Power. This should be well outside of the project area.

- At this same MM Station there is a buried fiber optic cable which crosses both lanes of I-89 that is owned by FairPoint. This buried cable should also be well outside of the project area. In the event that a cross over is constructed to facilitate construction you should be aware of this cable location.

- On the westerly side of Interstate 89 there is an aerial electric line which crosses the marsh and eventually reaches Grand View Road north of the bridge. This electric line (which is owned by GMP) is approximately 450 feet west of the bridges (see attached sketch).

- On the easterly side of Interstate 89 there is an aerial electric transmission line which crosses the marsh and eventually passes over both barrels of I-89 approximately 0.20 miles north of the existing bridges. This electric line is owned by GMP; attached to the poles of the transmission line there is a communication cable which is owned by Vermont Transco. This aerial transmission line and communication cable are approximately 650 feet east of the existing bridges (see the attached sketch).

Following is a list of contacts for this portion of the contract:

Mike Benjamin
Green Mountain Power Corporation

Telephone: (802) 655-8517

mike.benjamin@greenmountainpower.com

Address: 163 Acorn Lane Colchester, VT 05446

Laura Szabelski
FairPoint Communications

Telephone (802) 863-0703

lszabelski@fairpoint.com

Address: 800 Hinesburg Road South Burlington, VT 05403

John R. Stamator
Vermont Transco, LLC – VELCO

Telephone: (802) 342-0077

Address: 366 Pinnacle Ridge Road Rutland, VT 05701

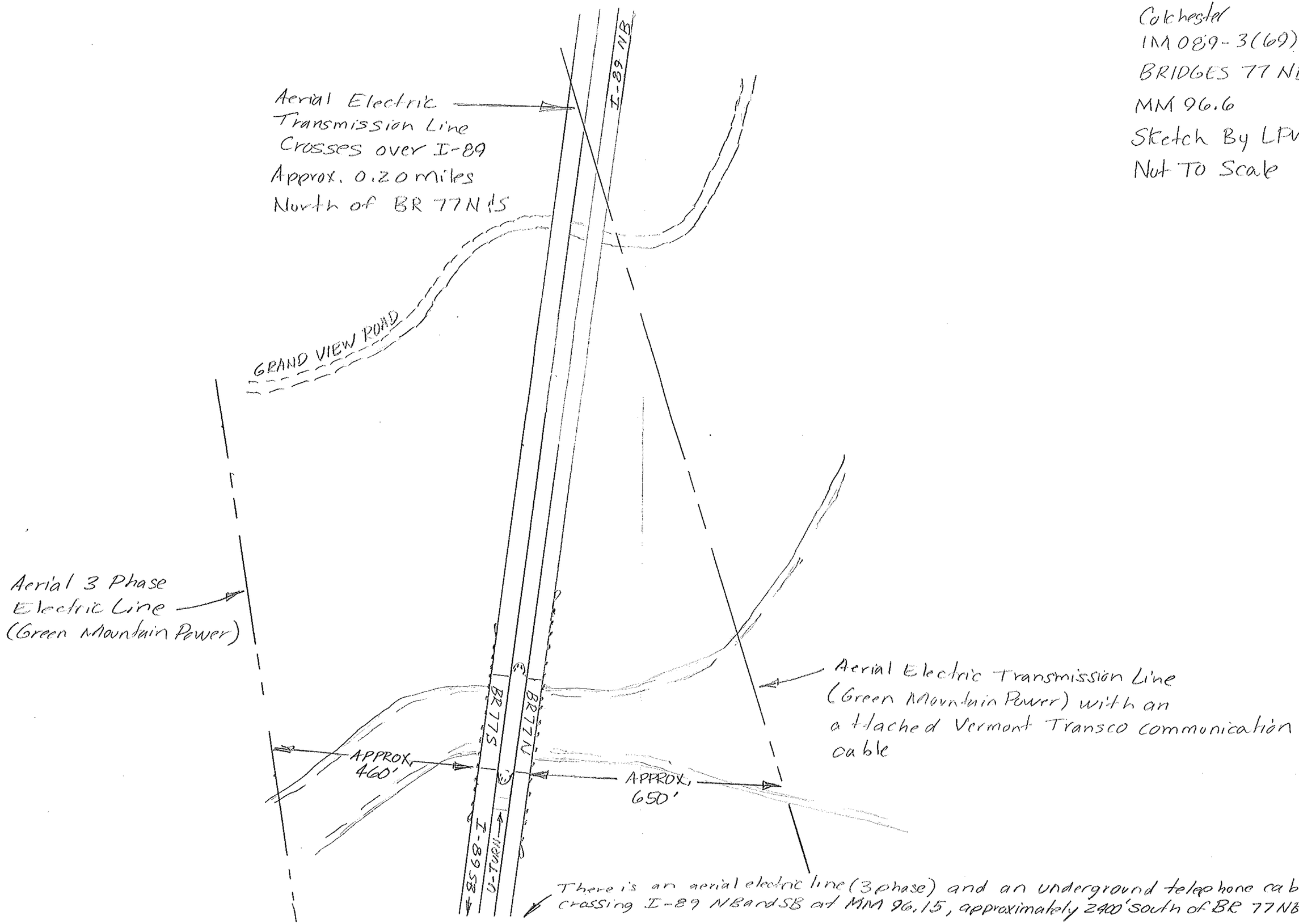
Lawrence Wheeler, Senior Technician

Greenman-Pedersen, Inc.
Engineering and Construction Services

Vermont Agency of Transportation
Structures Section
One National Life Drive
Montpelier, VT 05633-5001

Cell (802) 498-8418
lwheeler@gpinet.com
lawrence.wheeler@state.vt.us

Colchester
IM 089-3(69)
BRIDGES 77 NB & SB
MM 96.6
Sketch By LPW
Not To Scale



Fillbach, Tim

From: Bryan Osborne [bosborne@colchestervt.gov]
Sent: Monday, September 30, 2013 1:41 PM
To: Williams, Chris
Subject: I-89 Bay Road Bridge

Chris. Good speaking with you today. At this time, the Town would not support allowing the closure of Bay Road in support of the planned work on the Interstate Bridge, thereby making the majority of the questions mute. The Town is not planning any major improvements along Bay Road as it passes beneath the I-89 Bridge.

Thanks, Bryan

Bryan K. Osborne
Director of Public Works
Town of Colchester
P.O. Box 55, Colchester, Vt. 05446
Tel. (802) 264-5625
e-mail bosborne@colchestervt.gov

Vermont Agency of Transportation

Date: 06/13/2012

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

From 01/01/07 To 12/31/11 General Yearly Summaries Information

*	Reporting Agency/ Number	Town	Mile Marker	Date MM/DD/YY	Time	Weather	Contributing Circumstances	Direction Of Collision	Number Of Injuries	Number Of Fatalities	Direction	Road Group
Route: I-89 Continued ...												
	VTVSP0100/11A10 3210	Colchester	94.57	08/05/2011	16:31	Clear	Followed too closely, No improper driving	Rear End	1	0	N	SH
	VTVSP0100/10A10 4405	Colchester	94.65	10/26/2010	07:49	Cloudy	No improper driving, Followed too closely	Rear End	0	0	E	SH
	VTVSP0100/08A10 5082	Colchester	94.7	11/11/2008	17:05	Cloudy	Followed too closely, No improper driving	Rear End	0	0	N	SH
	0417/779-07	Colchester	94.9	01/14/2007	10:36	Snow	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	1	0	S	SH
	VTVSP0100/11A10 3261	Colchester	94.9	08/09/2011	08:49	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, Inattention, Driving too fast for conditions	Rear End	0	0	S	SH
	VTVSP0100/10A10 3034	Colchester	94.97	07/29/2010	14:03	Clear	Made an improper turn, No improper driving	Rear End	0	0	N	SH
	VTVSP0100/10A10 4089	Colchester	94.97	10/05/2010	20:40	Clear	No improper driving, Made an improper turn, Disregarded traffic signs, signals, road markings	Same Direction Sideswipe	0	0	N	SH
	VTVSP0100/08A10 0861	Colchester	95	02/10/2008	07:18	Snow	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	2	0	S	SH
	VTVSP0100/11A10 0115	Colchester	95	01/08/2011	08:57	Snow	Failure to keep in proper lane, No improper driving	Rear End	1	0	N	SH
	VTVSP0100/11A10 0484	Colchester	95	01/28/2011	13:38	Clear	No improper driving, Followed too closely	Rear End	2	0	N	SH
	VTVSP0100/08A10 1659	Colchester	95.01	04/01/2008	18:41	Cloudy	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Followed too closely, No improper driving	Same Direction Sideswipe	0	0		SH
	VTVSP0100/11A10 0552	Colchester	95.04	02/01/2011	15:43	Snow	Failure to keep in proper lane, Driving too fast for conditions	Single Vehicle Crash	0	1		SH
	VTVSP0100/08A10 5486	Colchester	95.05	12/07/2008	15:57	Snow	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, Failure to keep in proper lane	Single Vehicle Crash	1	0	S	SH
	VTVSP0100/08A10 2389	Colchester	95.24	05/25/2008	15:26	Clear	Disregarded traffic signs, signals, road markings, Made an improper turn, No improper driving	Rear End	0	0	N	SH
	VTVSP0100/10A10 5086	Colchester	95.24	12/08/2010	12:50	Clear		Same Direction Sideswipe	0	0	S	SH
	VTVSP0100/09A10 3654	Colchester	95.31	09/06/2009	12:18	Clear	Made an improper turn, Other improper action, No improper driving	Rear End	2	0		SH
	VTVSP0100/09A10 2823	Colchester	95.4	07/10/2009	11:00	Clear	Followed too closely, Other improper action	Rear End	0	0	S	SH
	VTDMV0000/8008 DMV0023	Colchester	95.5	02/01/2008	07:20	Cloudy	Unknown	Rear End	0	0	S	SH
	0417/9628-07	Colchester	95.57	07/31/2007	12:12	Clear	Failed to yield right of way, Inattention, Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, No improper driving	Same Direction Sideswipe	0	0		SH
	0417/18043-07	Colchester	95.75	12/29/2007	04:40	Sleet, Hail (Freezing Rain or Drizzle)	Driving too fast for conditions, Failure to keep in proper lane		0	0	N	SH
	VTVSP0100/11A10 1715	Colchester	95.8	04/24/2011	18:43	Clear	Failure to keep in proper lane	Single Vehicle Crash	1	0		SH
	VTVSP0100/09A10 1198	Colchester	96.15	03/09/2009	07:31	Snow	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	2	0	N	SH
	0417/339-07	Colchester	96.53	01/01/2007	18:33	Rain	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc, Followed too closely	Same Direction Sideswipe	0	0		SH
	VTVSP0100/10A10 0215	Colchester	96.57	01/11/2010	05:15	Cloudy	No improper driving, Other improper action	Other - Explain in Narrative	0	0		SH

**Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates the Mile Marker is Unknown.*

Vermont Agency of Transportation

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

From 01/01/07 To 12/31/11 General Yearly Summaries Information

*	Reporting Agency/ Number	Town	Mile Marker	Date MM/DD/YY	Time	Weather	Contributing Circumstances	Direction Of Collision	Number Of Injuries	Number Of Fatalities	Direction	Road Group
Route: I-89 Continued ...												
	VTVSP0100/10A10 0213	Colchester	96.57	01/11/2010	05:15	Cloudy	Failure to keep in proper lane	Same Direction Sideswipe	0	0	S	SH
	VTVSP0100/11A10 4963	Colchester	96.58	12/05/2011	14:48	Cloudy		Head On	0	0	N	SH
	0417/10721-07	Colchester	96.61	05/27/2007	14:25	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Exceeded authorized speed limit, No improper driving	Rear End	1	0	N	SH
	VTVSP0100/08A10 1363	Colchester	96.85	03/10/2008	07:48	Cloudy	Followed too closely, Other improper action, No improper driving	Rear End	0	0	S	SH
	VTVSP0100/09A10 2494	Colchester	96.85	06/16/2009	16:22	Clear	No improper driving, Followed too closely, Inattention	Rear End	2	0	N	SH
	VTVSP0100/09A10 3563	Colchester	96.85	08/31/2009	08:48	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Single Vehicle Crash	0	0		SH
	VTVSP0100/08A10 0022	Colchester	96.89	01/02/2008	08:05	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	S	SH
	VTDMV0004/11DM V0351	Colchester	96.9	11/15/2011	13:53	Clear	No improper driving, Followed too closely, Driving too fast for conditions	Rear End	0	0		SH
	VTVSP0100/11A10 3122	Colchester	97	07/29/2011	16:54	Cloudy	Followed too closely, Unknown, Failure to keep in proper lane, Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Rear End	0	0		SH
	VTVSP0100/09A10 2889	Colchester	97.05	07/14/2009	17:25	Clear	Followed too closely, No improper driving	Rear End	0	0	N	SH
	VTVSP0100/08A10 3414	Colchester	97.15	07/27/2008	15:43	Clear	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	1	0	N	SH
	VTVSP0100/09A10 2519	Colchester	97.26	06/18/2009	17:30	Rain	Followed too closely, Inattention, No improper driving	Rear End	0	0	N	SH
	VTVSP0100/10A10 2480	Colchester	97.35	06/23/2010	11:37	Cloudy	Failure to keep in proper lane	Single Vehicle Crash	0	0	N	SH
	VTVSP0100/08A10 0747	Colchester	97.56	02/04/2008	18:27	Cloudy	Exceeded authorized speed limit, Failure to keep in proper lane	Single Vehicle Crash	1	0		SH
	VTVSP0100/08A10 3820	Colchester	97.56	08/22/2008	17:02	Clear	Other improper action, Followed too closely	Rear End	0	0		SH
	VTVSP0100/09A10 1986	Colchester	97.56	05/11/2009	15:59	Clear	Made an improper turn, Failed to yield right of way, No improper driving	Same Direction Sideswipe	0	0	N	SH
	VTVSP0100/08A10 3116	Colchester	97.62	07/10/2008	11:30	Clear	Failed to yield right of way, No improper driving	Same Direction Sideswipe	0	0		SH
	0417/16118-07	Colchester	97.66	11/10/2007	22:10	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, No improper driving	Same Direction Sideswipe	0	0	S	SH
	VTVSP0700/10A10 0214	Colchester	97.66	01/11/2010	06:44	Clear	Driving too fast for conditions, Followed too closely	Rear End	0	0	S	SH
	VTVSP0100/11A10 1943	Colchester	97.97	05/10/2011	18:37	Clear	Failure to keep in proper lane, Visibility obstructed	Same Direction Sideswipe	2	0		SH
	VTVSP0100/09A10 4436	Colchester	98.11	11/05/2009	17:01	Clear	Followed too closely, No improper driving	Same Direction Sideswipe	0	0	N	SH
	VTVSP0100/08A10 5894	Colchester	98.17	12/29/2008	05:43	Clear	Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway etc	Single Vehicle Crash	0	0	N	SH
	VTVSP0100/08A10 1359	Colchester	UNK	03/10/2008	07:50	Cloudy	Followed too closely, Other improper action, No improper driving	Rear End	0	0	S	SH
	VTVSP0100/08A10 2342	Colchester	UNK	05/22/2008	10:36	Clear	No improper driving, Operating defective equipment	Other - Explain in Narrative	0	0	S	SH
	VTVSP0100/08A10 3098	Colchester	UNK	07/09/2008	10:37		No improper driving, Followed too closely, Inattention	Rear End	0	0	S	SH
	VTDMV0000/08A1 05179	Colchester	UNK	11/18/2008	08:00	Snow	Failure to keep in proper lane	Single Vehicle Crash	0	0		SH

**Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates the Mile Marker is Unknown.*

US Route 7 between Exits 16 and 17

Counted Hourly Volumes from Year 2014 (Based on P6D040(14))

Threshold values: According to the 2010HCM, the maximum capacity for a two-lane highway which has been reduced to a single lane, is 1400 vehicles/hour.

VTrans field data indicates that the capacity is slightly less, around 1350 vehicles/hour

Month	Jun		Month	July		Month	Aug		Month	Sept	
Avg Vol 2014	Day		Avg Vol 2014	Day		Avg Vol 2014	Day		Avg Vol 2014	Day	
Begin Hour	Mon-Fri	Sat-Sun	Begin Hour	Mon-Fri	Sat-Sun	Begin Hour	Mon-Fri	Sat-Sun	Begin Hour	Mon-Fri	Sat-Sun
12:00 AM	53	105	12:00 AM	60	97	12:00 AM	57	97	12:00 AM	45	92
1:00 AM	36	78	1:00 AM	37	68	1:00 AM	33	63	1:00 AM	28	50
2:00 AM	41	69	2:00 AM	41	61	2:00 AM	42	59	2:00 AM	35	55
3:00 AM	46	38	3:00 AM	45	42	3:00 AM	46	43	3:00 AM	43	43
4:00 AM	111	61	4:00 AM	111	51	4:00 AM	109	49	4:00 AM	107	47
5:00 AM	282	107	5:00 AM	253	101	5:00 AM	248	94	5:00 AM	245	98
6:00 AM	713	206	6:00 AM	662	182	6:00 AM	679	170	6:00 AM	664	181
7:00 AM	1370	366	7:00 AM	1154	310	7:00 AM	1217	304	7:00 AM	1344	306
8:00 AM	1220	537	8:00 AM	1138	470	8:00 AM	1151	470	8:00 AM	1188	489
9:00 AM	896	746	9:00 AM	909	720	9:00 AM	884	730	9:00 AM	855	735
10:00 AM	982	1045	10:00 AM	1001	1038	10:00 AM	981	977	10:00 AM	913	1000
11:00 AM	1081	1133	11:00 AM	1134	1113	11:00 AM	1113	1127	11:00 AM	998	1133
12:00 PM	1172	1228	12:00 PM	1230	1153	12:00 PM	1222	1177	12:00 PM	1110	1157
1:00 PM	1127	1151	1:00 PM	1175	1077	1:00 PM	1145	1096	1:00 PM	1078	1072
2:00 PM	1264	1108	2:00 PM	1220	1053	2:00 PM	1215	1075	2:00 PM	1177	1052
3:00 PM	1511	1106	3:00 PM	1407	1032	3:00 PM	1436	1079	3:00 PM	1439	1033
4:00 PM	1715	1051	4:00 PM	1652	979	4:00 PM	1654	1010	4:00 PM	1630	1017
5:00 PM	1765	950	5:00 PM	1620	910	5:00 PM	1685	946	5:00 PM	1694	919
6:00 PM	1090	745	6:00 PM	1031	723	6:00 PM	1072	724	6:00 PM	1078	727
7:00 PM	750	609	7:00 PM	717	573	7:00 PM	758	579	7:00 PM	715	527
8:00 PM	571	533	8:00 PM	565	478	8:00 PM	551	464	8:00 PM	481	383
9:00 PM	367	380	9:00 PM	399	343	9:00 PM	354	305	9:00 PM	329	252
10:00 PM	219	226	10:00 PM	263	230	10:00 PM	226	223	10:00 PM	189	182
11:00 PM	126	129	11:00 PM	144	131	11:00 PM	128	136	11:00 PM	115	116

P6D092 in Colchester- 2015 Average Volume

SEPTEMBER NORTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	109	129	169
1:00 AM	58	76	80
2:00 AM	45	57	66
3:00 AM	45	53	50
4:00 AM	56	56	42
5:00 AM	171	173	71
6:00 AM	513	462	141
7:00 AM	742	710	264
8:00 AM	597	572	339
9:00 AM	560	585	449
10:00 AM	612	694	626
11:00 AM	680	792	774
12:00 PM	774	933	981
1:00 PM	858	1046	1005
2:00 PM	1146	1429	1087
3:00 PM	1699	1898	1136
4:00 PM	2360	2320	1159
5:00 PM	2330	2241	1066
6:00 PM	1302	1418	885
7:00 PM	868	1004	765
8:00 PM	646	834	632
9:00 PM	470	747	490
10:00 PM	266	479	339
11:00 PM	218	312	228

OCTOBER NORTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	87	126	129
1:00 AM	51	73	74
2:00 AM	42	52	53
3:00 AM	49	48	49
4:00 AM	83	59	60
5:00 AM	229	165	168
6:00 AM	532	439	448
7:00 AM	704	695	709
8:00 AM	587	614	626
9:00 AM	548	602	614
10:00 AM	618	656	669
11:00 AM	693	782	797
12:00 PM	793	885	903
1:00 PM	924	1047	1068
2:00 PM	1287	1438	1467
3:00 PM	1850	1805	1841
4:00 PM	2301	2306	2353
5:00 PM	2042	2241	2286
6:00 PM	1172	1420	1448
7:00 PM	776	983	1002
8:00 PM	579	759	774
9:00 PM	414	685	699
10:00 PM	242	479	489
11:00 PM	179	320	327

NOVEMBER NORTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	95	113	131
1:00 AM	58	83	68
2:00 AM	37	58	53
3:00 AM	40	58	41
4:00 AM	56	87	52
5:00 AM	153	197	83
6:00 AM	413	408	133
7:00 AM	686	587	235
8:00 AM	560	535	302
9:00 AM	498	534	405
10:00 AM	553	637	576
11:00 AM	632	745	676
12:00 PM	735	873	823
1:00 PM	827	1035	895
2:00 PM	1114	1355	999
3:00 PM	1633	1758	1080
4:00 PM	2258	2040	1083
5:00 PM	2086	1792	947
6:00 PM	1126	1096	745
7:00 PM	728	784	618
8:00 PM	530	681	472
9:00 PM	422	641	406
10:00 PM	227	359	259
11:00 PM	210	260	186

SEPTEMBER SOUTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	51	58	74
1:00 AM	41	42	39
2:00 AM	48	51	37
3:00 AM	107	117	71
4:00 AM	281	249	98
5:00 AM	700	705	205
6:00 AM	1739	1684	384
7:00 AM	2879	2683	496
8:00 AM	1840	1800	696
9:00 AM	1128	1173	933
10:00 AM	989	1090	1146
11:00 AM	931	1050	1197
12:00 PM	889	1030	1154
1:00 PM	845	983	1035
2:00 PM	891	960	963
3:00 PM	923	1060	921
4:00 PM	973	1143	870
5:00 PM	936	1145	773
6:00 PM	645	923	636
7:00 PM	398	571	451
8:00 PM	287	393	342
9:00 PM	209	299	247
10:00 PM	178	226	200
11:00 PM	76	122	93

OCTOBER SOUTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	51	59	68
1:00 AM	38	49	53
2:00 AM	63	48	38
3:00 AM	153	122	79
4:00 AM	381	244	120
5:00 AM	957	668	210
6:00 AM	1989	1643	359
7:00 AM	2553	2618	507
8:00 AM	1566	1733	731
9:00 AM	1041	1237	945
10:00 AM	931	1103	1125
11:00 AM	895	1104	1195
12:00 PM	871	1115	1142
1:00 PM	833	997	1032
2:00 PM	880	1014	987
3:00 PM	909	1107	883
4:00 PM	945	1124	822
5:00 PM	830	1115	713
6:00 PM	556	887	583
7:00 PM	338	557	387
8:00 PM	249	385	282
9:00 PM	185	295	215
10:00 PM	143	216	171
11:00 PM	72	100	84

NOVEMBER SOUTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	56	66	67
1:00 AM	42	48	49
2:00 AM	44	63	64
3:00 AM	105	161	165
4:00 AM	264	326	332
5:00 AM	662	785	801
6:00 AM	1664	1652	1685
7:00 AM	2690	2178	2222
8:00 AM	1698	1476	1506
9:00 AM	1054	1104	1126
10:00 AM	905	1006	1026
11:00 AM	821	974	994
12:00 PM	822	979	998
1:00 PM	765	908	926
2:00 PM	809	952	971
3:00 PM	835	973	993
4:00 PM	874	1039	1060
5:00 PM	805	945	964
6:00 PM	497	689	702
7:00 PM	285	417	426
8:00 PM	217	304	310
9:00 PM	176	238	242
10:00 PM	159	179	183
11:00 PM	66	81	82

P6D092 in Colchester- 2015 Average Volume

MAY NORTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	105	122	161
1:00 AM	59	67	74
2:00 AM	41	45	60
3:00 AM	43	45	47
4:00 AM	57	48	42
5:00 AM	165	156	71
6:00 AM	450	425	137
7:00 AM	696	670	249
8:00 AM	593	582	333
9:00 AM	558	583	459
10:00 AM	606	665	624
11:00 AM	678	772	775
12:00 PM	770	925	943
1:00 PM	863	1056	1006
2:00 PM	1160	1353	1084
3:00 PM	1676	1806	1129
4:00 PM	2284	2256	1149
5:00 PM	2253	2131	1027
6:00 PM	1249	1347	853
7:00 PM	840	956	709
8:00 PM	632	766	577
9:00 PM	474	667	467
10:00 PM	277	471	319
11:00 PM	208	297	229

JUNE NORTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	115	142	193
1:00 AM	65	66	88
2:00 AM	47	58	68
3:00 AM	43	50	45
4:00 AM	57	56	44
5:00 AM	147	154	78
6:00 AM	430	380	137
7:00 AM	701	639	284
8:00 AM	614	582	361
9:00 AM	586	614	479
10:00 AM	647	697	652
11:00 AM	725	854	848
12:00 PM	817	1000	994
1:00 PM	930	1178	1084
2:00 PM	1186	1465	1105
3:00 PM	1692	1857	1163
4:00 PM	2350	2310	1130
5:00 PM	2305	2187	1031
6:00 PM	1273	1341	862
7:00 PM	867	981	717
8:00 PM	691	844	592
9:00 PM	528	738	524
10:00 PM	322	499	349
11:00 PM	242	372	245

JULY NORTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	112	143	146
1:00 AM	73	91	93
2:00 AM	55	57	59
3:00 AM	48	46	47
4:00 AM	61	56	57
5:00 AM	158	136	138
6:00 AM	387	320	326
7:00 AM	651	580	591
8:00 AM	602	597	609
9:00 AM	612	661	674
10:00 AM	691	780	796
11:00 AM	804	970	989
12:00 PM	903	1131	1154
1:00 PM	1002	1282	1308
2:00 PM	1271	1521	1552
3:00 PM	1784	1854	1891
4:00 PM	2371	2226	2271
5:00 PM	2384	2158	2201
6:00 PM	1386	1384	1412
7:00 PM	898	1005	1025
8:00 PM	753	831	848
9:00 PM	609	815	832
10:00 PM	411	552	563
11:00 PM	277	356	363

AUGUST NORTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	128	140	218
1:00 AM	72	82	95
2:00 AM	54	73	70
3:00 AM	50	49	54
4:00 AM	54	59	40
5:00 AM	166	169	80
6:00 AM	426	384	165
7:00 AM	709	659	315
8:00 AM	626	607	399
9:00 AM	625	639	556
10:00 AM	701	769	759
11:00 AM	793	948	971
12:00 PM	903	1113	1129
1:00 PM	1012	1274	1197
2:00 PM	1304	1635	1280
3:00 PM	1816	2034	1356
4:00 PM	2458	2483	1332
5:00 PM	2432	2342	1212
6:00 PM	1344	1557	1011
7:00 PM	970	1104	855
8:00 PM	784	938	767
9:00 PM	616	814	581
10:00 PM	373	553	412
11:00 PM	258	367	279

MAY SOUTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	50	59	67
1:00 AM	32	43	38
2:00 AM	43	42	37
3:00 AM	96	106	61
4:00 AM	250	224	90
5:00 AM	674	679	181
6:00 AM	1617	1662	410
7:00 AM	2613	2574	540
8:00 AM	1773	1763	697
9:00 AM	1087	1237	937
10:00 AM	898	1062	1086
11:00 AM	837	1028	1182
12:00 PM	841	1016	1095
1:00 PM	809	1008	1020
2:00 PM	860	1024	949
3:00 PM	883	1100	890
4:00 PM	931	1143	818
5:00 PM	848	1026	742
6:00 PM	599	797	589
7:00 PM	380	546	468
8:00 PM	283	398	338
9:00 PM	212	313	266
10:00 PM	172	232	205
11:00 PM	77	126	108

JUNE SOUTHBOUND

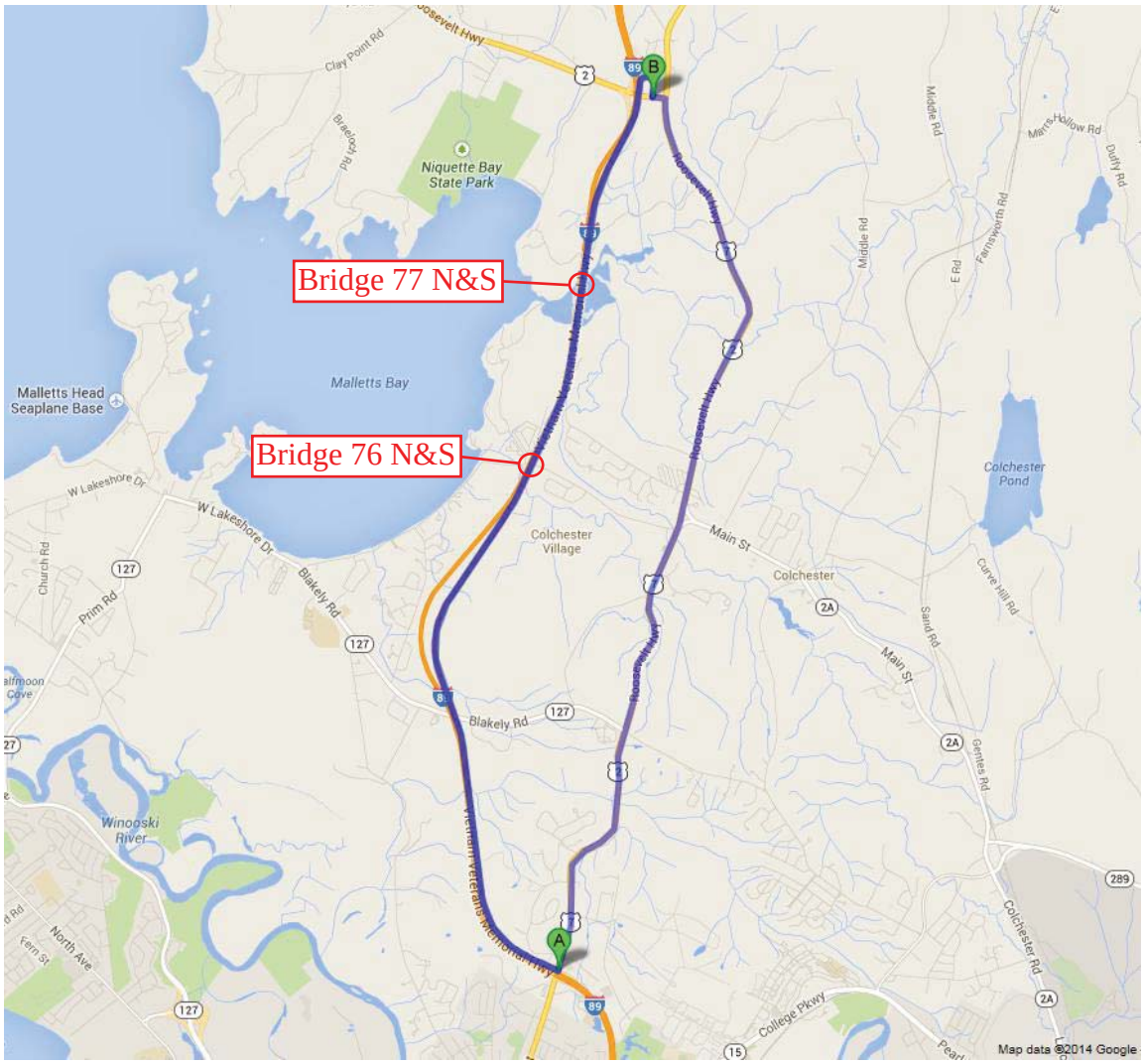
Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	57	63	87
1:00 AM	40	49	41
2:00 AM	44	47	35
3:00 AM	97	107	66
4:00 AM	260	241	95
5:00 AM	710	699	204
6:00 AM	1705	1614	415
7:00 AM	2601	2453	510
8:00 AM	1796	1804	726
9:00 AM	1161	1271	953
10:00 AM	993	1195	1133
11:00 AM	937	1147	1189
12:00 PM	929	1126	1173
1:00 PM	880	1060	1088
2:00 PM	909	1073	1030
3:00 PM	922	1133	1003
4:00 PM	962	1103	923
5:00 PM	919	1065	782
6:00 PM	632	851	633
7:00 PM	395	575	487
8:00 PM	317	430	390
9:00 PM	253	361	320
10:00 PM	187	241	216
11:00 PM	88	138	112

JULY SOUTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	64	75	86
1:00 AM	42	45	53
2:00 AM	48	56	48
3:00 AM	103	107	72
4:00 AM	272	241	107
5:00 AM	714	621	224
6:00 AM	1723	1494	409
7:00 AM	2552	2135	534
8:00 AM	1801	1634	745
9:00 AM	1250	1284	1057
10:00 AM	1141	1251	1245
11:00 AM	1118	1218	1324
12:00 PM	1092	1182	1213
1:00 PM	1007	1131	1159
2:00 PM	1005	1087	1091
3:00 PM	985	1093	1100
4:00 PM	1005	1159	1048
5:00 PM	967	1127	903
6:00 PM	704	872	748
7:00 PM	450	615	566
8:00 PM	365	515	455
9:00 PM	291	391	381
10:00 PM	212	267	284
11:00 PM	100	151	144

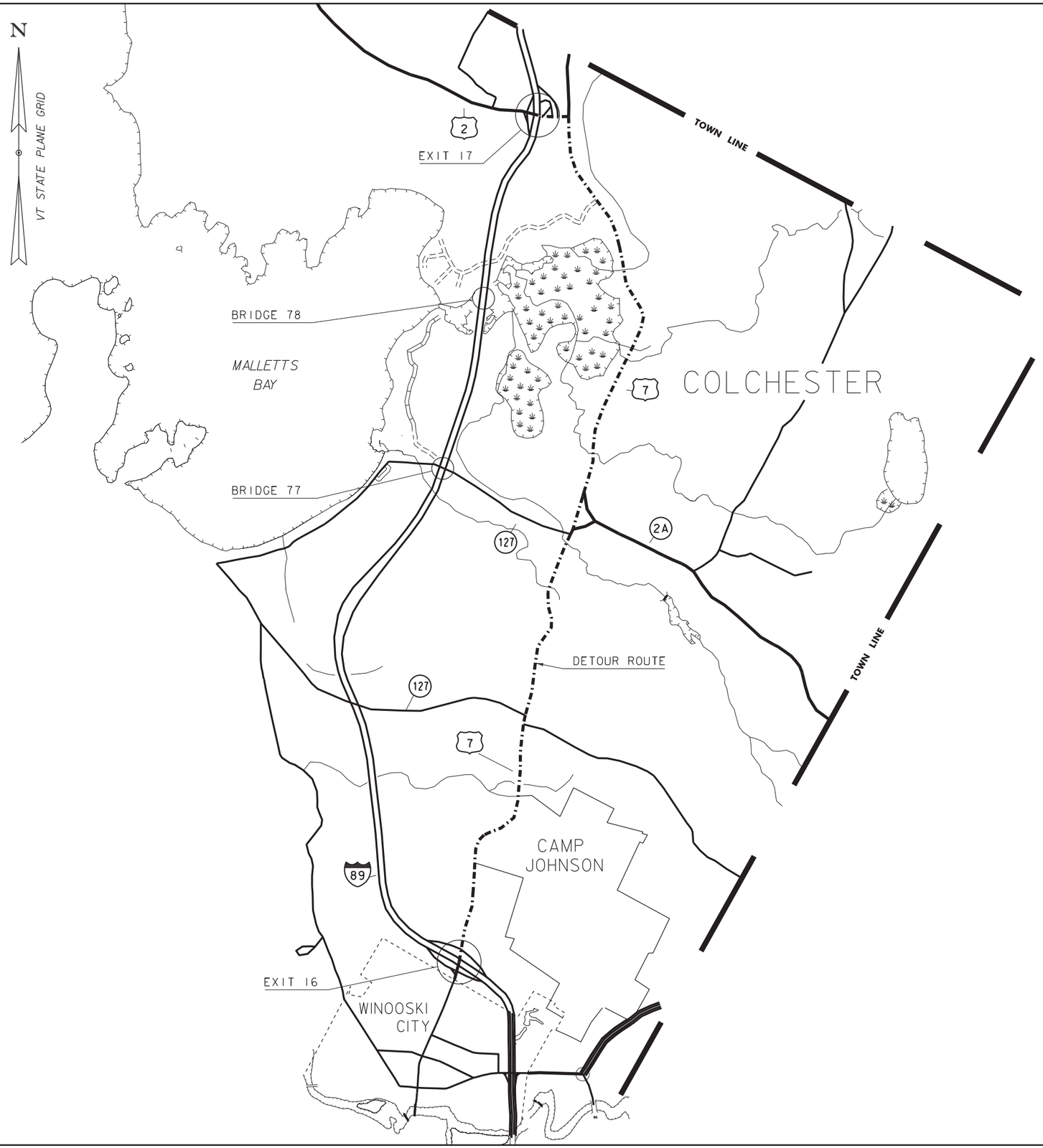
AUGUST SOUTHBOUND

Begin Hour	Mon-Thu	Fri	Sat-Sun
12:00AM	62	66	87
1:00 AM	42	44	53
2:00 AM	54	54	43
3:00 AM	109	115	74
4:00 AM	274	247	109
5:00 AM	711	682	230
6:00 AM	1730	1608	435
7:00 AM	2662	2454	574
8:00 AM	1832	1792	797
9:00 AM	1268	1347	1132
10:00 AM	1185	1322	1335
11:00 AM	1162	1285	1400
12:00 PM	1110	1251	1293
1:00 PM	1036	1164	1212
2:00 PM	1039	1149	1152
3:00 PM	1017	1165	1119
4:00 PM	1037	1185	1024
5:00 PM	1020	1133	919
6:00 PM	704	904	724
7:00 PM	447	629	546
8:00 PM	360	505	479
9:00 PM	280	401	365
10:00 PM	205	270	259
11:00 PM	97	164	144

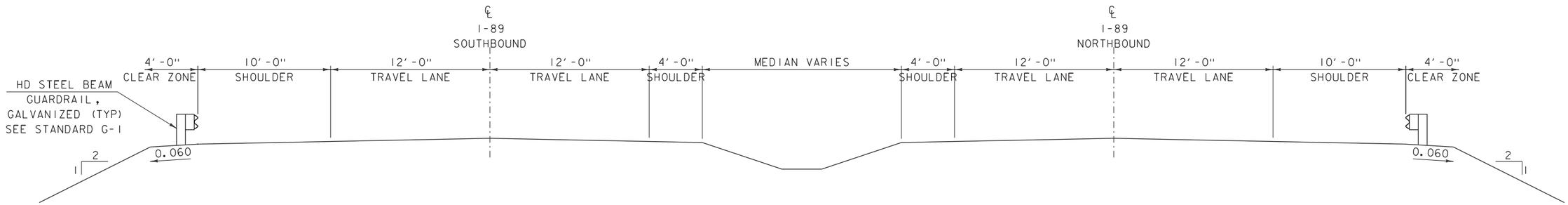


<u>Detour Route</u> – Exit 16 I-89 to US 2 to Exit 17 I-89

A to B on Through Route: 6.7 Miles (about 7 minutes)
A to B on Detour Route: 6.3 Miles (about 11 minutes)
Added Miles: 0 Miles
End to End Distance: 13.0 Miles

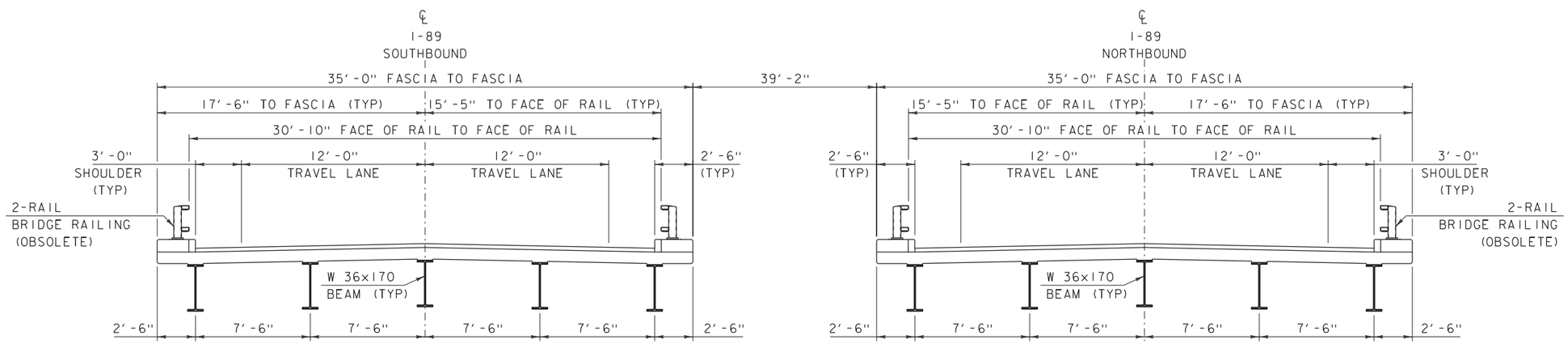


PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-1(69)	
FILE NAME: 95a208/s95a208detour.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: J.FITCH	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
REGIONAL DETOUR	SHEET 1 OF 50



EXISTING ROADWAY TYPICAL SECTION

SCALE 1/4" = 1'-0"

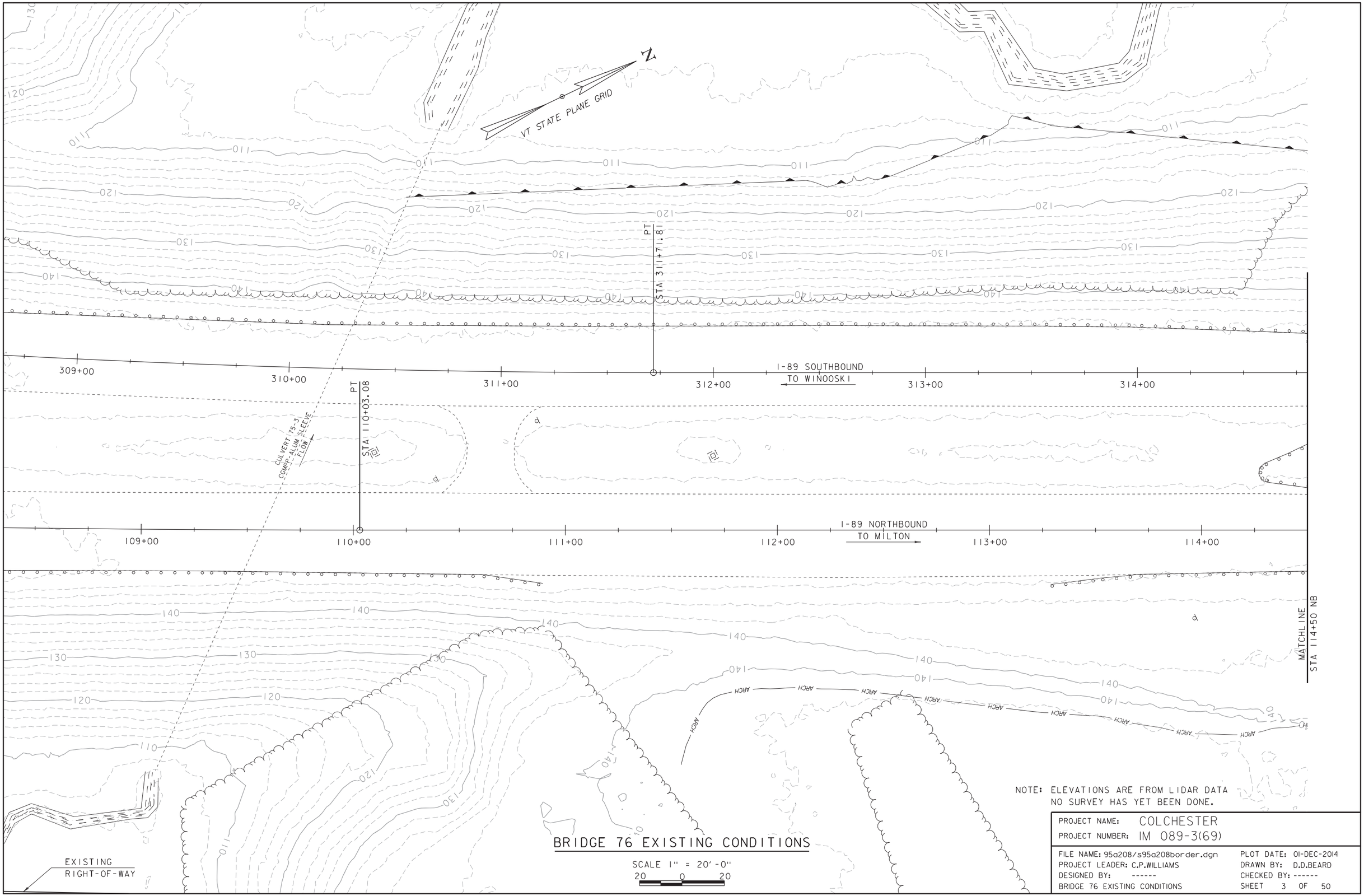


BR 77 FLOW

BRIDGE 76 & 77 EXISTING TYPICAL SECTION

SCALE 1/4" = 1'-0"

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING TYPICAL SECTIONS	SHEET 2 OF 50

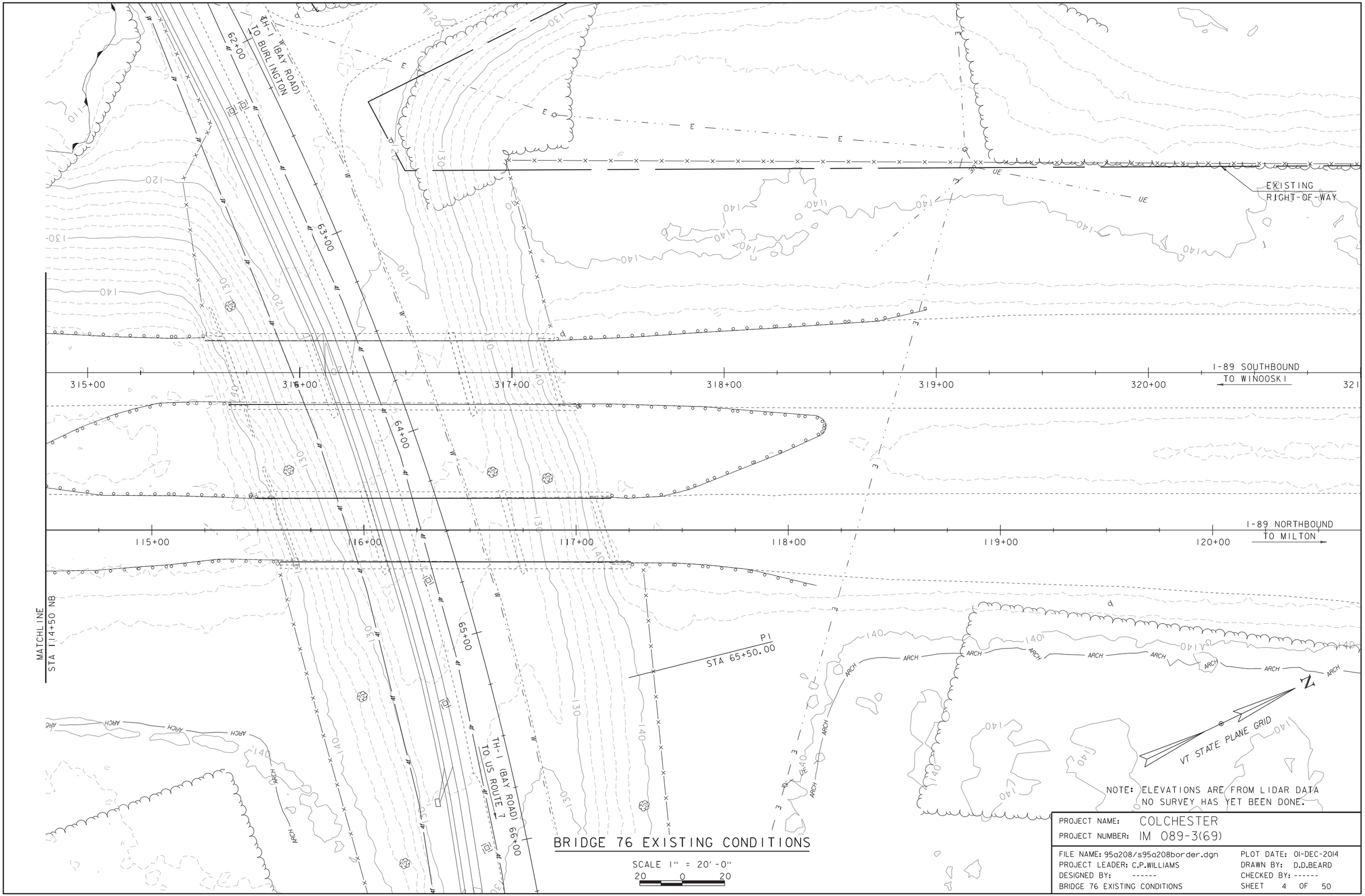


NOTE: ELEVATIONS ARE FROM LIDAR DATA
NO SURVEY HAS YET BEEN DONE.

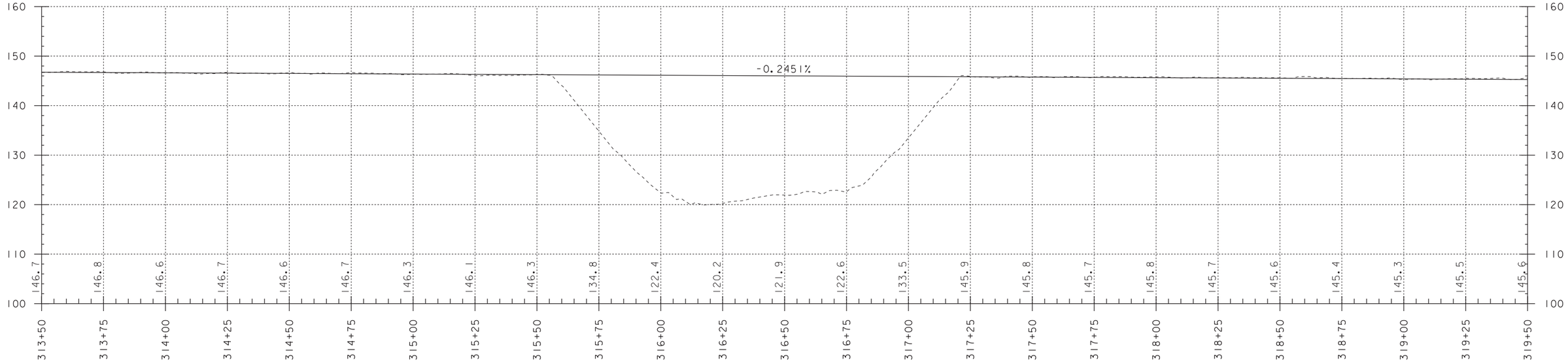
BRIDGE 76 EXISTING CONDITIONS

SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 EXISTING CONDITIONS	SHEET 3 OF 50

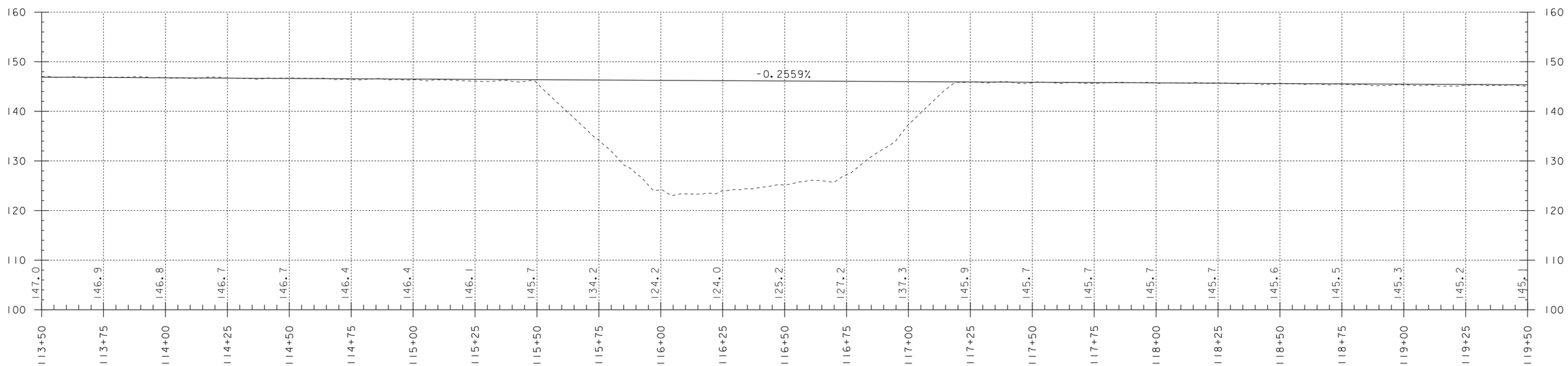


PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 EXISTING CONDITIONS	SHEET 4 OF 50



I-89 BRIDGE 76 SOUTHBOUND PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



I-89 BRIDGE 76 NORTHBOUND PROFILE

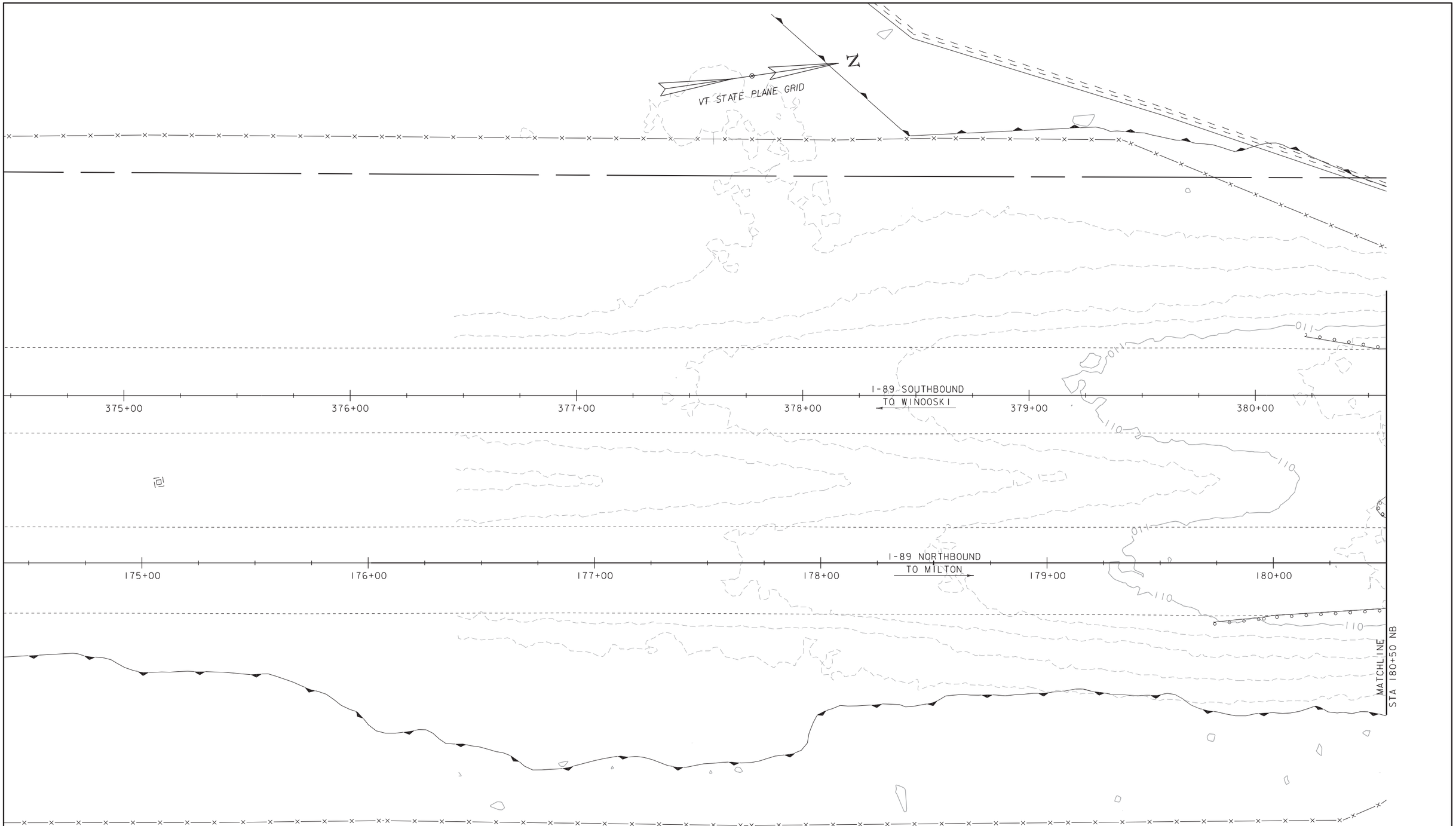
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208profile.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 N/S PROFILE	SHEET 5 OF 50



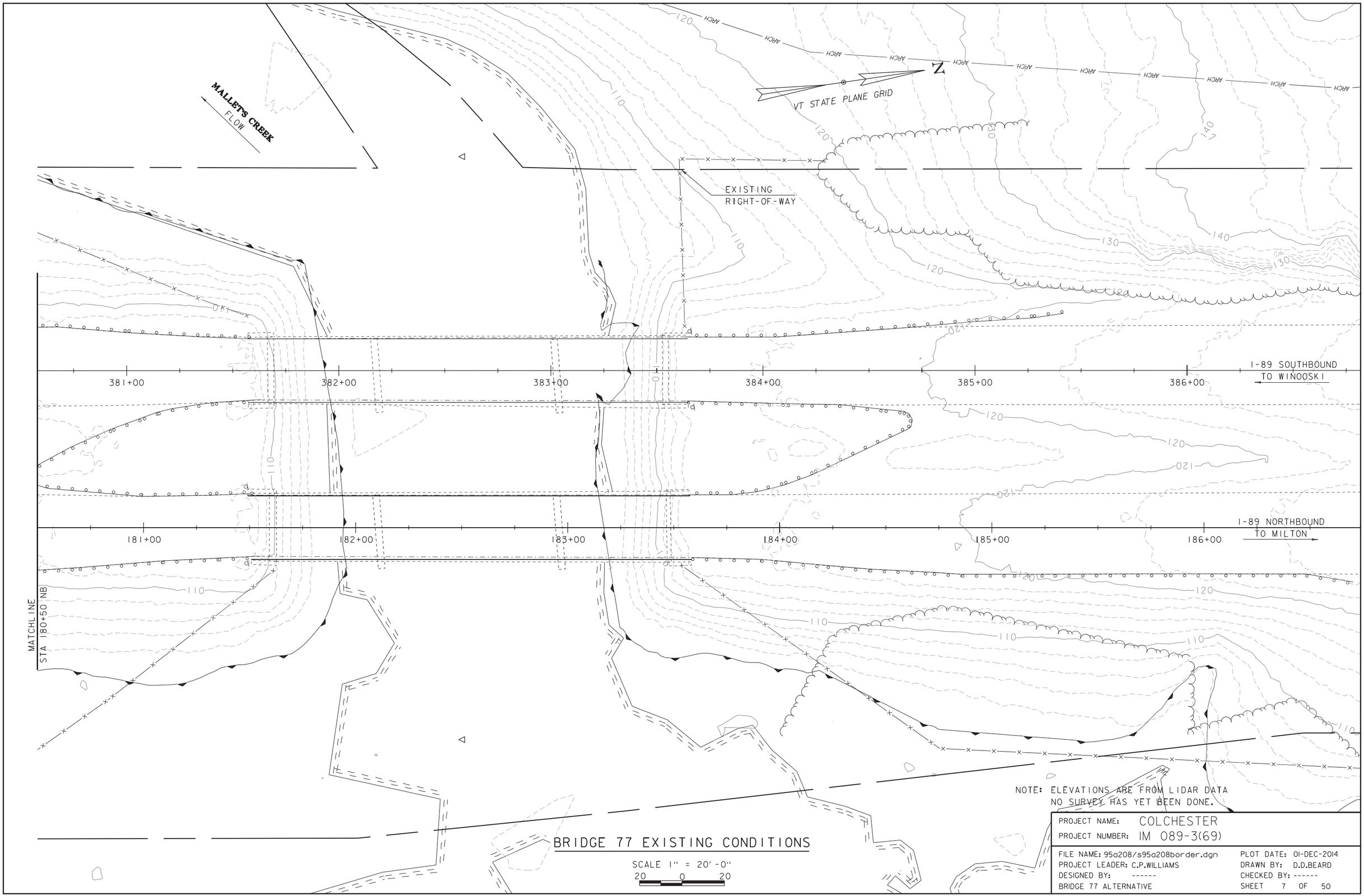
NOTE: ELEVATIONS ARE FROM LIDAR DATA
NO SURVEY HAS YET BEEN DONE.

EXISTING
RIGHT-OF-WAY

BRIDGE 77 EXISTING CONDITIONS

SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 EXISTING CONDITIONS	SHEET 6 OF 50

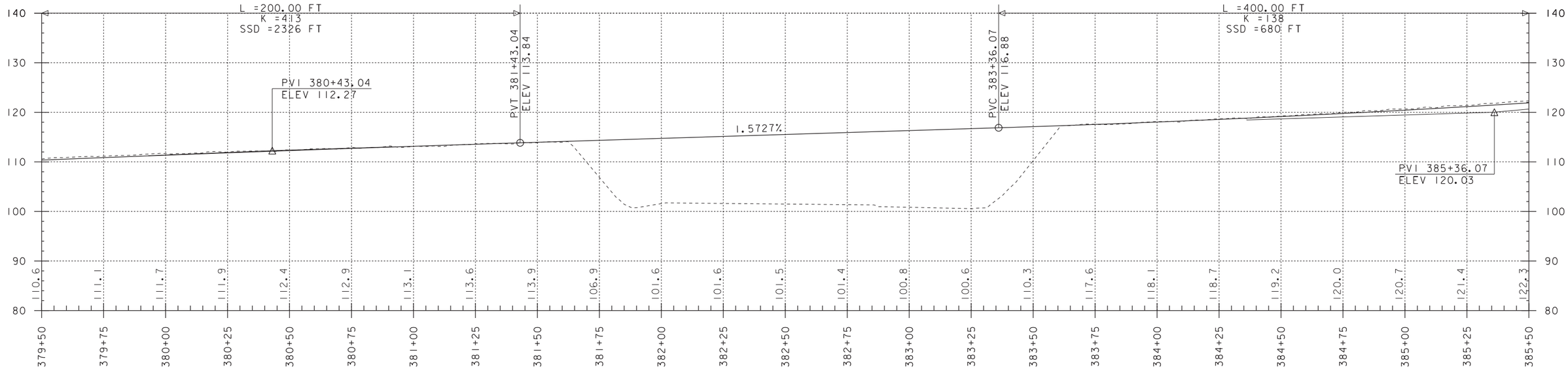


NOTE: ELEVATIONS ARE FROM LIDAR DATA
NO SURVEY HAS YET BEEN DONE.

BRIDGE 77 EXISTING CONDITIONS

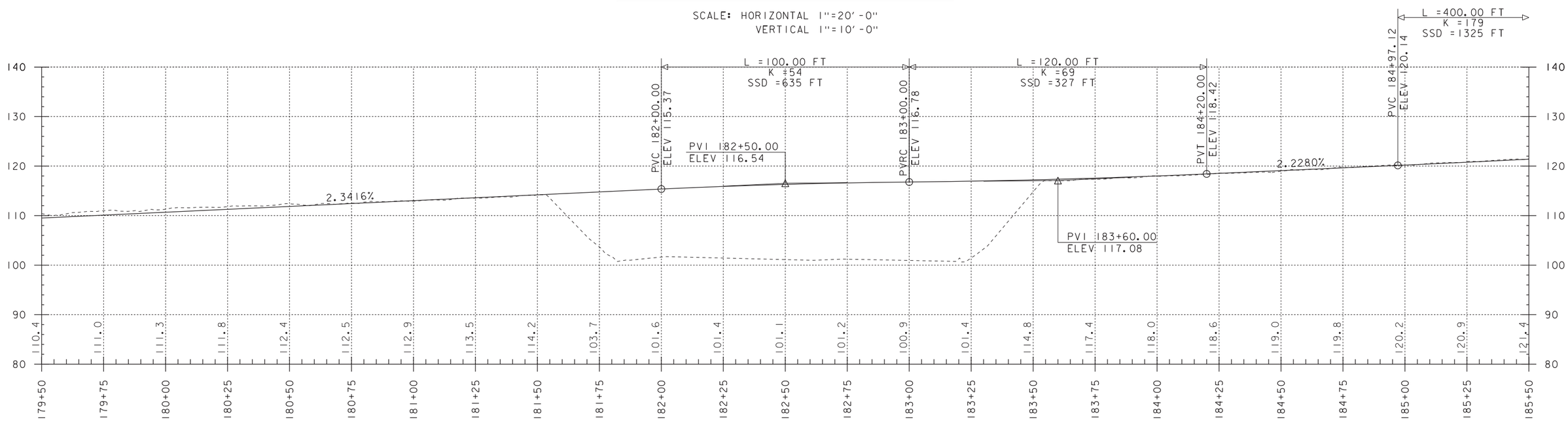
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 ALTERNATIVE	SHEET 7 OF 50



I-89 BRIDGE 77 SOUTHBOUND PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



I-89 BRIDGE 77 NORTHBOUND PROFILE

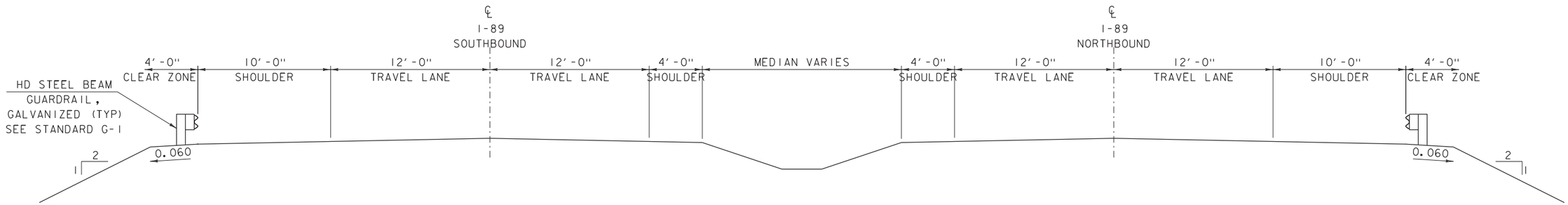
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

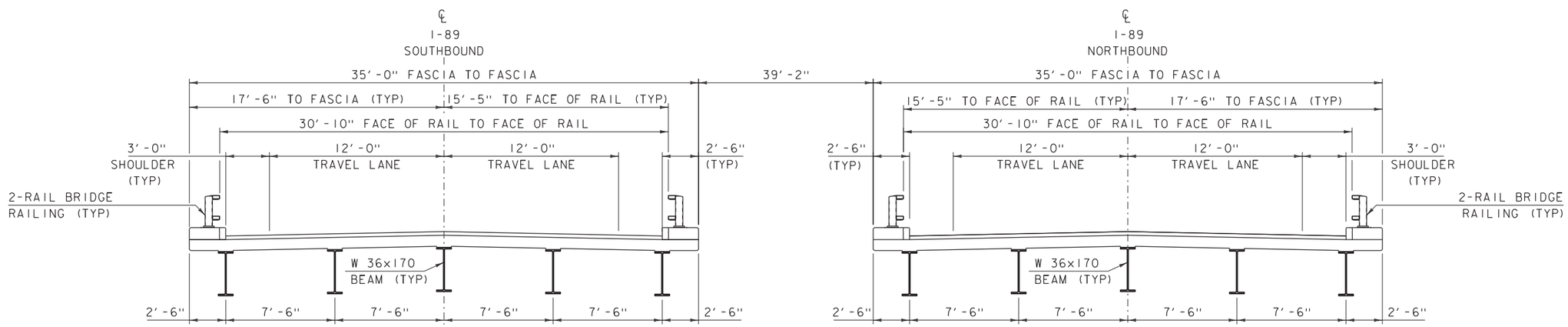
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208profile.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 N/S PROFILE	SHEET 8 OF 50



EXISTING ROADWAY TYPICAL SECTION

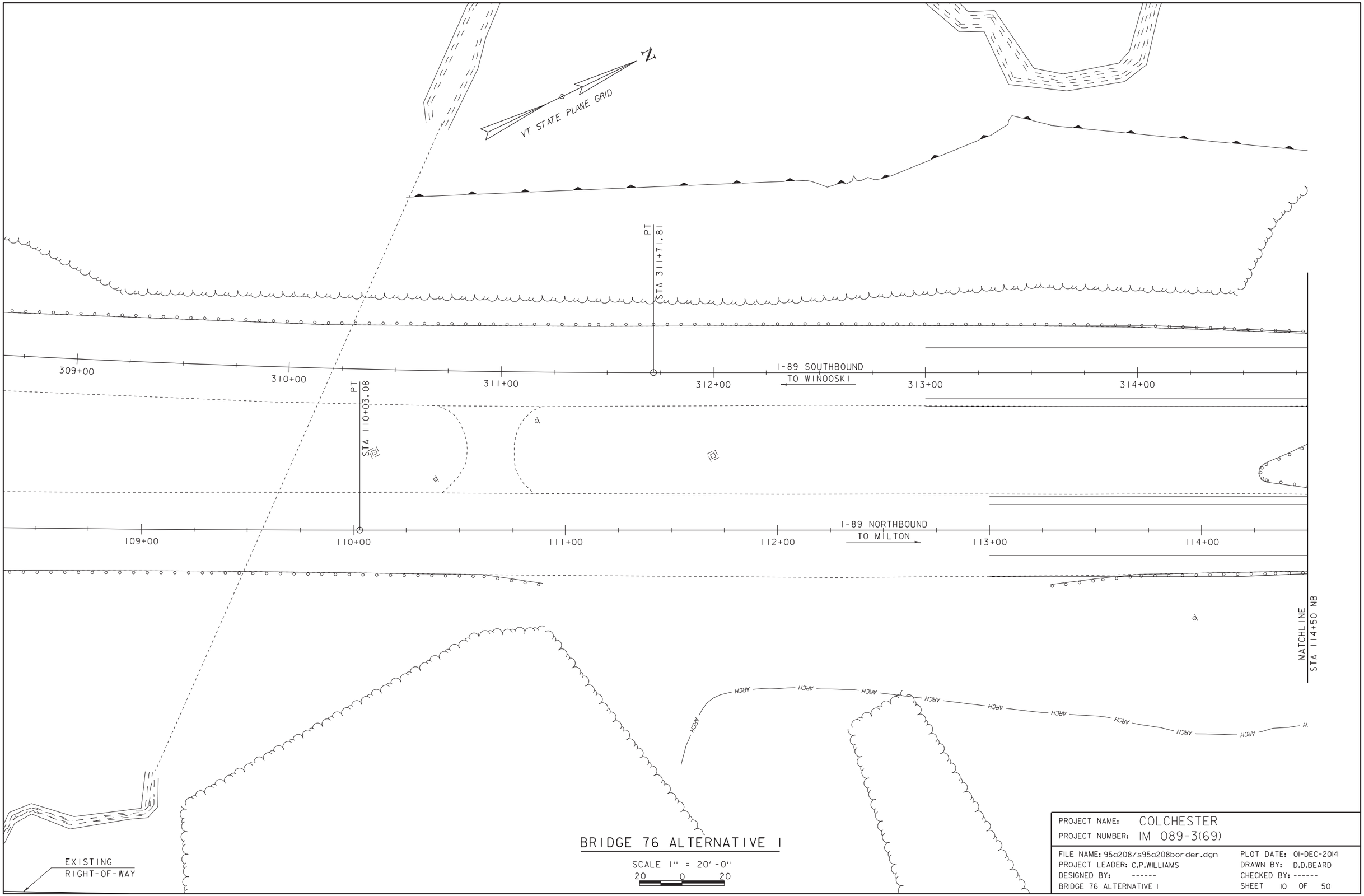
SCALE 1/4" = 1'-0"



BRIDGE 76 ALTERNATIVE #1 TYPICAL SECTION

SCALE 1/4" = 1'-0"

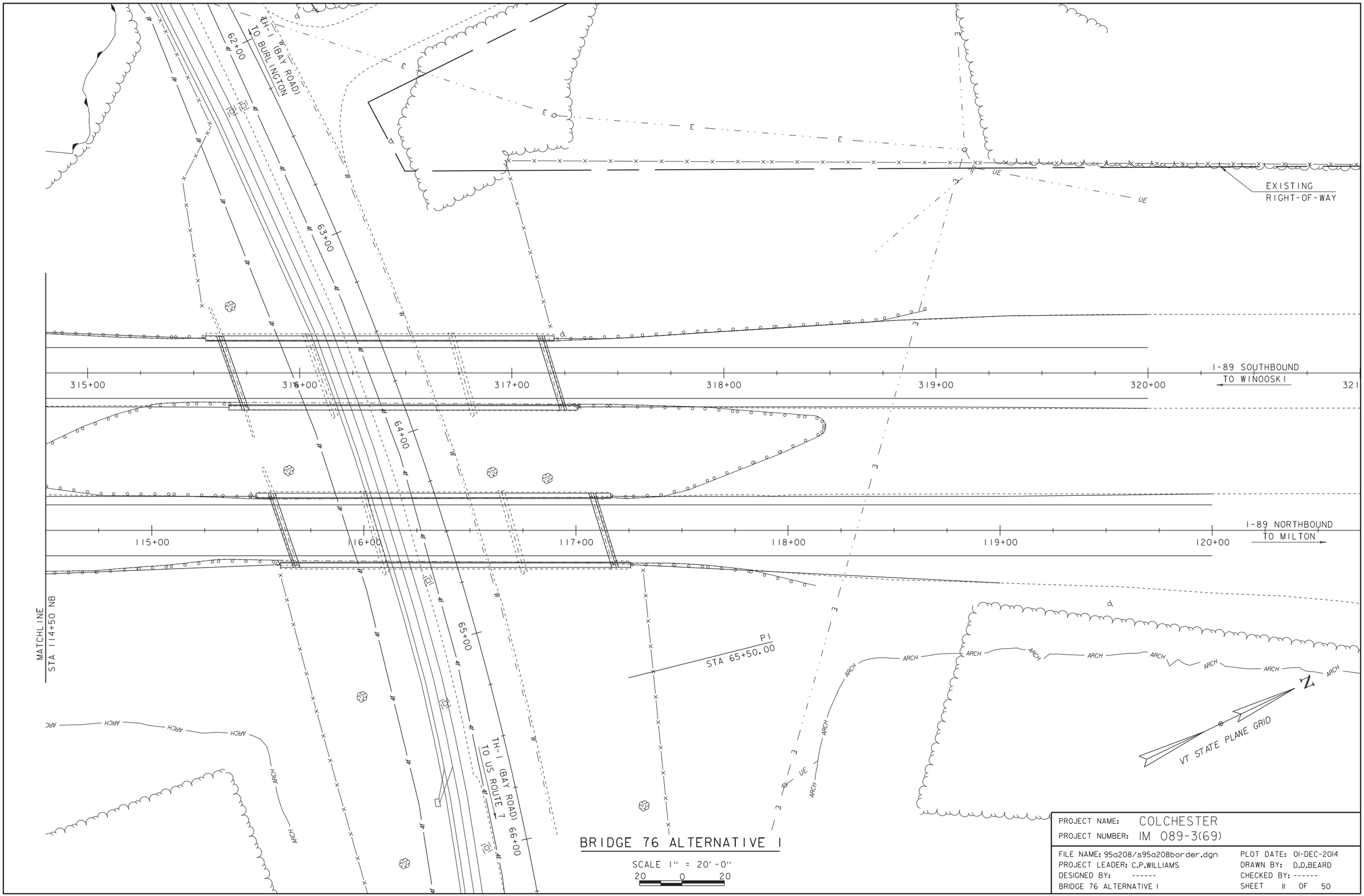
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BR 76 ALTERNATIVE 1 TYPICAL SECTIONS	SHEET 9 OF 50



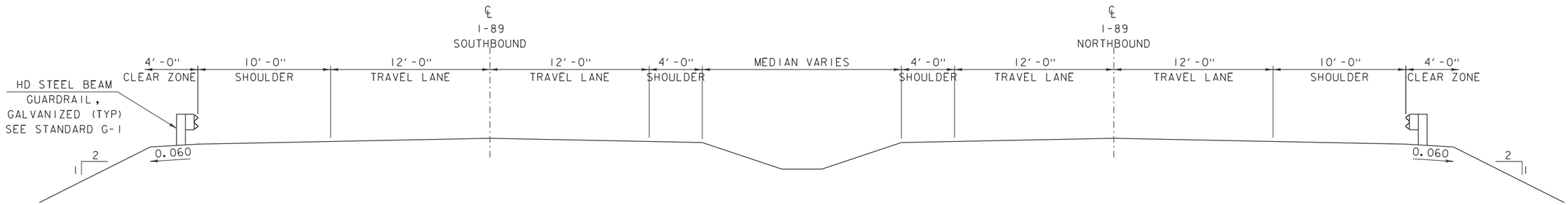
BRIDGE 76 ALTERNATIVE 1

SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 ALTERNATIVE 1	SHEET 10 OF 50

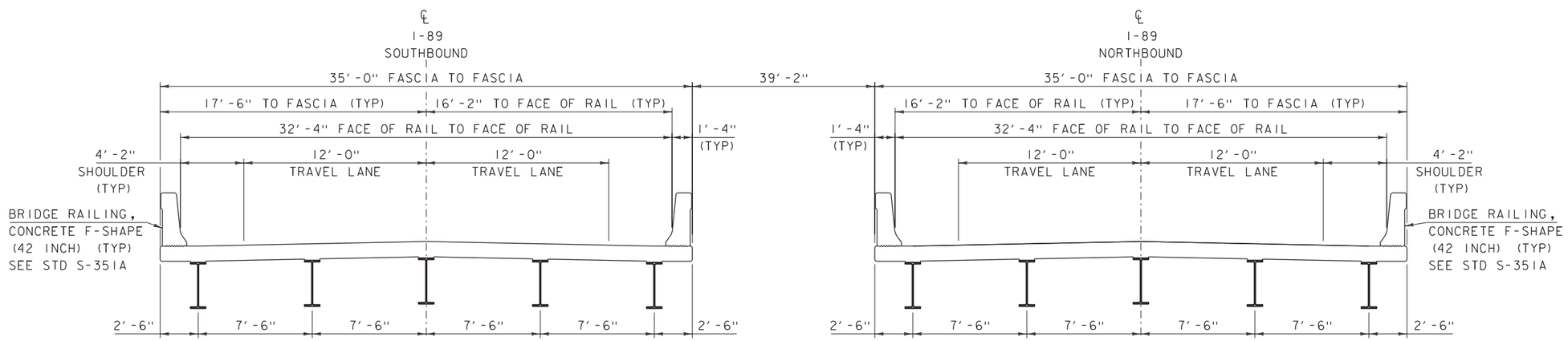


PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 ALTERNATIVE 1	SHEET 11 OF 50



EXISTING ROADWAY TYPICAL SECTION

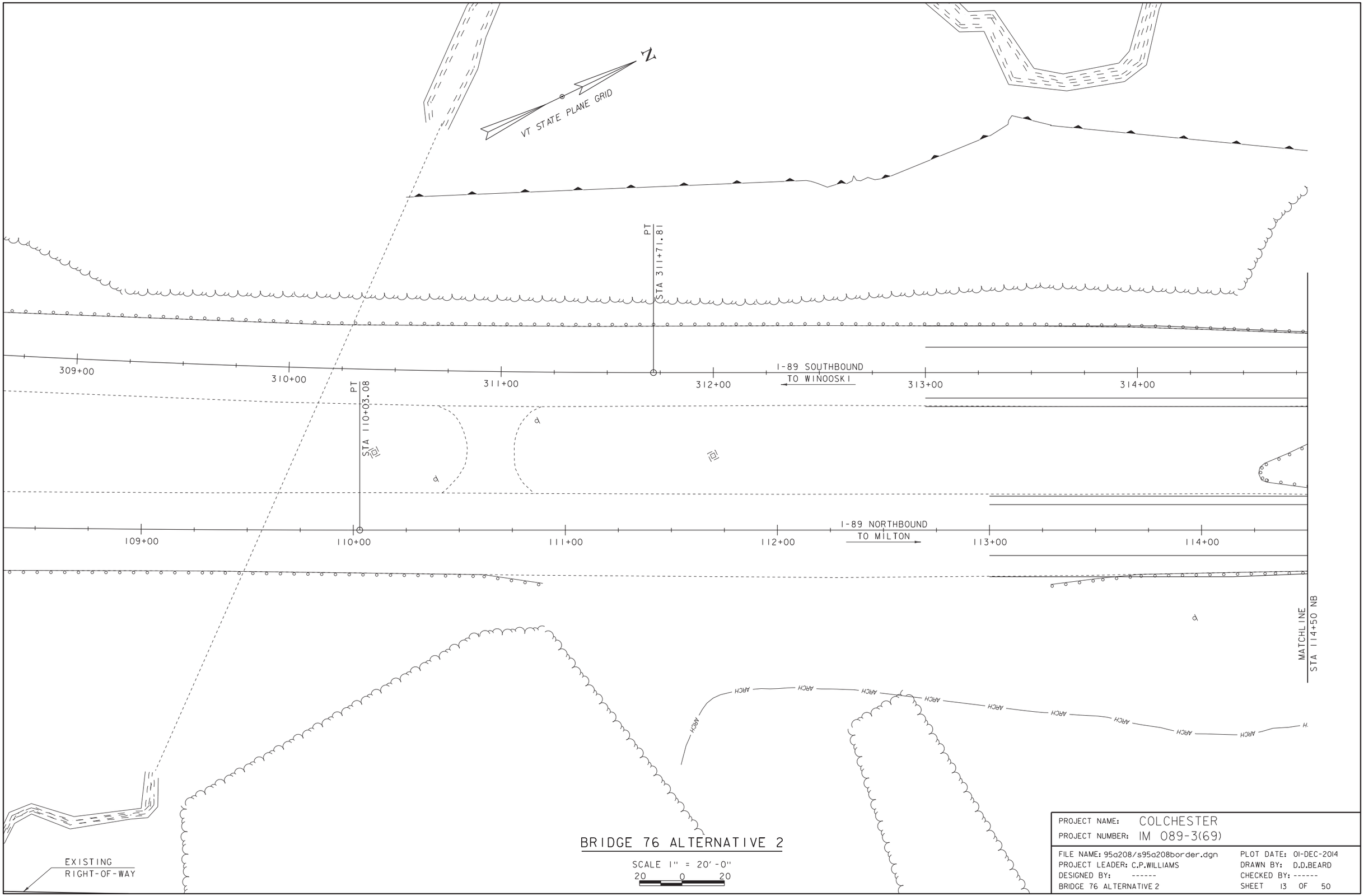
SCALE 1/4" = 1'-0"



BRIDGE 76 ALTERNATIVE #2 TYPICAL SECTION

SCALE 1/4" = 1'-0"

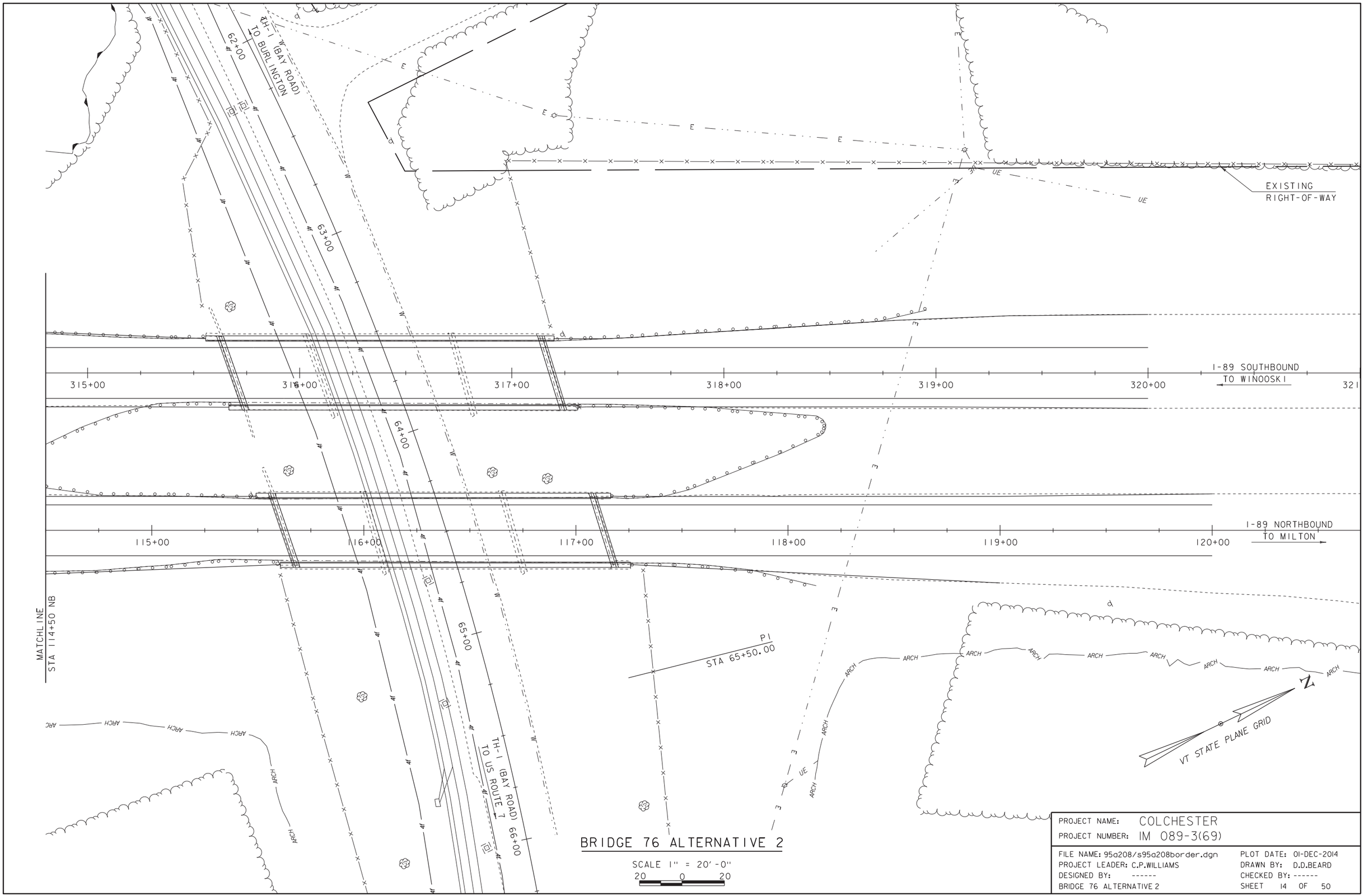
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BR 76 ALTERNATIVE 2 TYPICAL SECTIONS	SHEET 12 OF 50



BRIDGE 76 ALTERNATIVE 2

SCALE 1" = 20'-0"
20 0 20

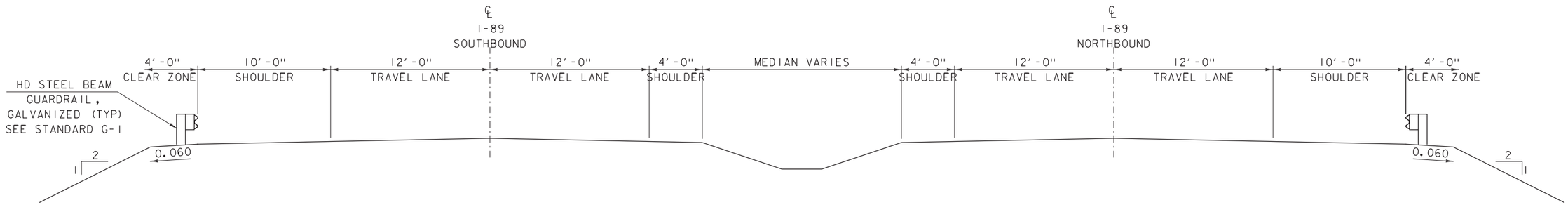
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 ALTERNATIVE 2	SHEET 13 OF 50



BRIDGE 76 ALTERNATIVE 2

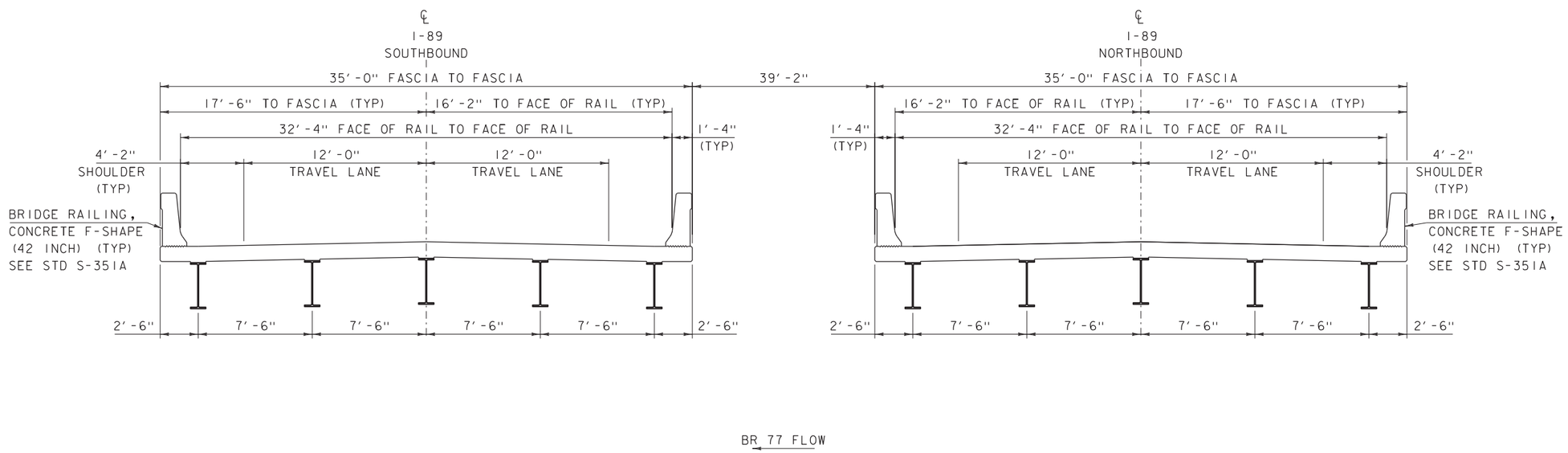
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 ALTERNATIVE 2	SHEET 14 OF 50



EXISTING ROADWAY TYPICAL SECTION

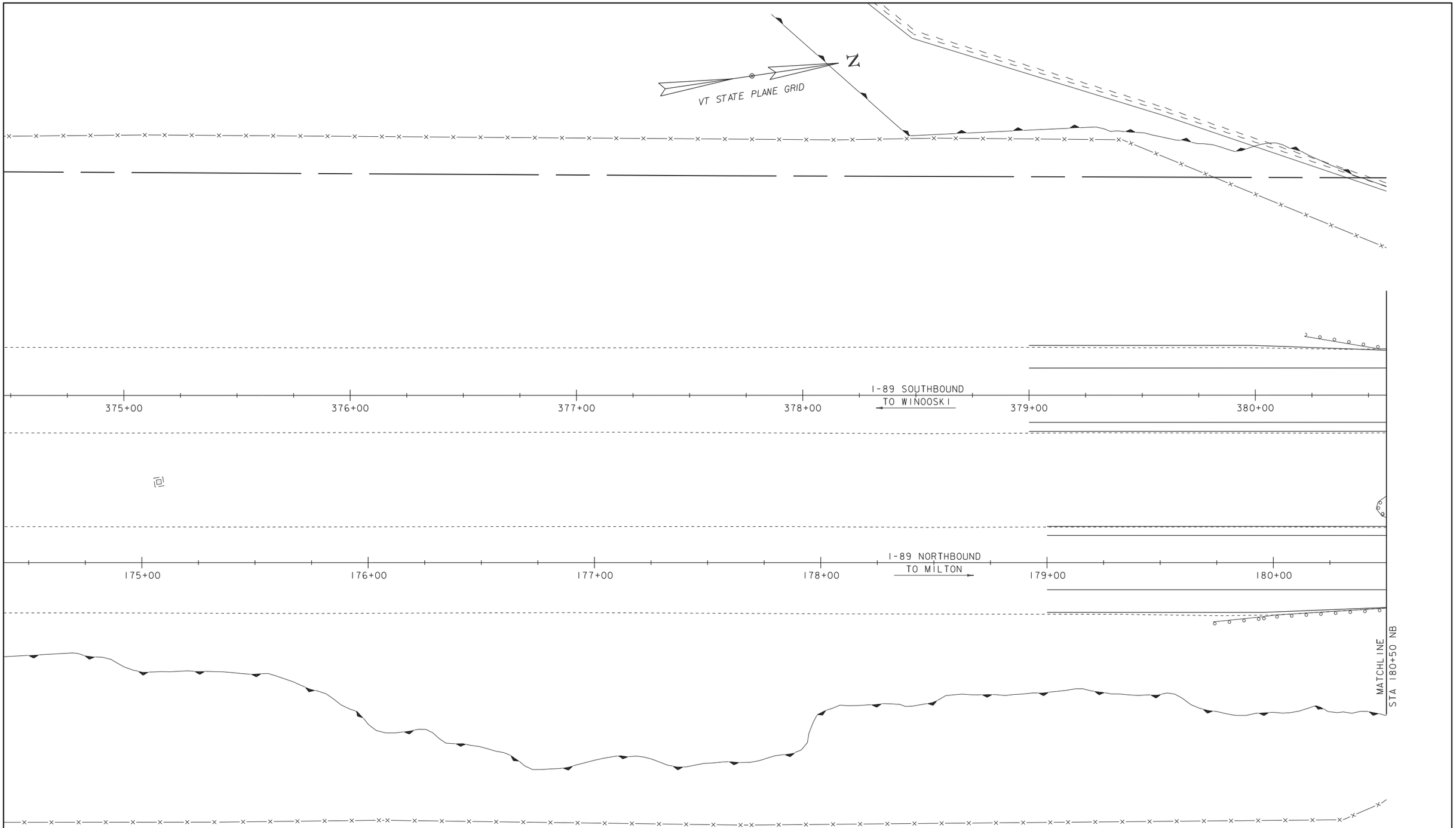
SCALE 1/4" = 1'-0"



BRIDGE 77 ALTERNATIVE #2 TYPICAL SECTION

SCALE 1/4" = 1'-0"

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BR 77 ALTERNATIVE 2 TYPICAL SECTIONS	SHEET 15 OF 50

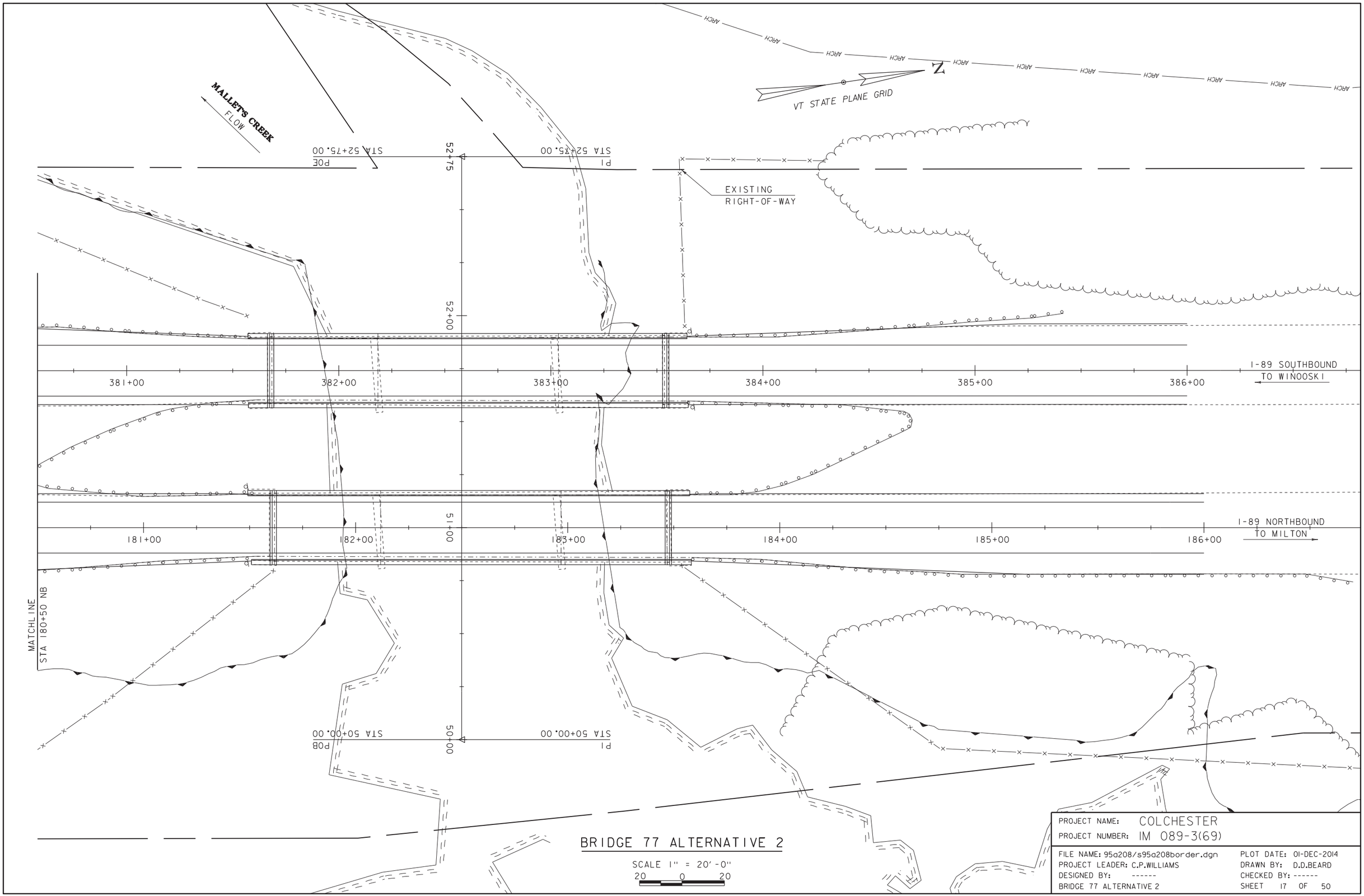


EXISTING
RIGHT-OF-WAY

BRIDGE 77 ALTERNATIVE 2

SCALE 1" = 20'-0"
20 0 20

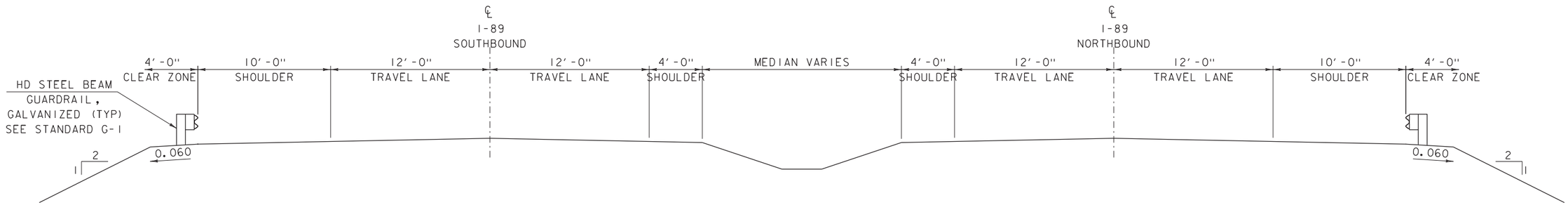
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 ALTERNATIVE 2	SHEET 16 OF 50



BRIDGE 77 ALTERNATIVE 2

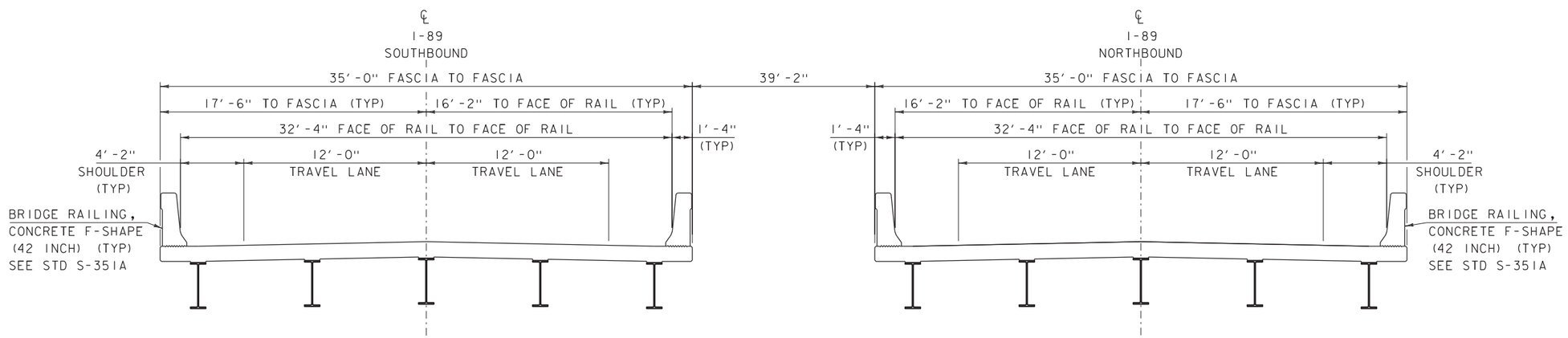
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 ALTERNATIVE 2	SHEET 17 OF 50



PROPOSED ROADWAY TYPICAL SECTION

SCALE 1/4" = 1'-0"

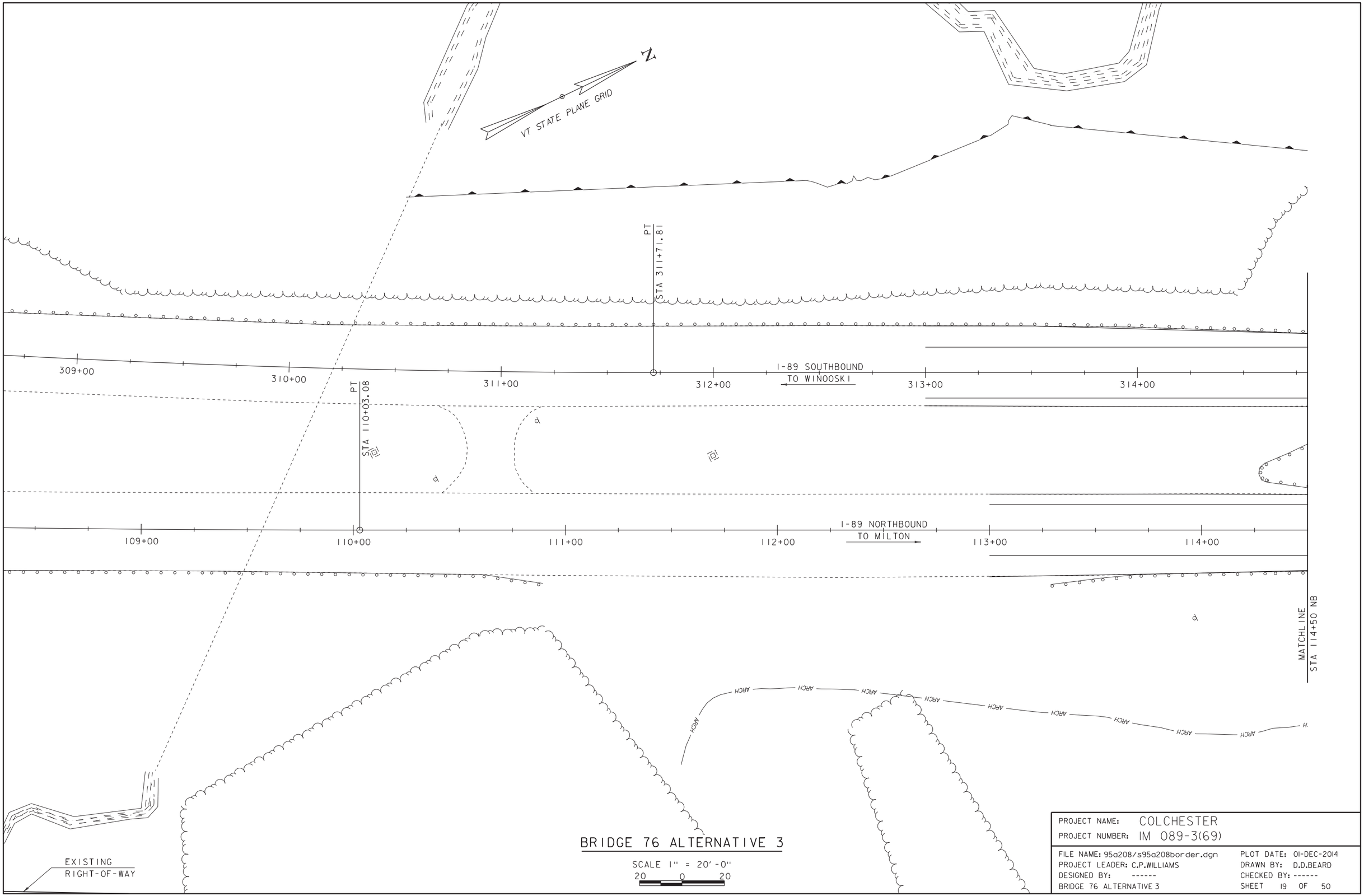


BRIDGE 76 ALTERNATIVE #3 TYPICAL SECTION

SCALE 1/4" = 1'-0"

NOTE: SUBSTRUCTURE NOT YET DESIGNED

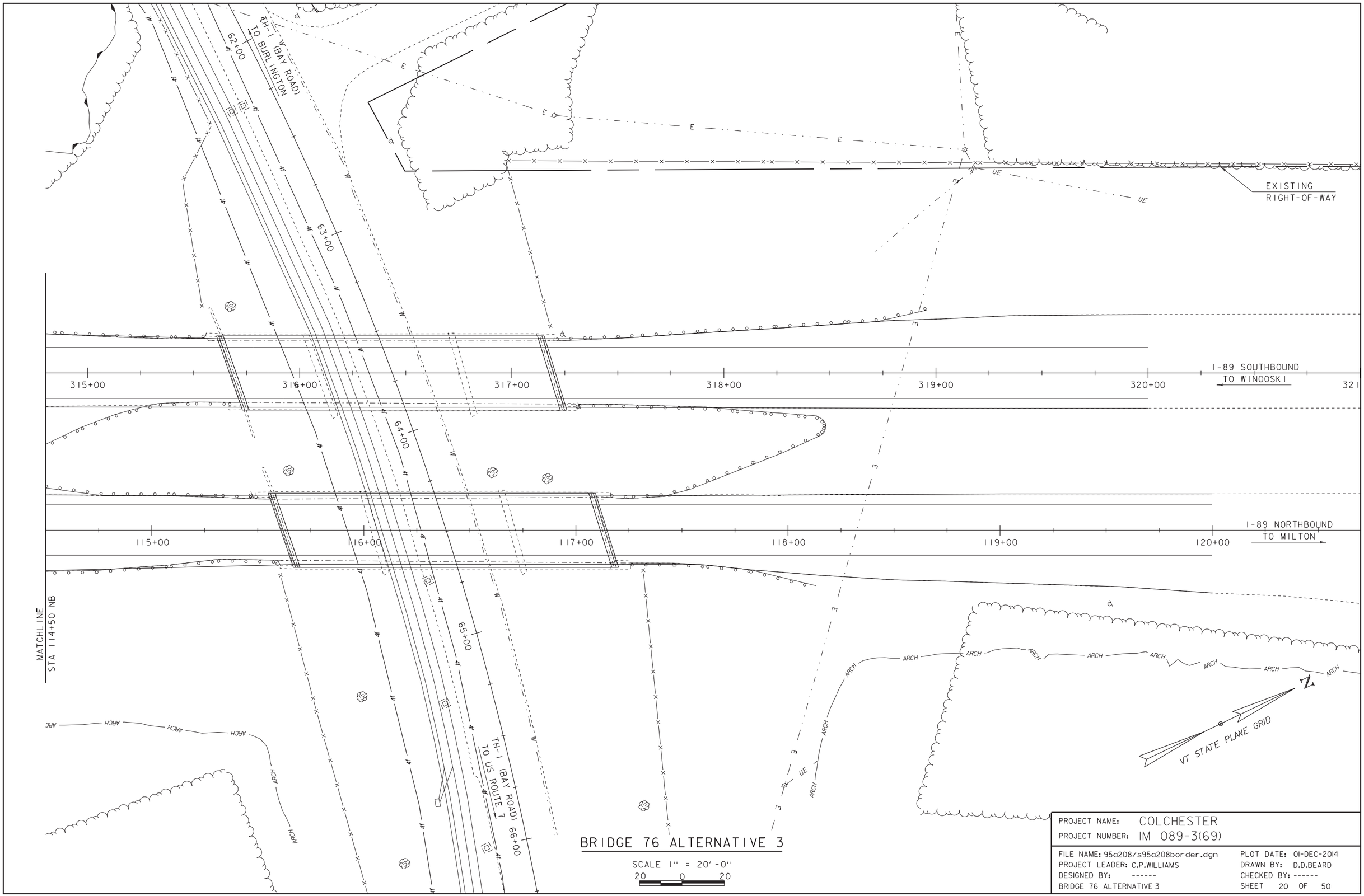
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BR 76 ALTERNATIVE 3 TYPICAL SECTIONS	SHEET 18 OF 50



BRIDGE 76 ALTERNATIVE 3

SCALE 1" = 20'-0"
20 0 20

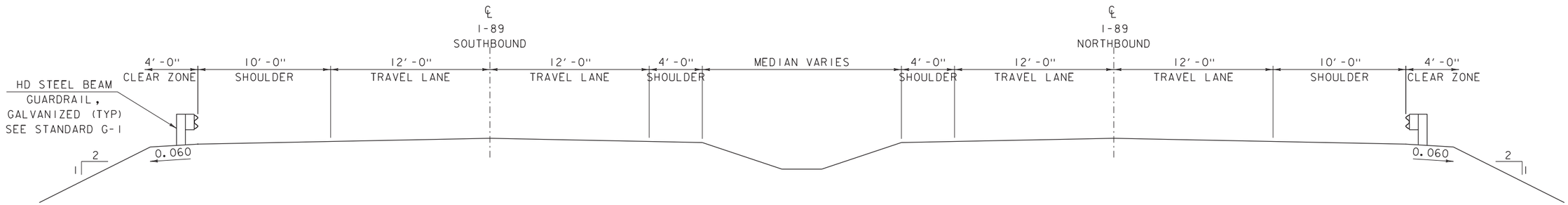
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 ALTERNATIVE 3	SHEET 19 OF 50



BRIDGE 76 ALTERNATIVE 3

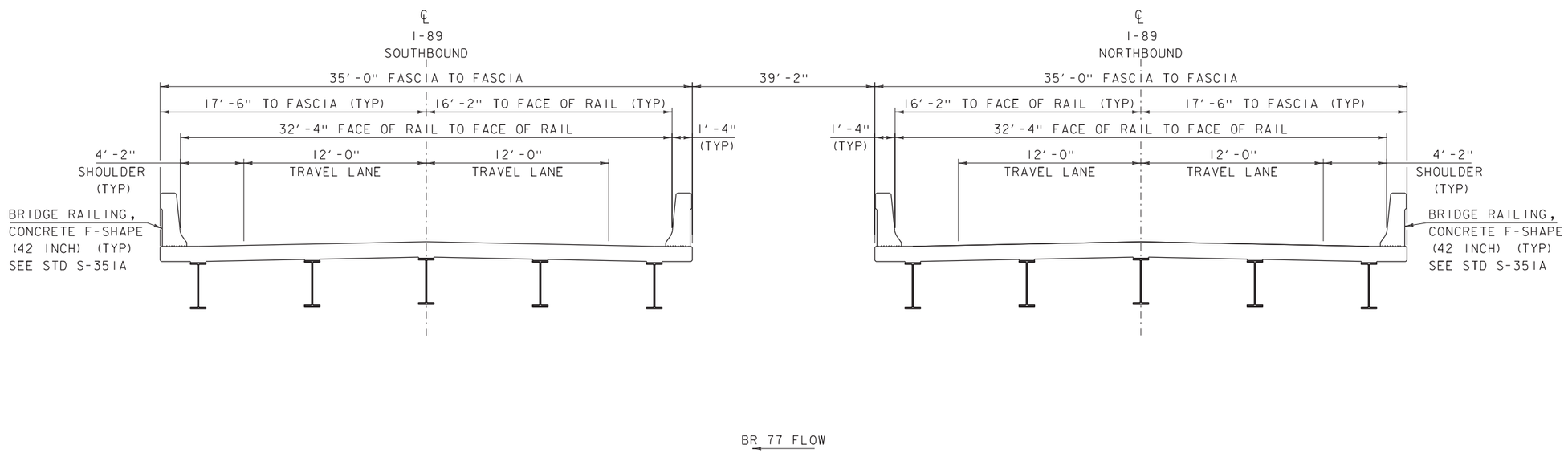
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 ALTERNATIVE 3	SHEET 20 OF 50



PROPOSED ROADWAY TYPICAL SECTION

SCALE 1/4" = 1'-0"

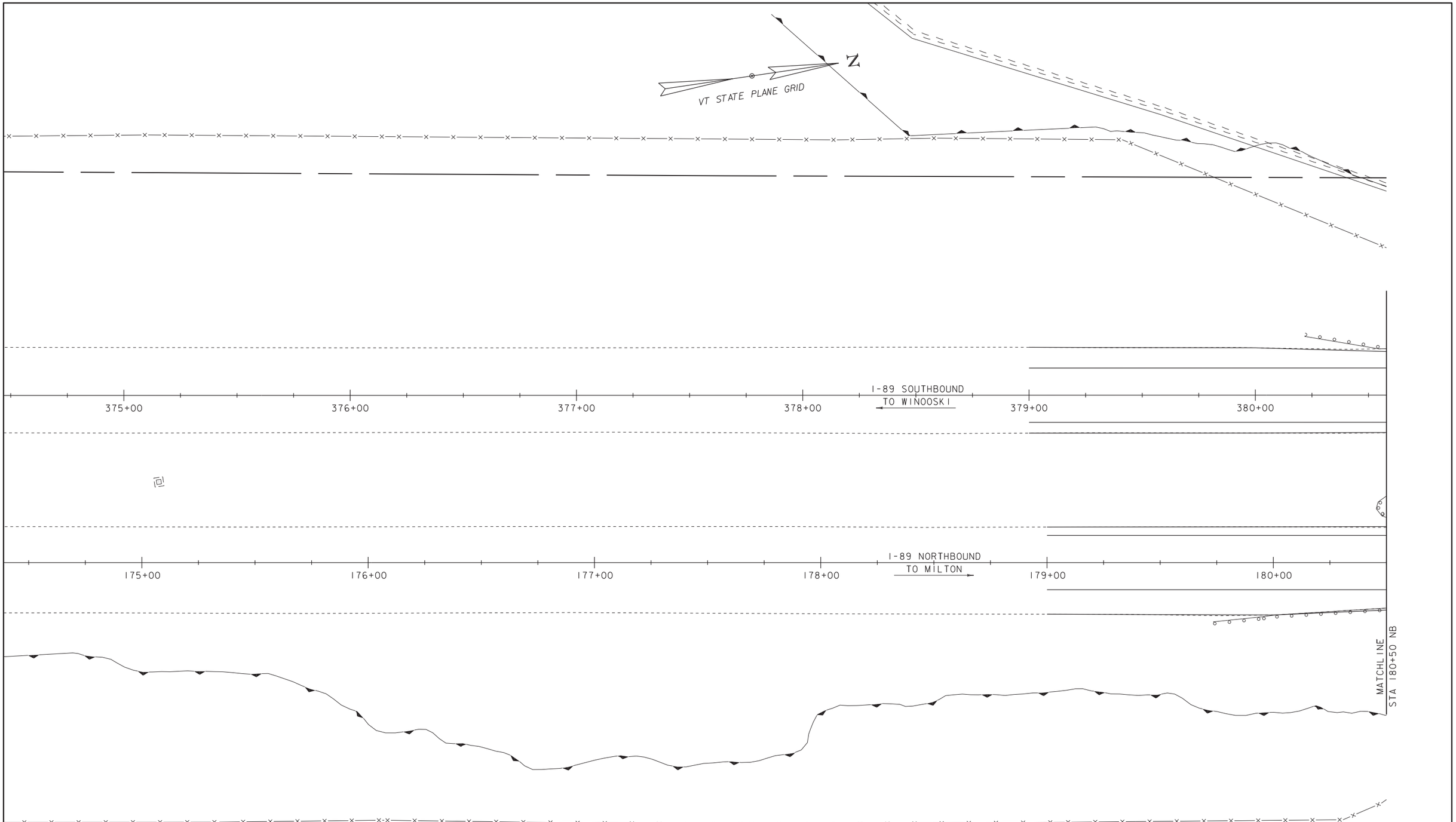


BRIDGE 77 ALTERNATIVE #3 TYPICAL SECTION

SCALE 1/4" = 1'-0"

NOTE: SUBSTRUCTURE NOT YET DESIGNED

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BR 77 ALTERNATIVE 3 TYPICAL SECTIONS	SHEET 21 OF 50

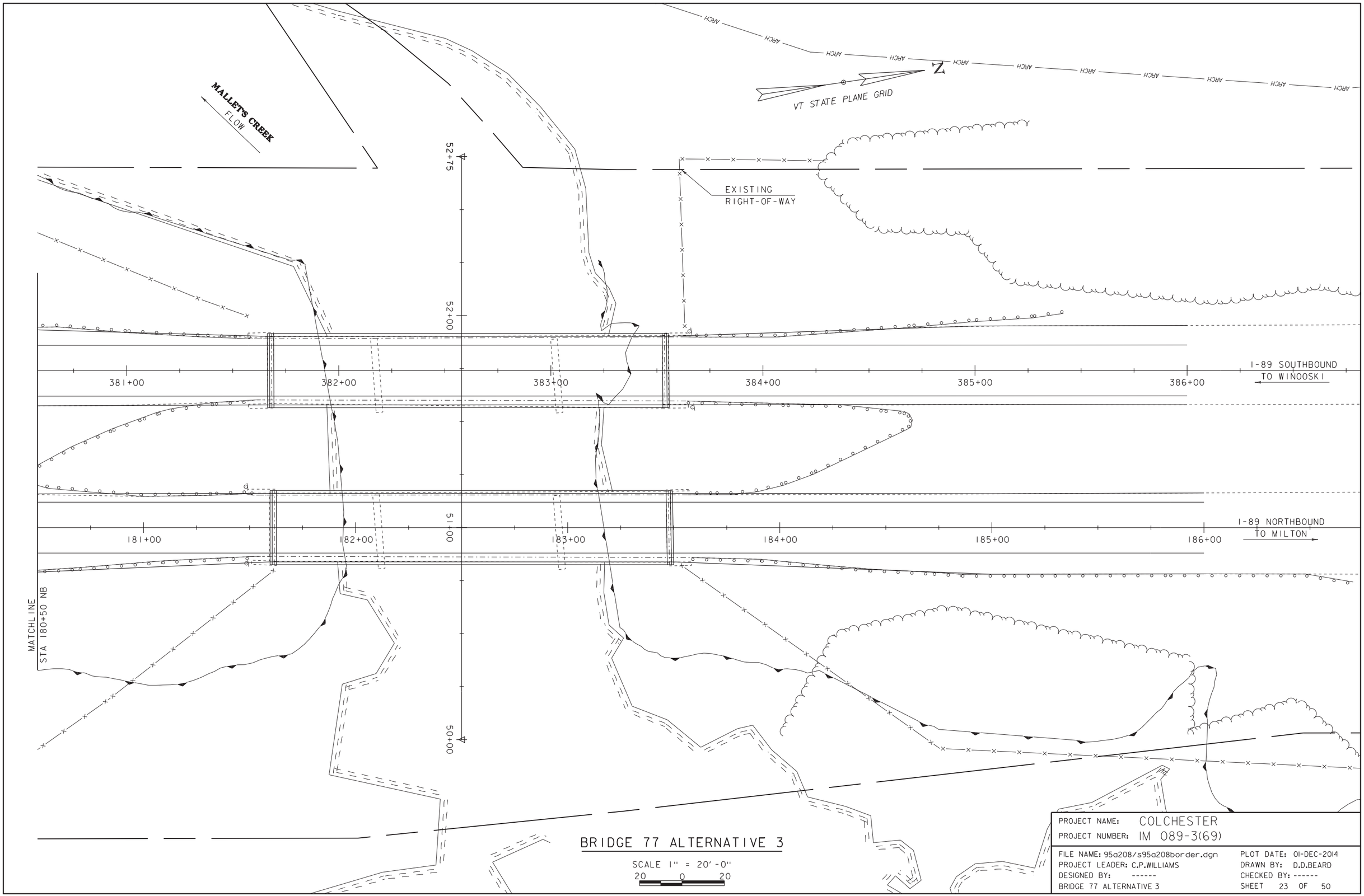


EXISTING
RIGHT-OF-WAY

BRIDGE 77 ALTERNATIVE 3

SCALE 1" = 20'-0"
20 0 20

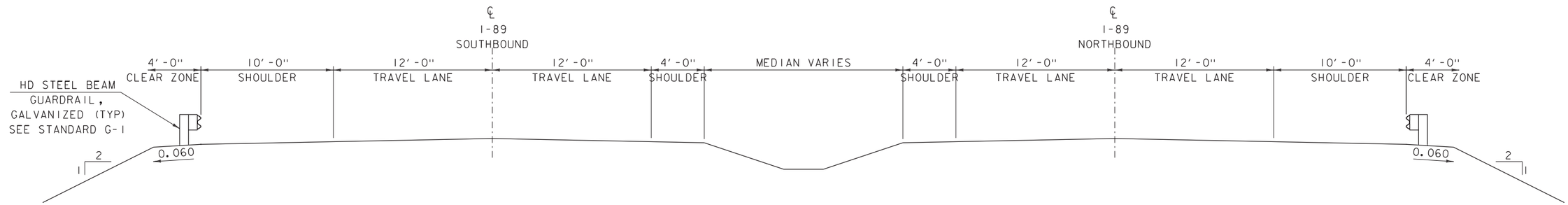
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 ALTERNATIVE 3	SHEET 22 OF 50



BRIDGE 77 ALTERNATIVE 3

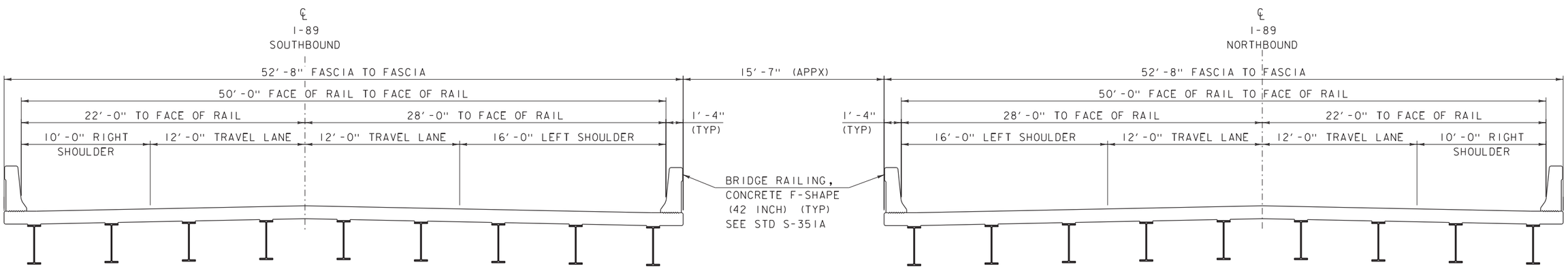
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 ALTERNATIVE 3	SHEET 23 OF 50



PROPOSED ROADWAY TYPICAL SECTION

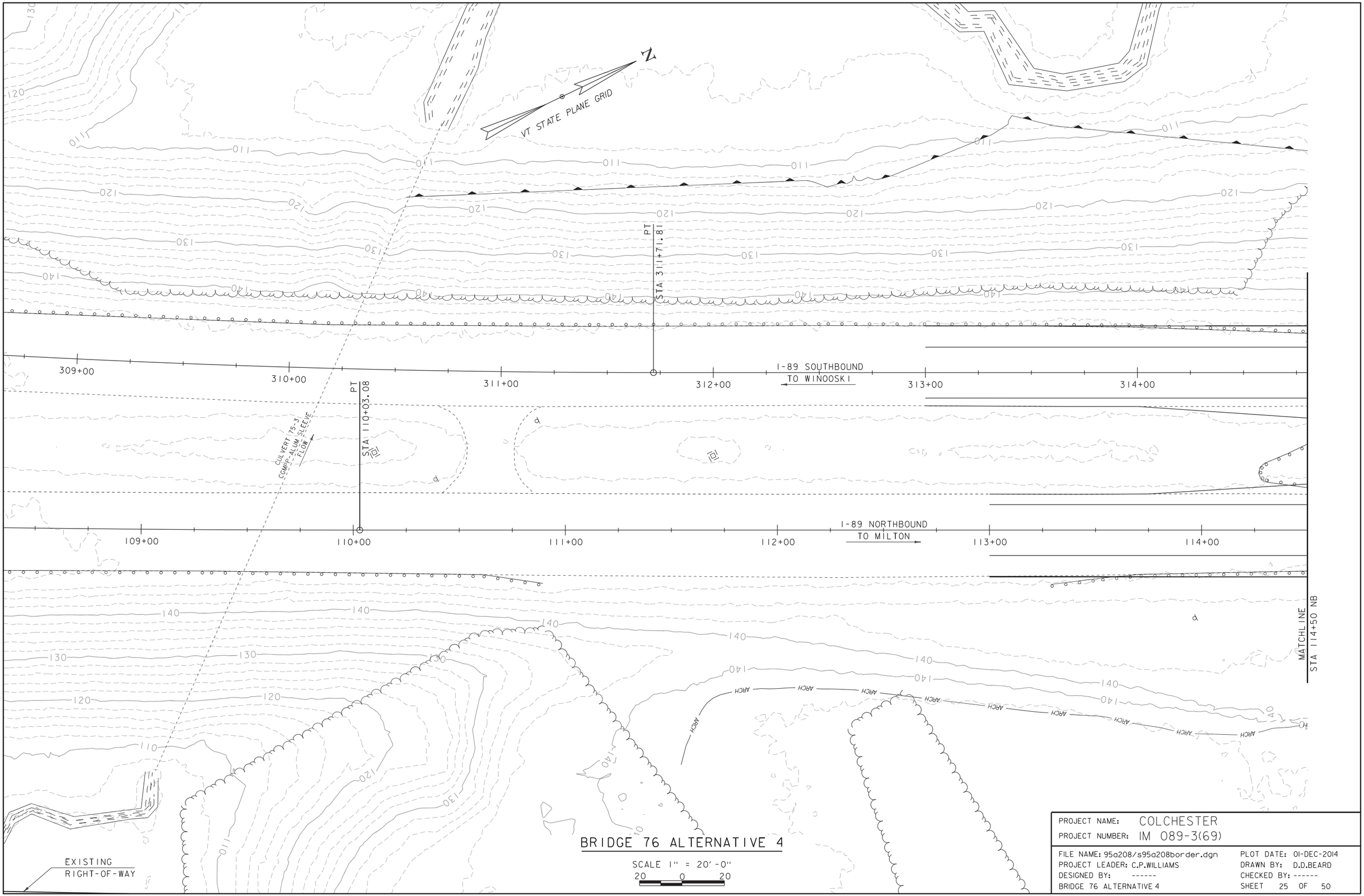
SCALE 1/4" = 1'-0"



BRIDGE 76 ALTERNATIVE #4 TYPICAL SECTION

SCALE 1/4" = 1'-0"
NOTE: SUBSTRUCTURE NOT YET DESIGNED

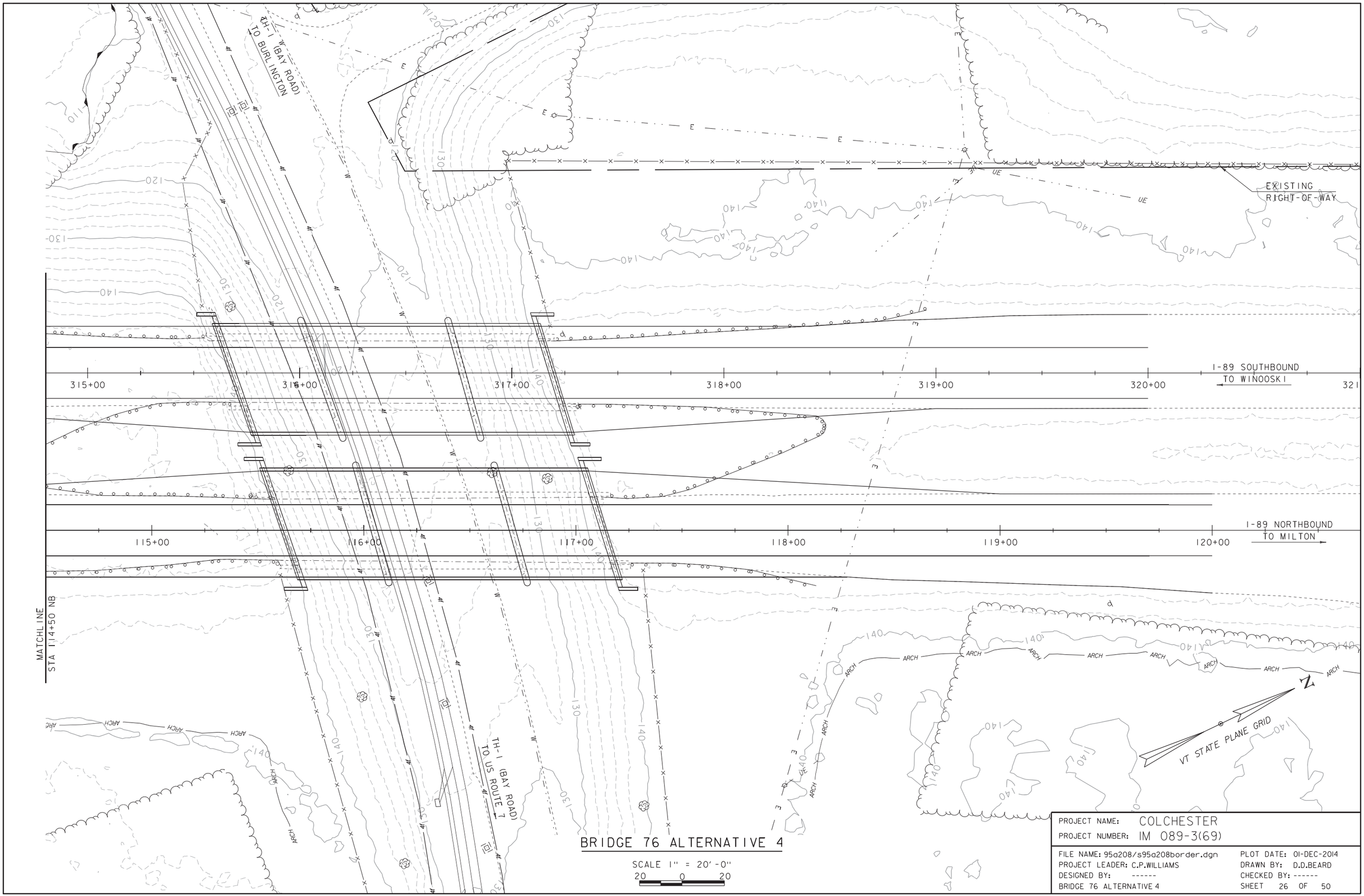
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BR 76 ALTERNATIVE 4 TYPICAL SECTIONS	SHEET 24 OF 50



BRIDGE 76 ALTERNATIVE 4

SCALE 1" = 20'-0"
20 0 20

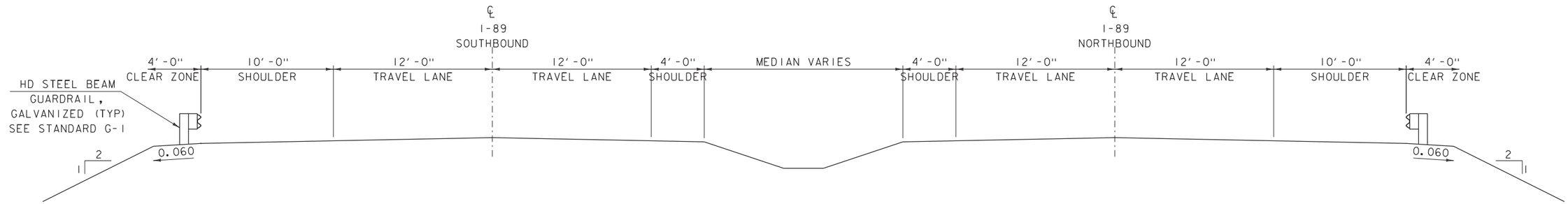
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 ALTERNATIVE 4	SHEET 25 OF 50



BRIDGE 76 ALTERNATIVE 4

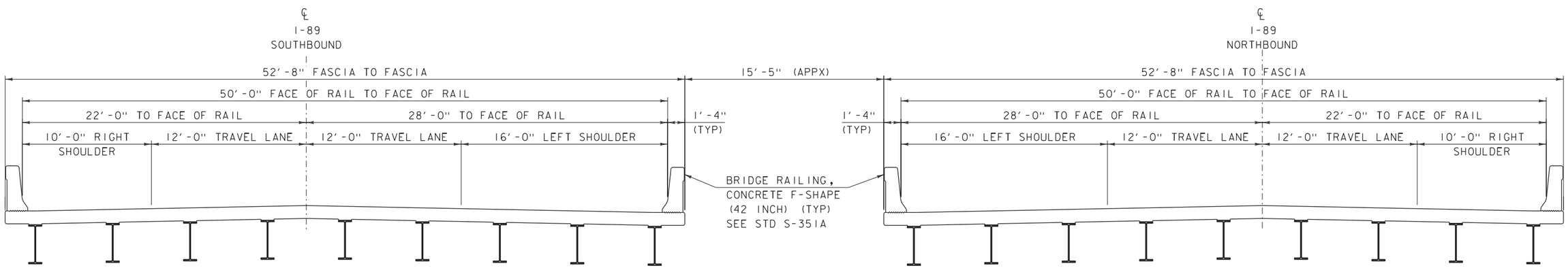
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 ALTERNATIVE 4	SHEET 26 OF 50



PROPOSED ROADWAY TYPICAL SECTION

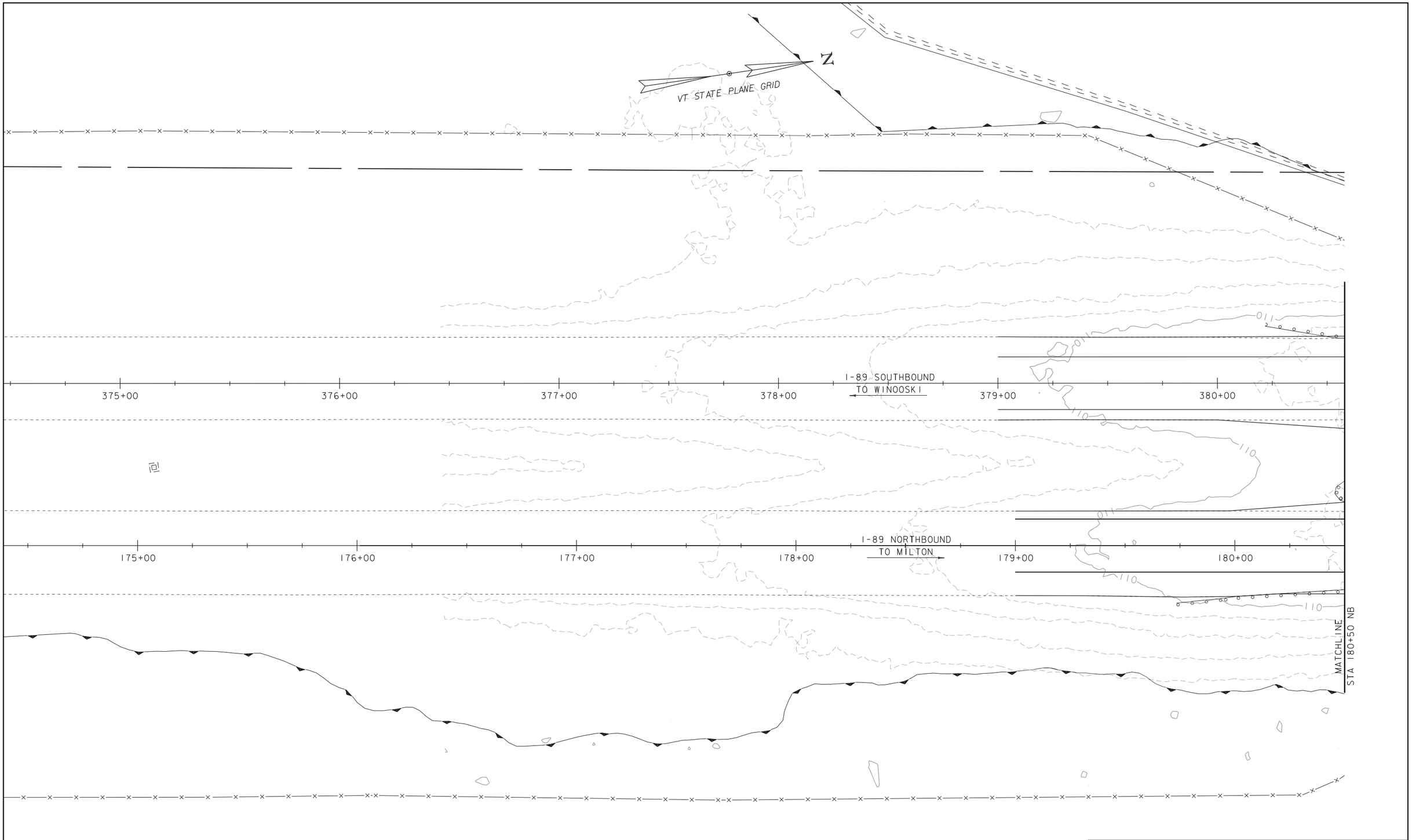
SCALE 1/4" = 1'-0"



BRIDGE 77 ALTERNATIVE #4 TYPICAL SECTION

SCALE 1/4" = 1'-0"
NOTE: SUBSTRUCTURE NOT YET DESIGNED

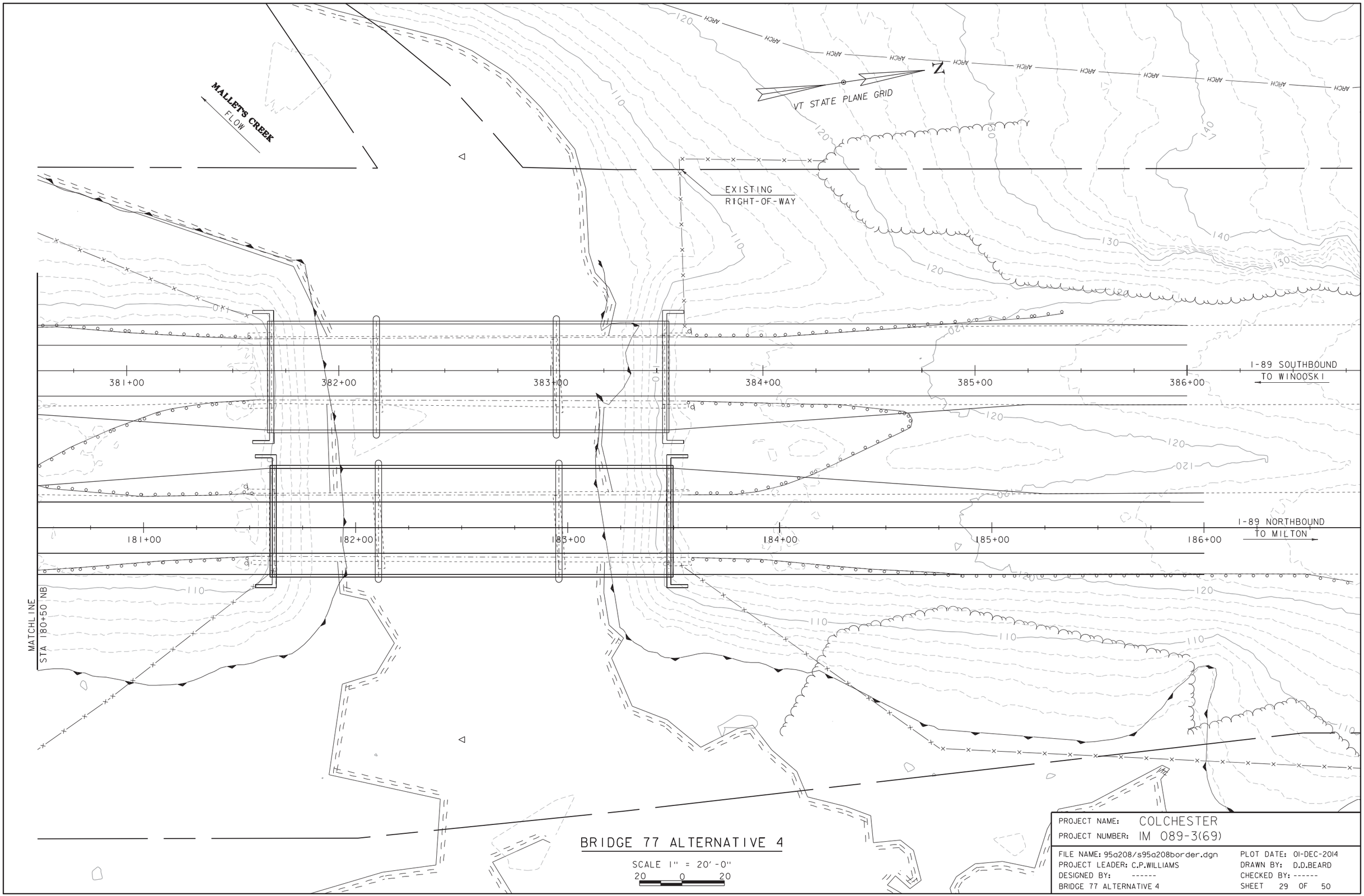
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BR 77 ALTERNATIVE 4 TYPICAL SECTIONS	SHEET 27 OF 50



BRIDGE 77 ALTERNATIVE 4

SCALE 1" = 20'-0"
20 0 20

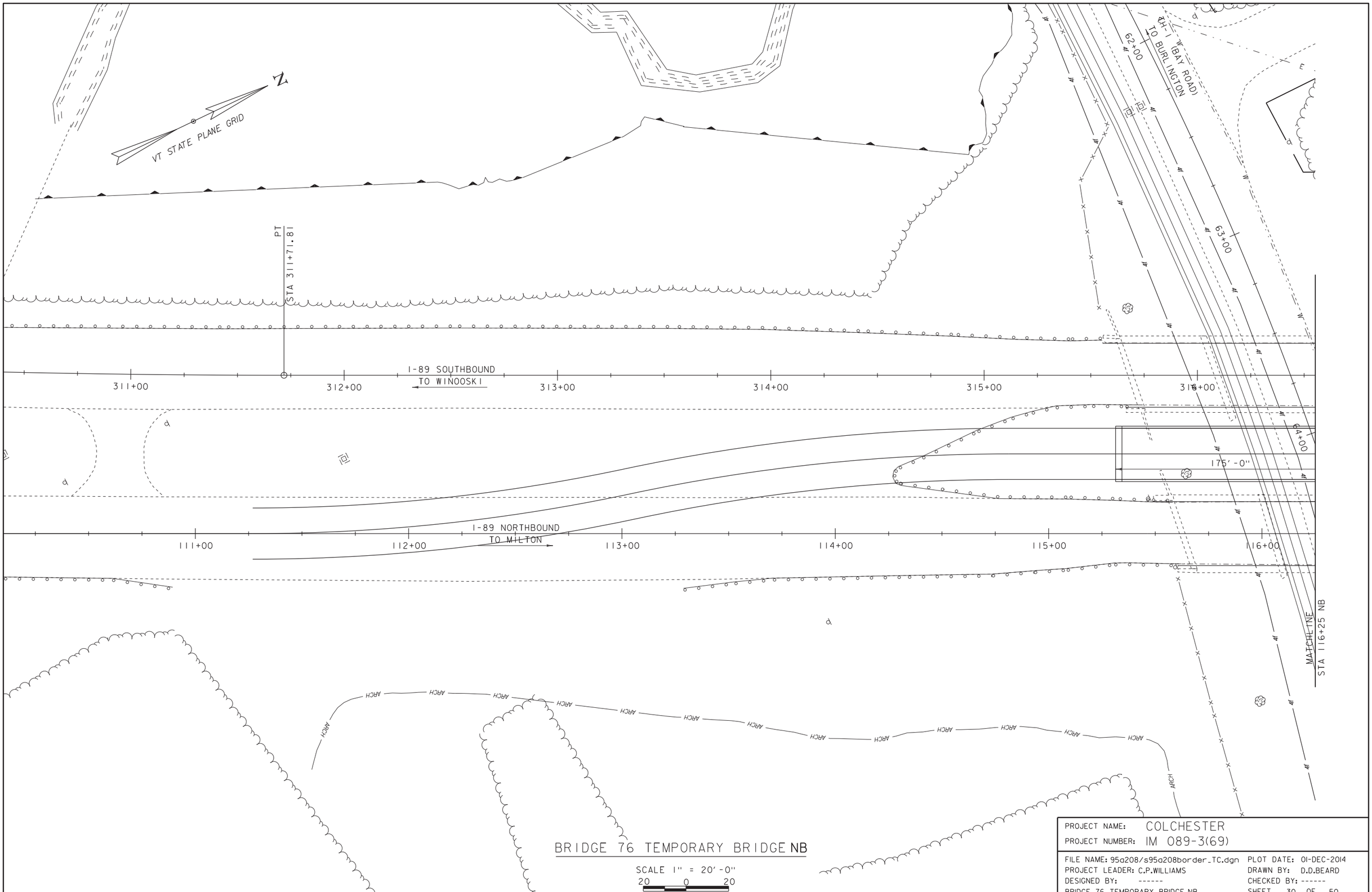
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 ALTERNATIVE 4	SHEET 28 OF 50



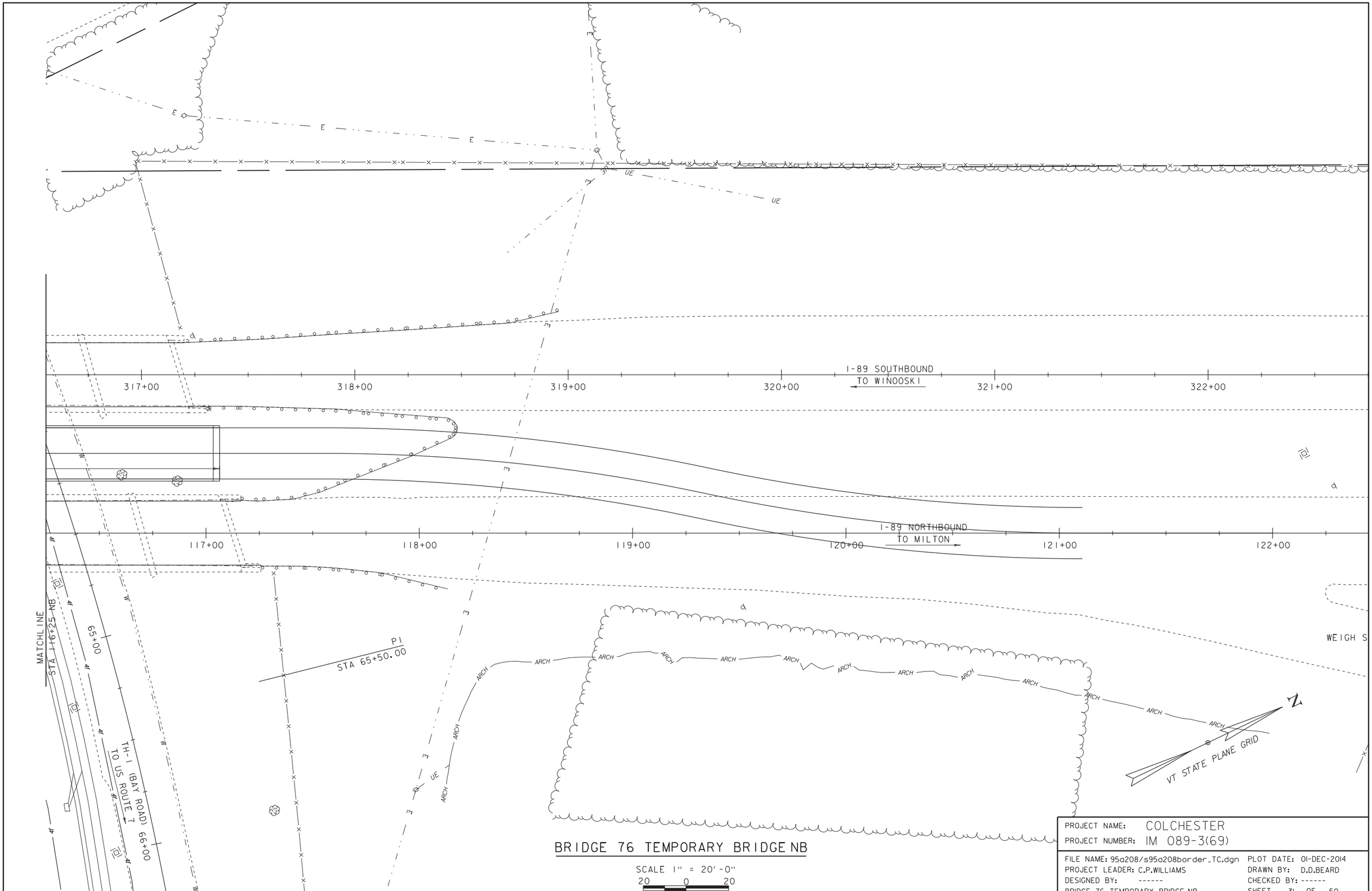
BRIDGE 77 ALTERNATIVE 4

SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 ALTERNATIVE 4	SHEET 29 OF 50



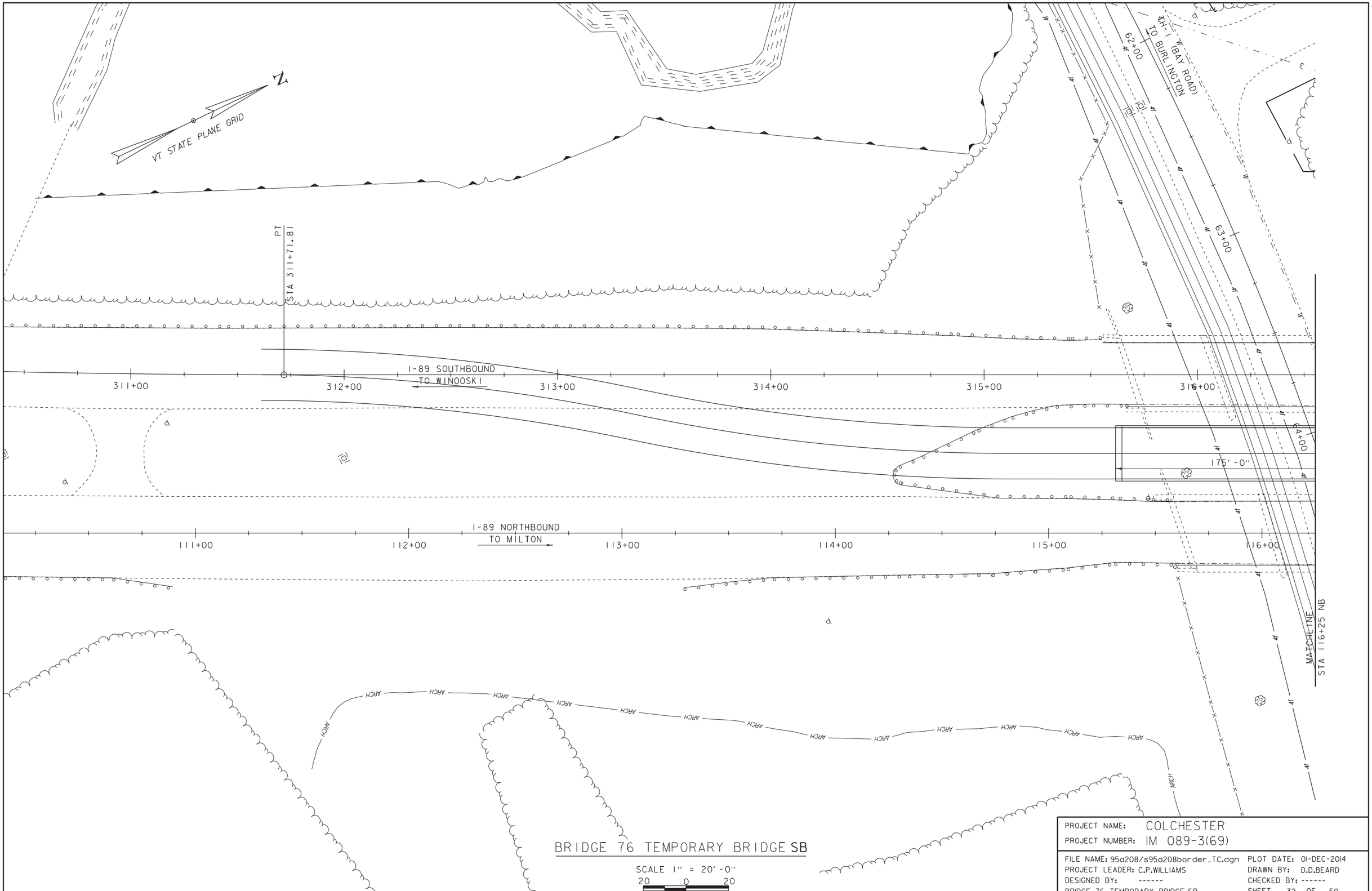
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 TEMPORARY BRIDGE NB	SHEET 30 OF 50



BRIDGE 76 TEMPORARY BRIDGE NB

SCALE 1" = 20'-0"
20 0 20

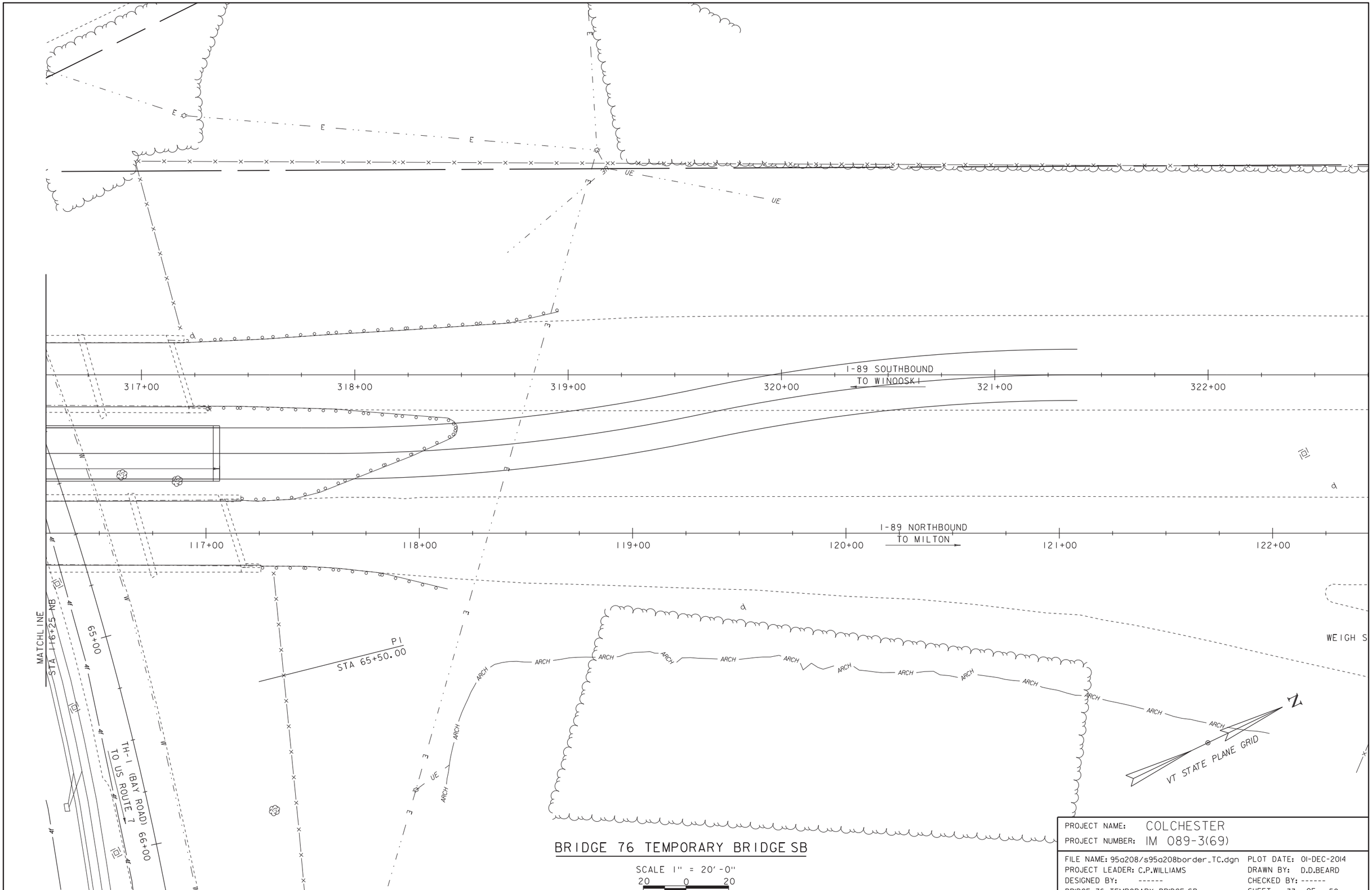
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 TEMPORARY BRIDGE NB	SHEET 31 OF 50



BRIDGE 76 TEMPORARY BRIDGE SB

SCALE 1" = 20'-0"
20 0 20

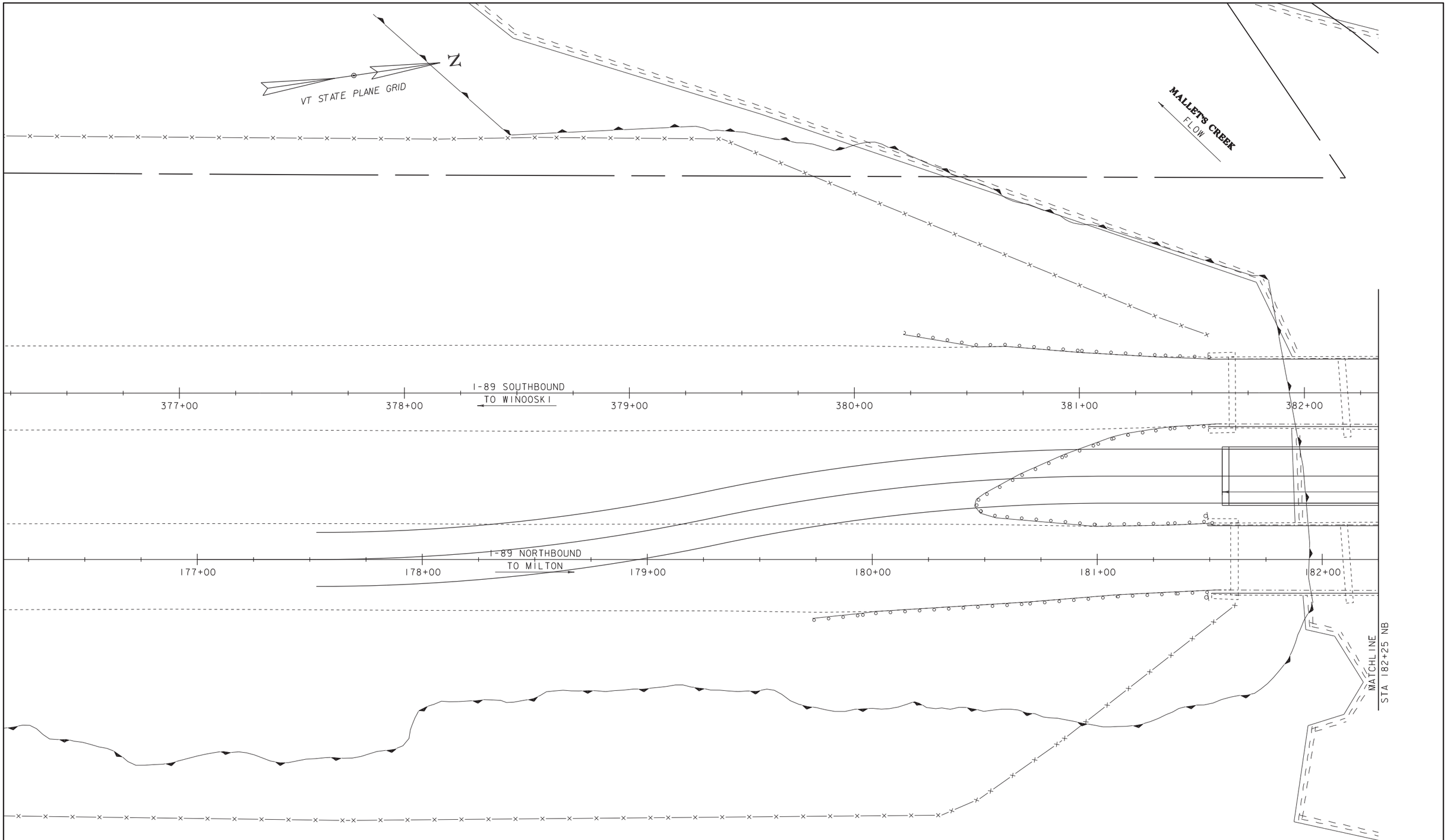
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 TEMPORARY BRIDGE SB	SHEET 32 OF 50



BRIDGE 76 TEMPORARY BRIDGE SB

SCALE 1" = 20'-0"
20 0 20

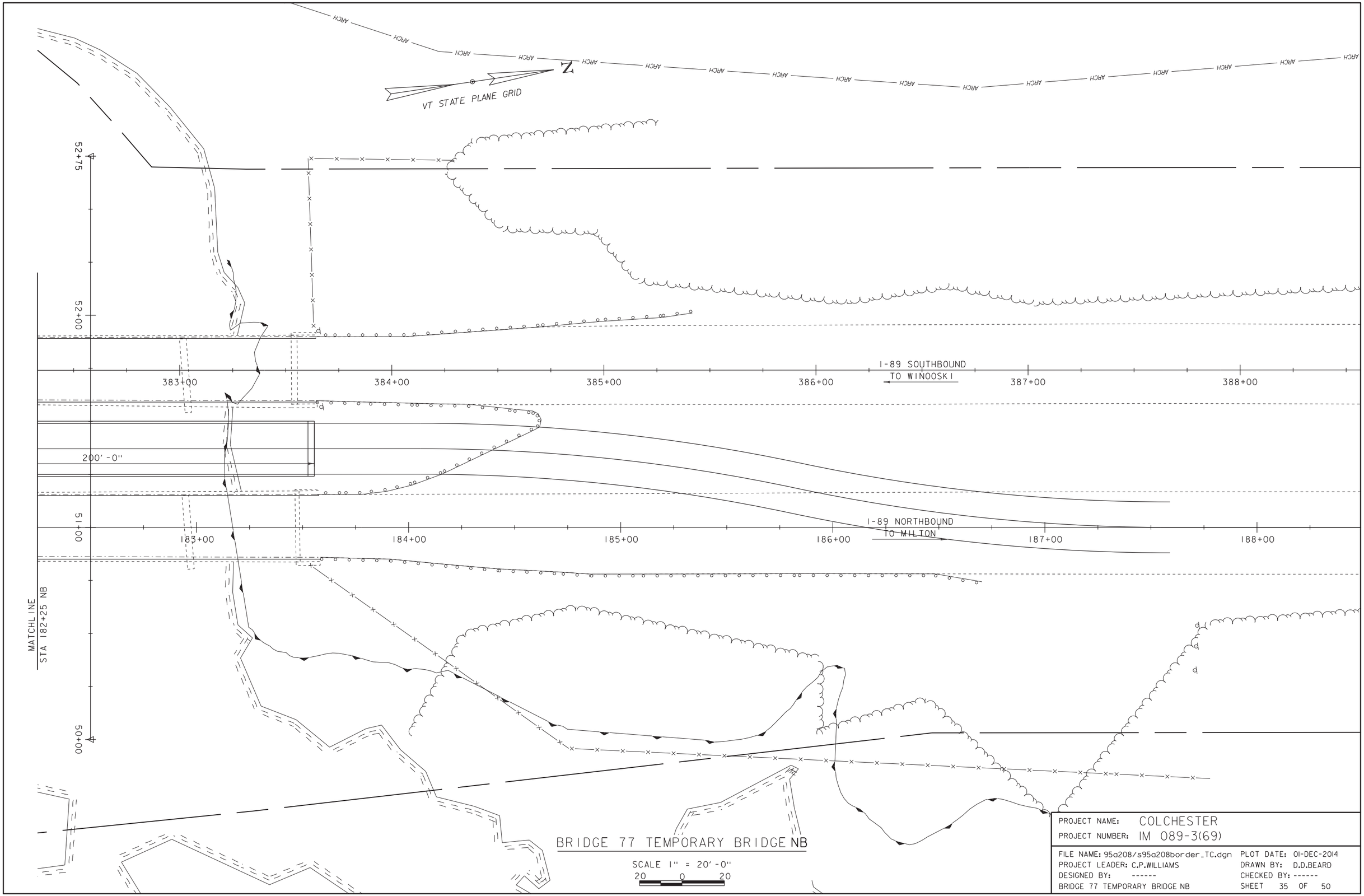
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 TEMPORARY BRIDGE SB	SHEET 33 OF 50



BRIDGE 77 TEMPORARY BRIDGE NB

SCALE 1" = 20'-0"
20 0 20

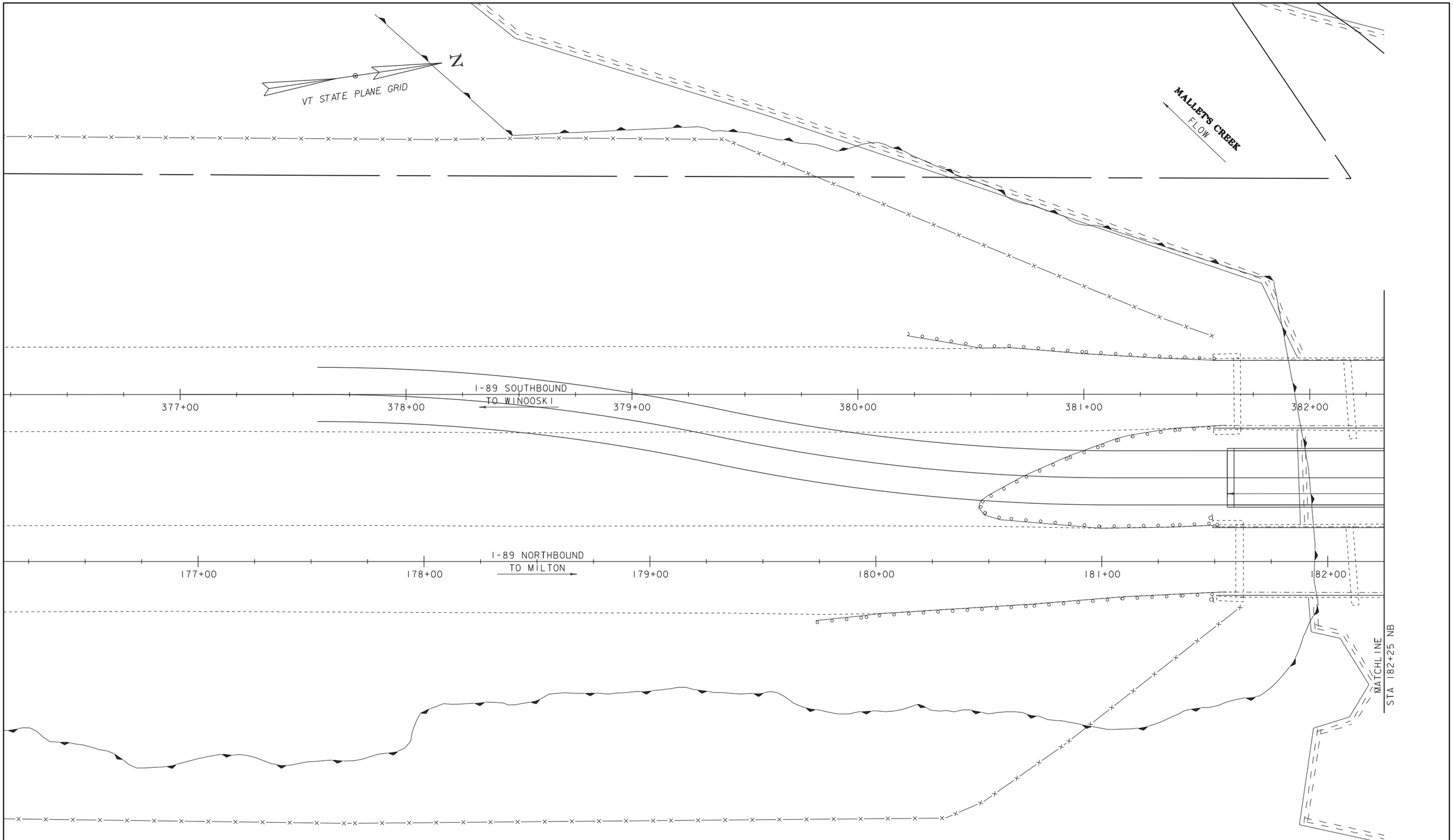
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 TEMPORARY BRIDGE NB	SHEET 34 OF 50



PROJECT NAME: COLCHESTER
PROJECT NUMBER: IM 089-3(69)

FILE NAME: 95a208/s95a208border_TC.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
BRIDGE 77 TEMPORARY BRIDGE NB

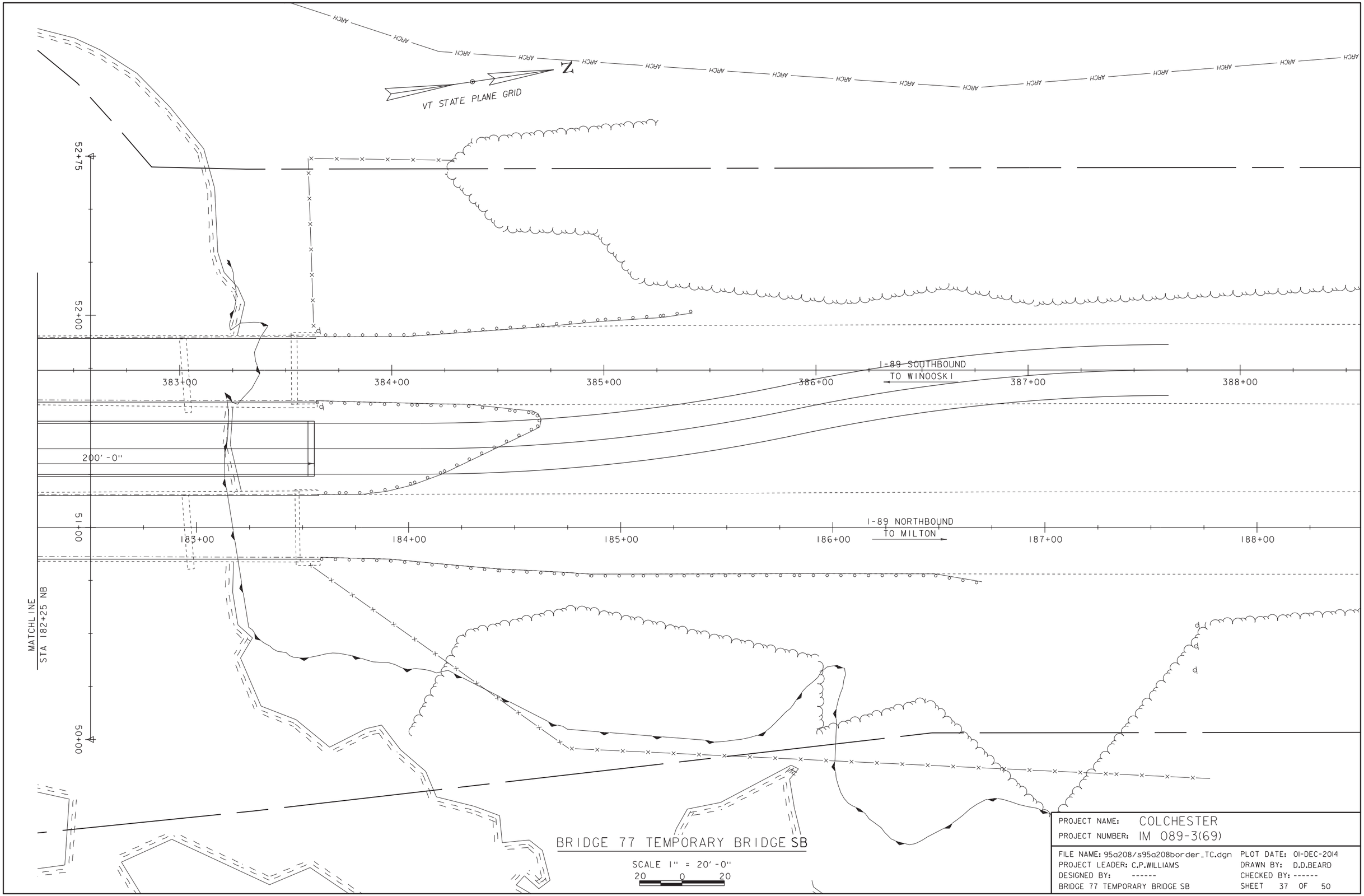
PLOT DATE: 01-DEC-2014
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 35 OF 50



BRIDGE 77 TEMPORARY BRIDGE SB

SCALE 1" = 20'-0"
20 0 20

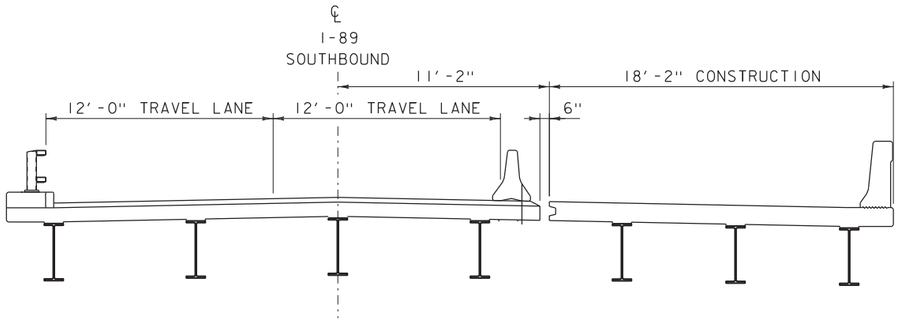
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 TEMPORARY BRIDGE SB	SHEET 36 OF 50

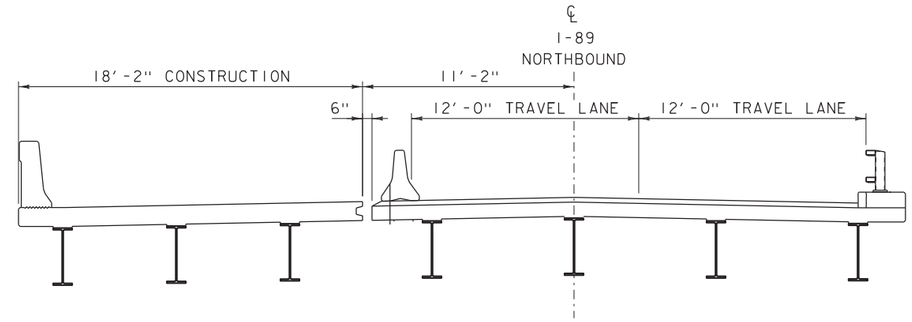


PROJECT NAME: COLCHESTER
PROJECT NUMBER: IM 089-3(69)

FILE NAME: 95a208/s95a208border_TC.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
BRIDGE 77 TEMPORARY BRIDGE SB

PLOT DATE: 01-DEC-2014
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 37 OF 50

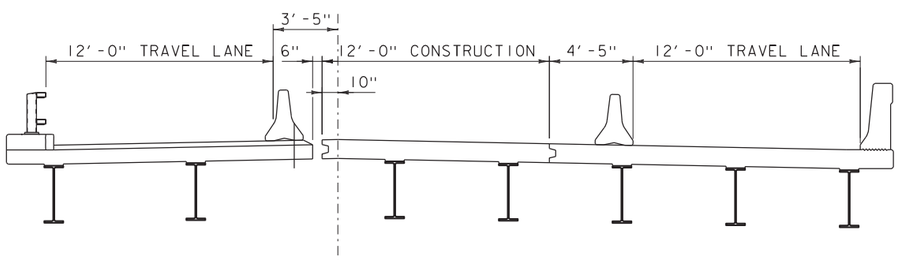


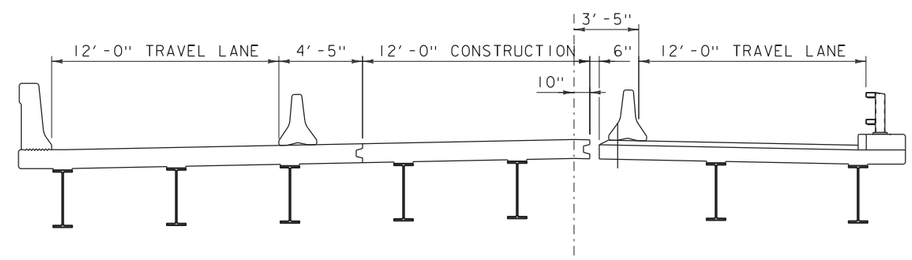


BR 77 FLOW

BRIDGE 76 & 77 PHASE #1 TYPICAL SECTION

SCALE 1/4" = 1'-0"

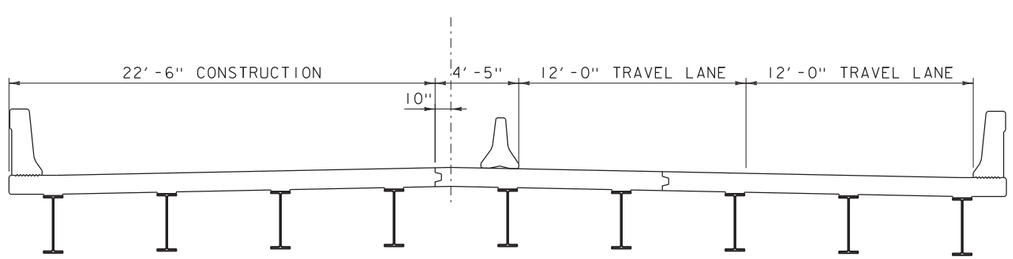


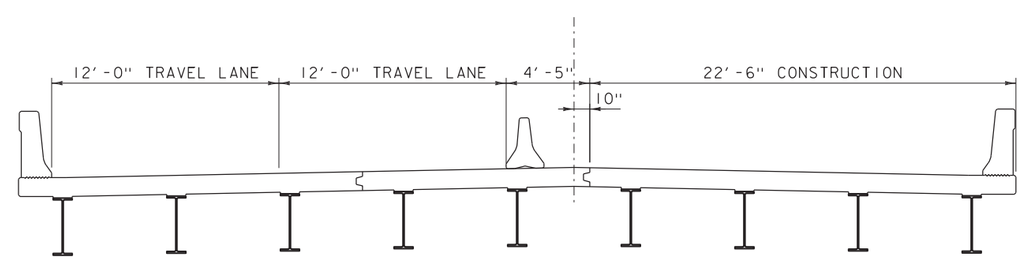


BR 77 FLOW

BRIDGE 76 & 77 PHASE #2 TYPICAL SECTION

SCALE 1/4" = 1'-0"



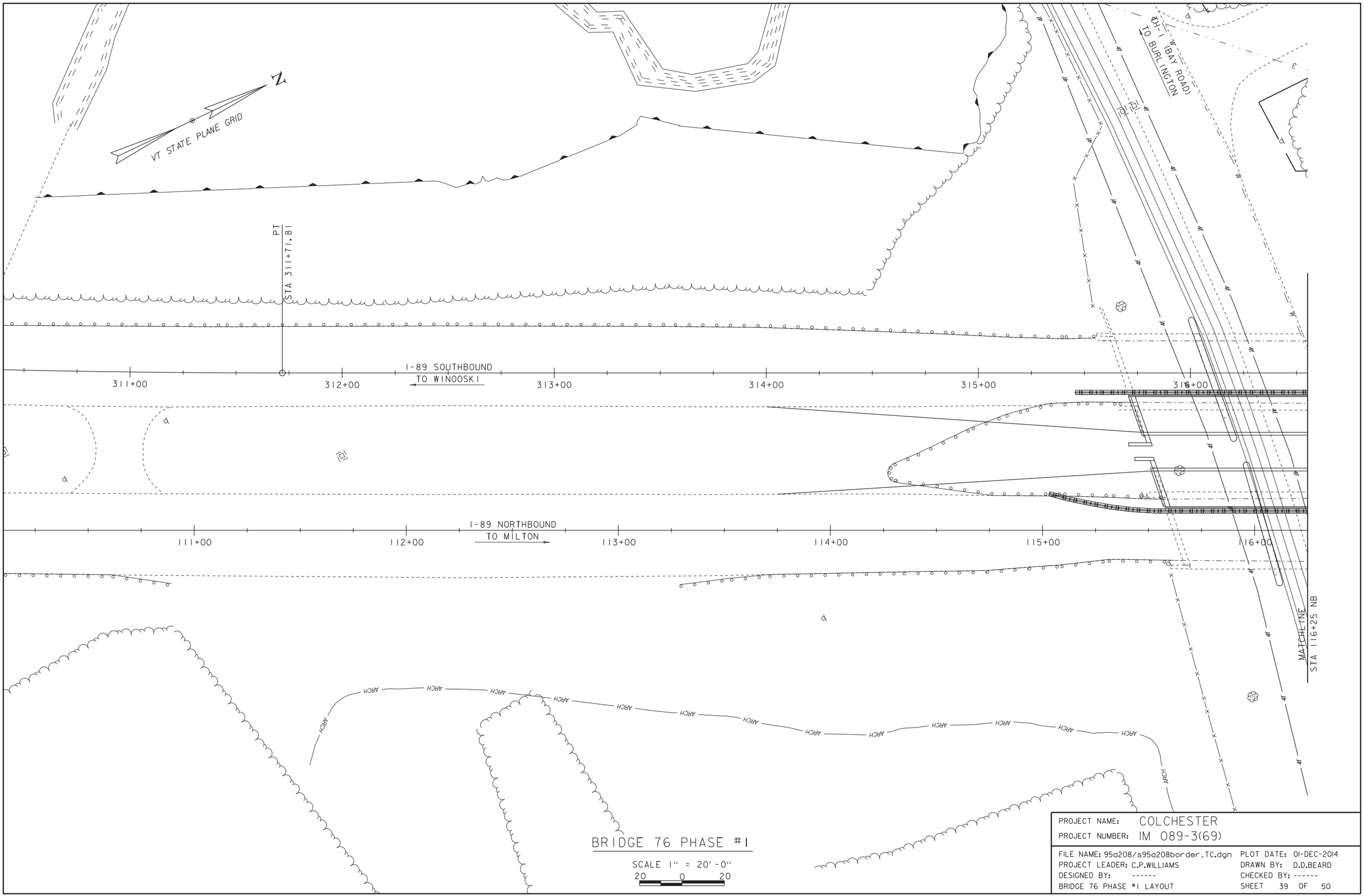


BR 77 FLOW

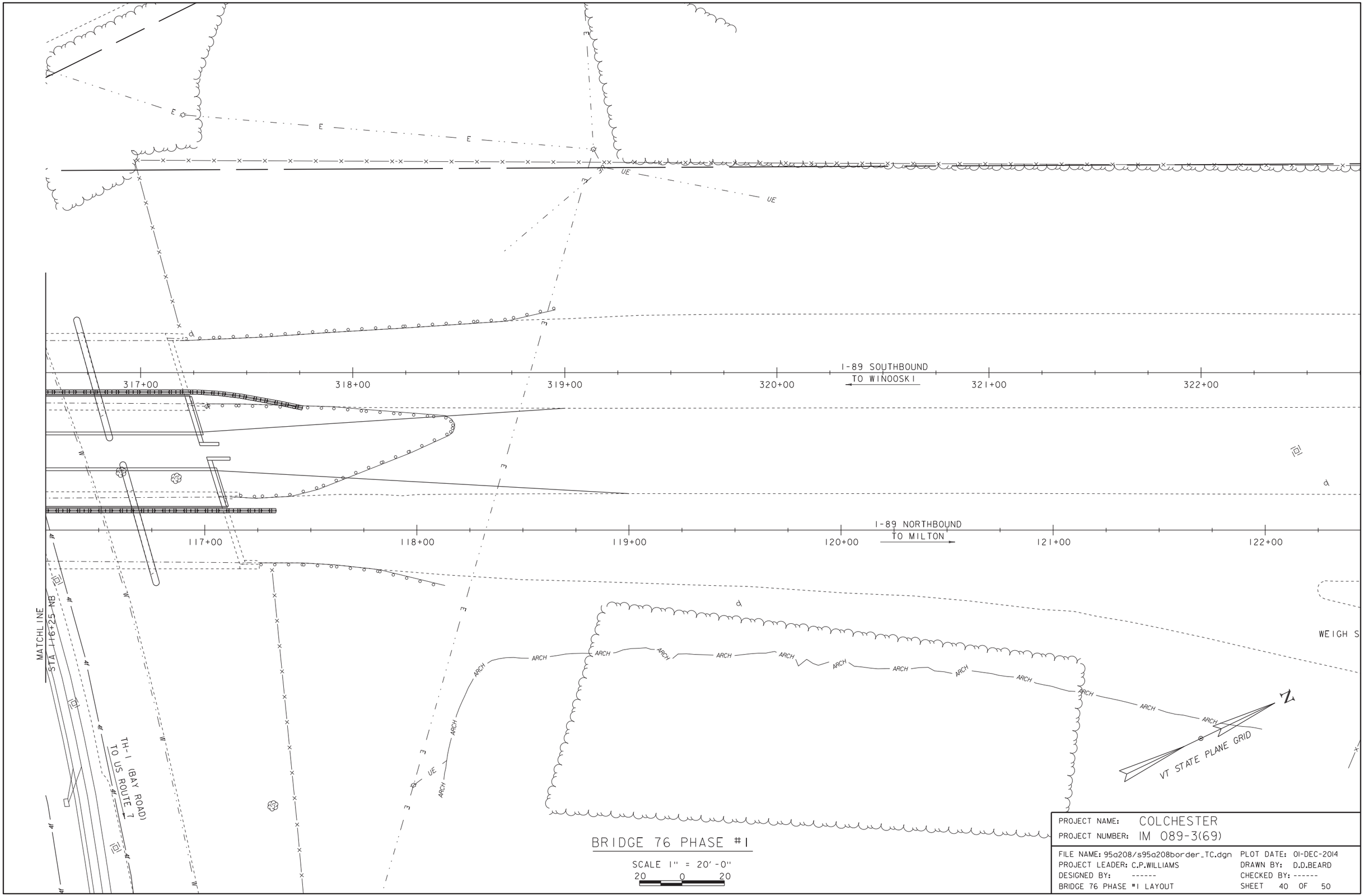
BRIDGE 76 & 77 PHASE #3 TYPICAL SECTION

SCALE 1/4" = 1'-0"

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208typ.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: T.FILLBACH	CHECKED BY: T.FILLBACH
TYPICAL PHASING SECTIONS	SHEET 38 OF 50



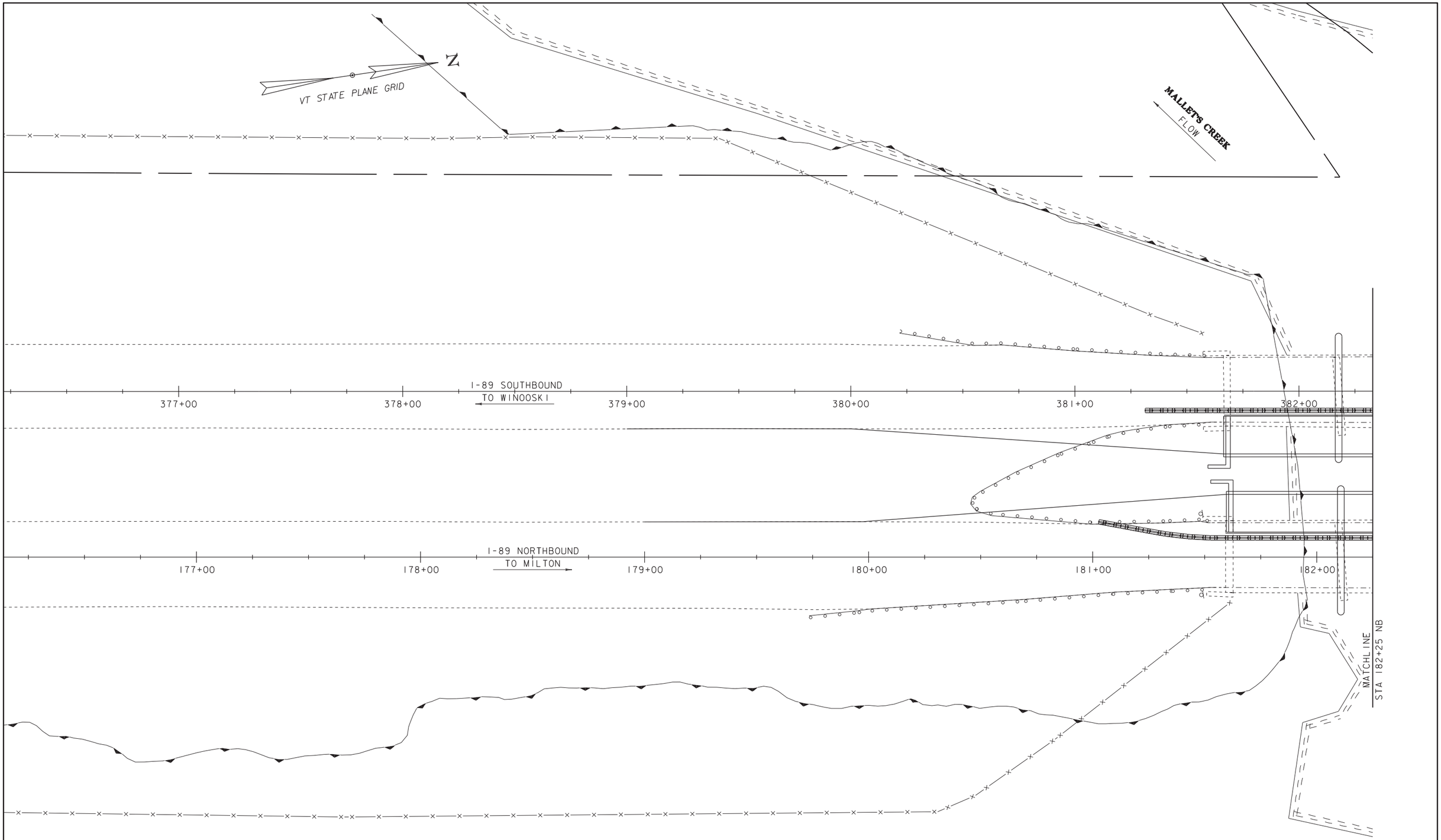
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 PHASE #1 LAYOUT	SHEET 39 OF 50



BRIDGE 76 PHASE #1

SCALE 1" = 20'-0"
20 0 20

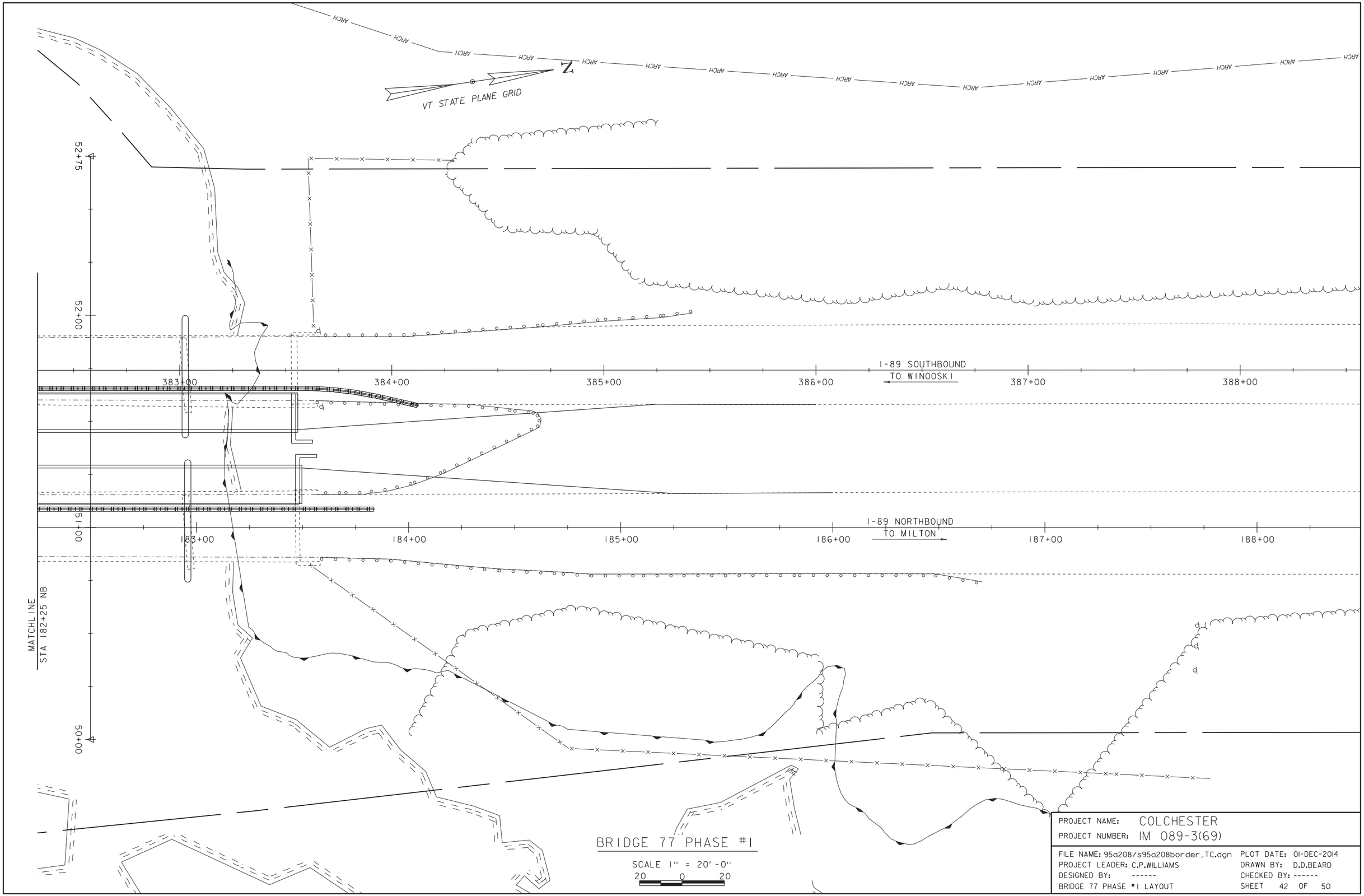
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 PHASE #1 LAYOUT	SHEET 40 OF 50



BRIDGE 77 PHASE #1

SCALE 1" = 20'-0"
20 0 20

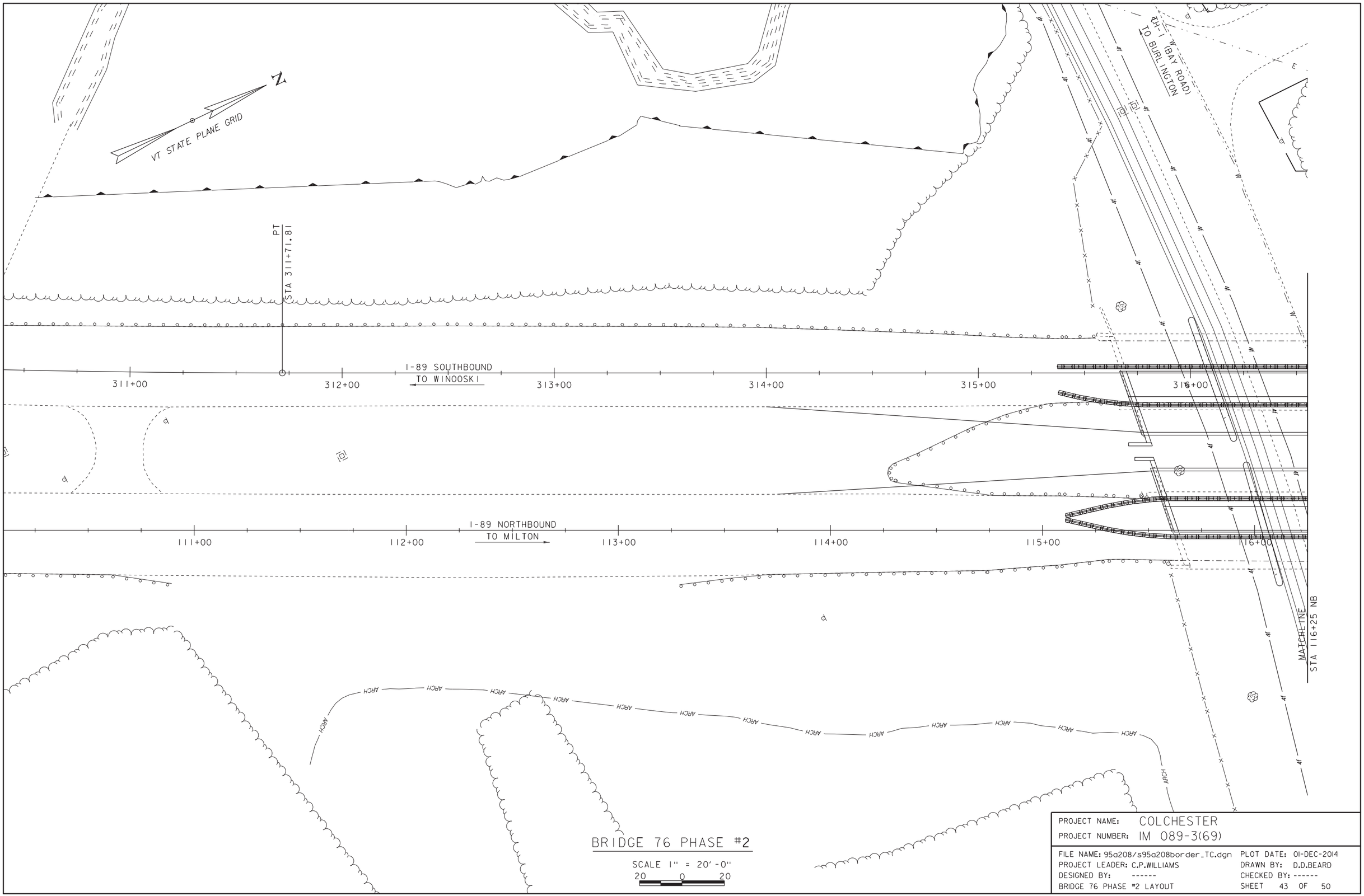
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 PHASE #1 LAYOUT	SHEET 41 OF 50



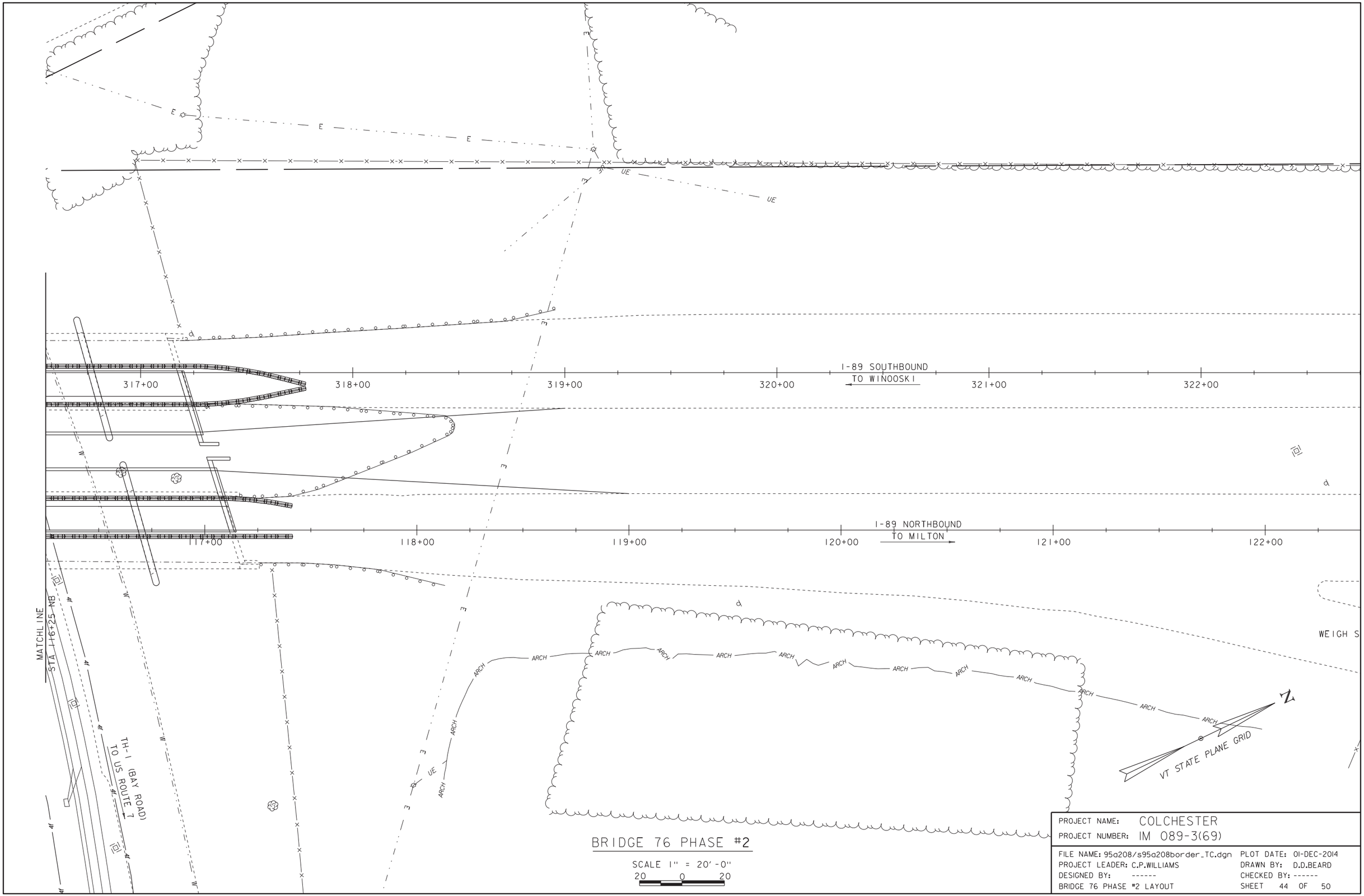
PROJECT NAME: COLCHESTER
PROJECT NUMBER: IM 089-3(69)

FILE NAME: 95a208/s95a208border_TC.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
BRIDGE 77 PHASE #1 LAYOUT

PLOT DATE: 01-DEC-2014
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 42 OF 50



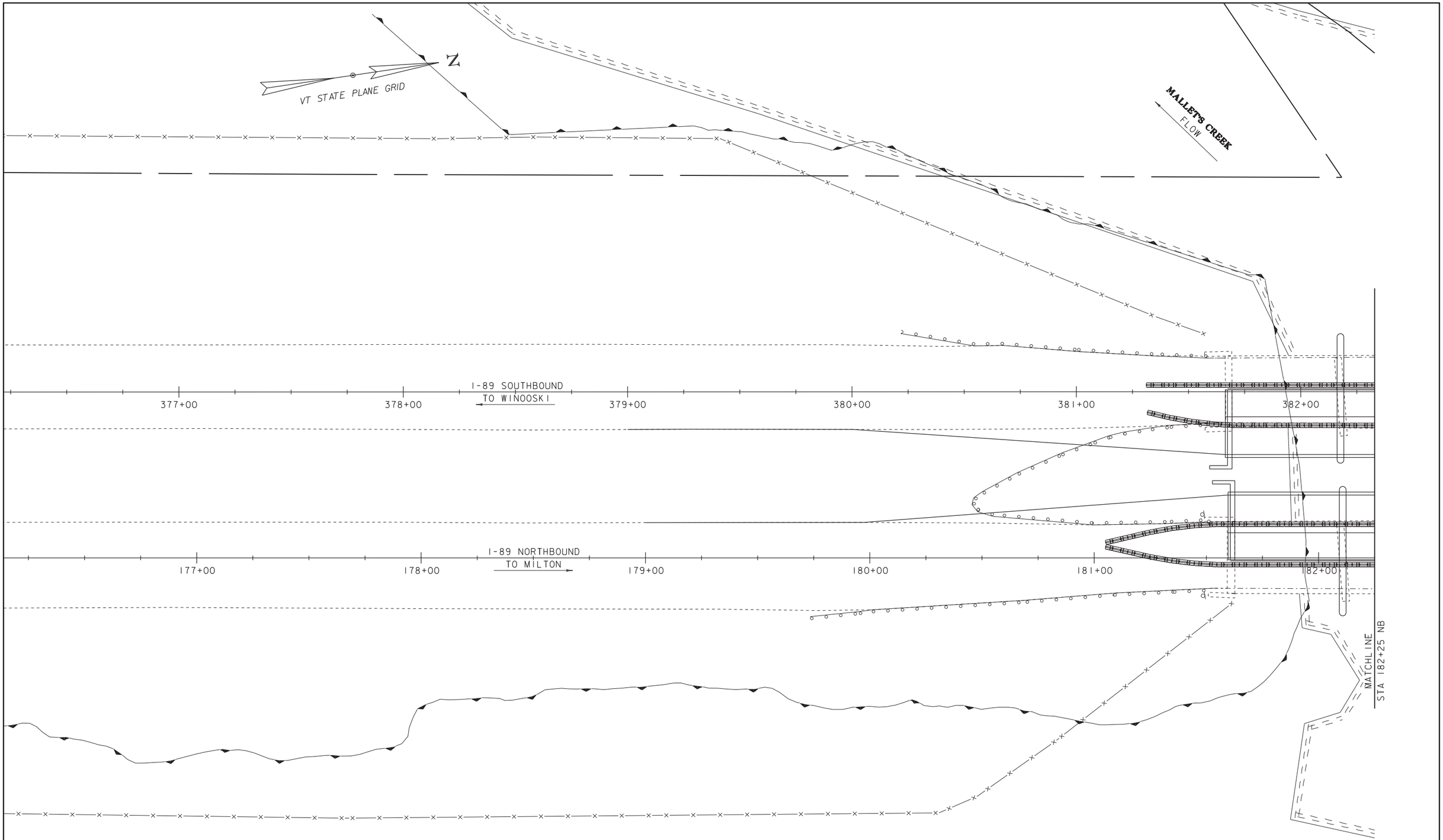
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 PHASE #2 LAYOUT	SHEET 43 OF 50



BRIDGE 76 PHASE #2

SCALE 1" = 20'-0"
20 0 20

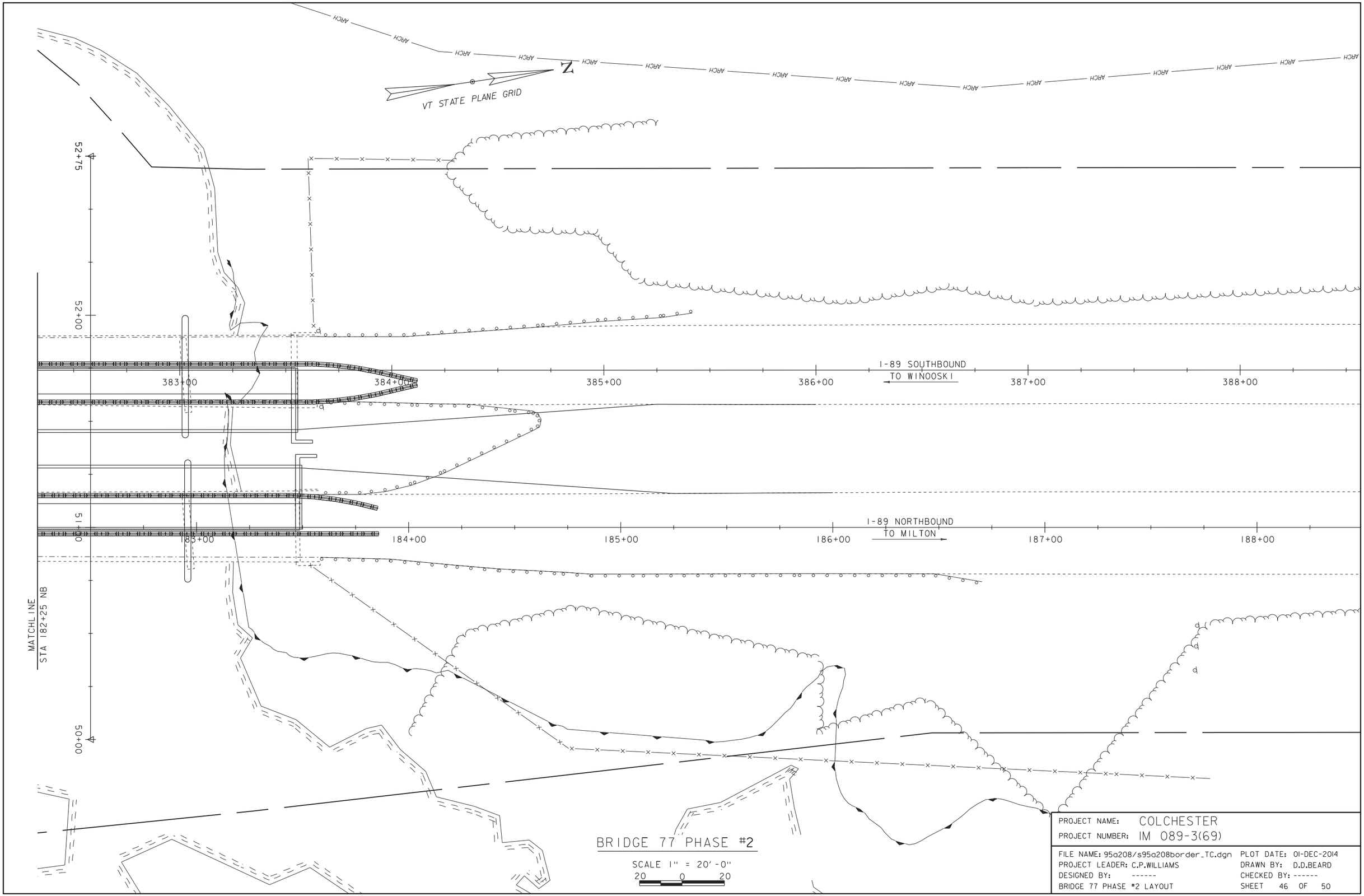
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 PHASE #2 LAYOUT	SHEET 44 OF 50



BRIDGE 77 PHASE #2

SCALE 1" = 20'-0"
20 0 20

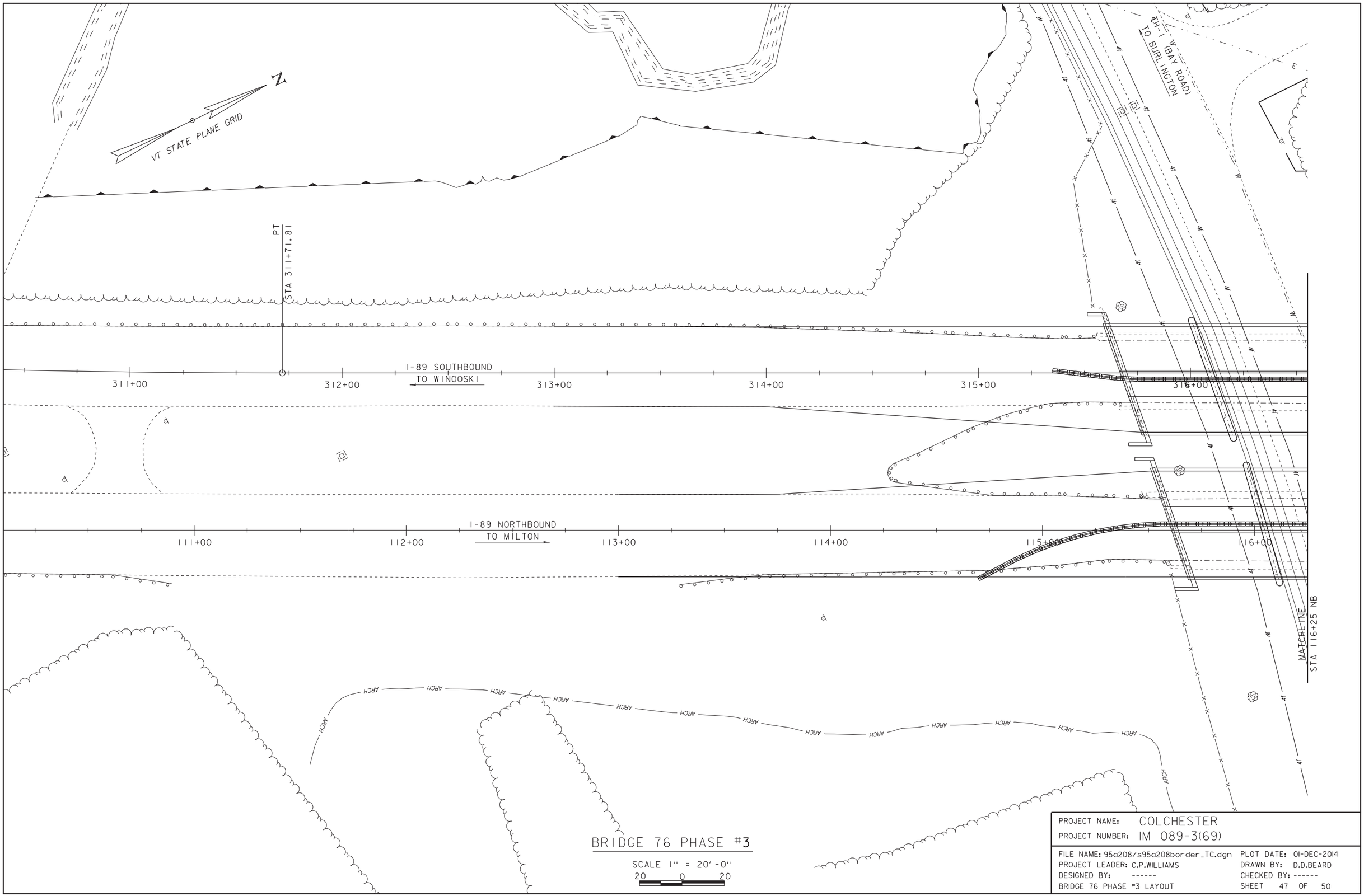
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 PHASE #2 LAYOUT	SHEET 45 OF 50



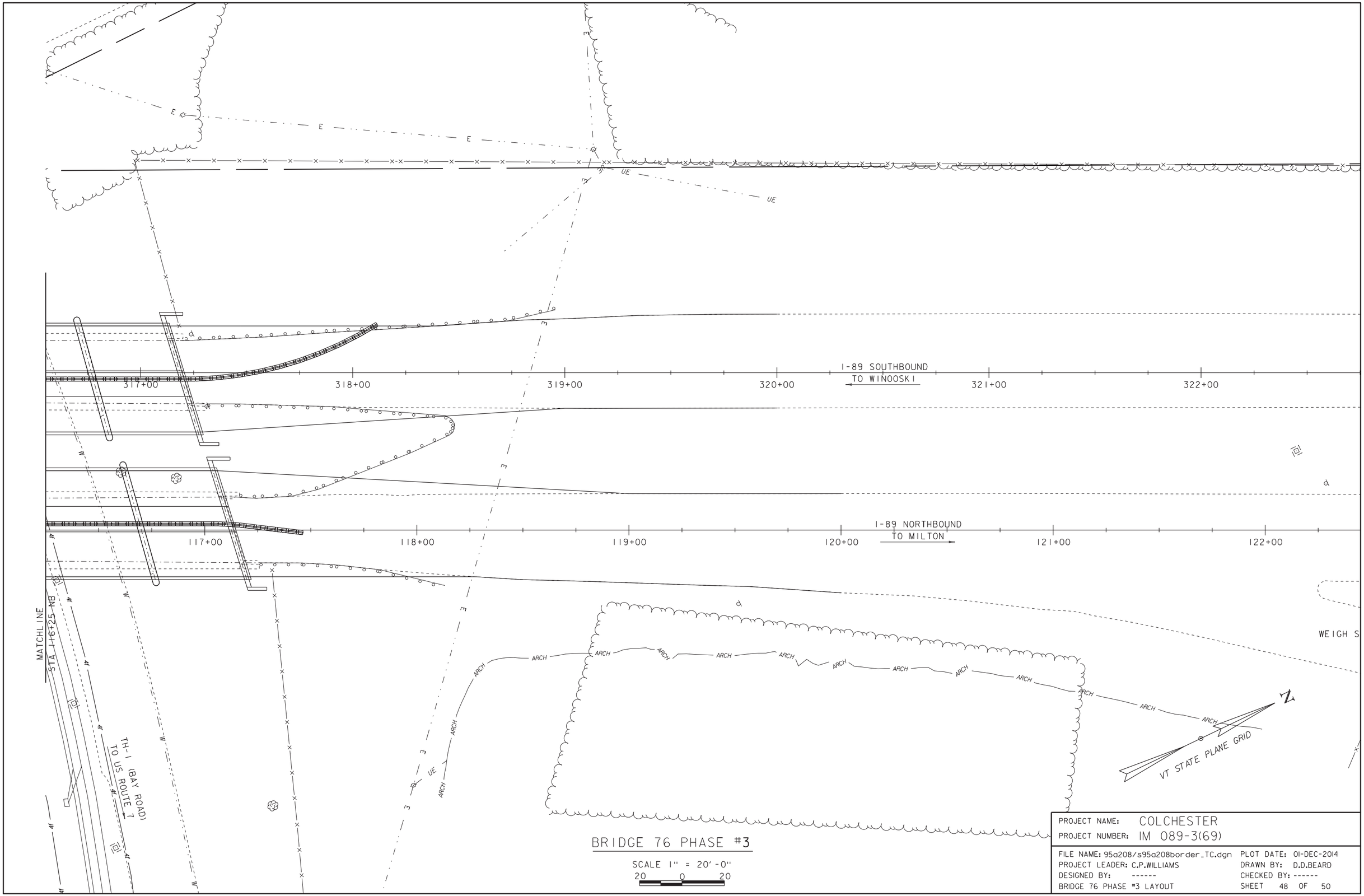
PROJECT NAME: COLCHESTER
PROJECT NUMBER: IM 089-3(69)

FILE NAME: 95a208/s95a208border_TC.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
BRIDGE 77 PHASE #2 LAYOUT

PLOT DATE: 01-DEC-2014
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 46 OF 50



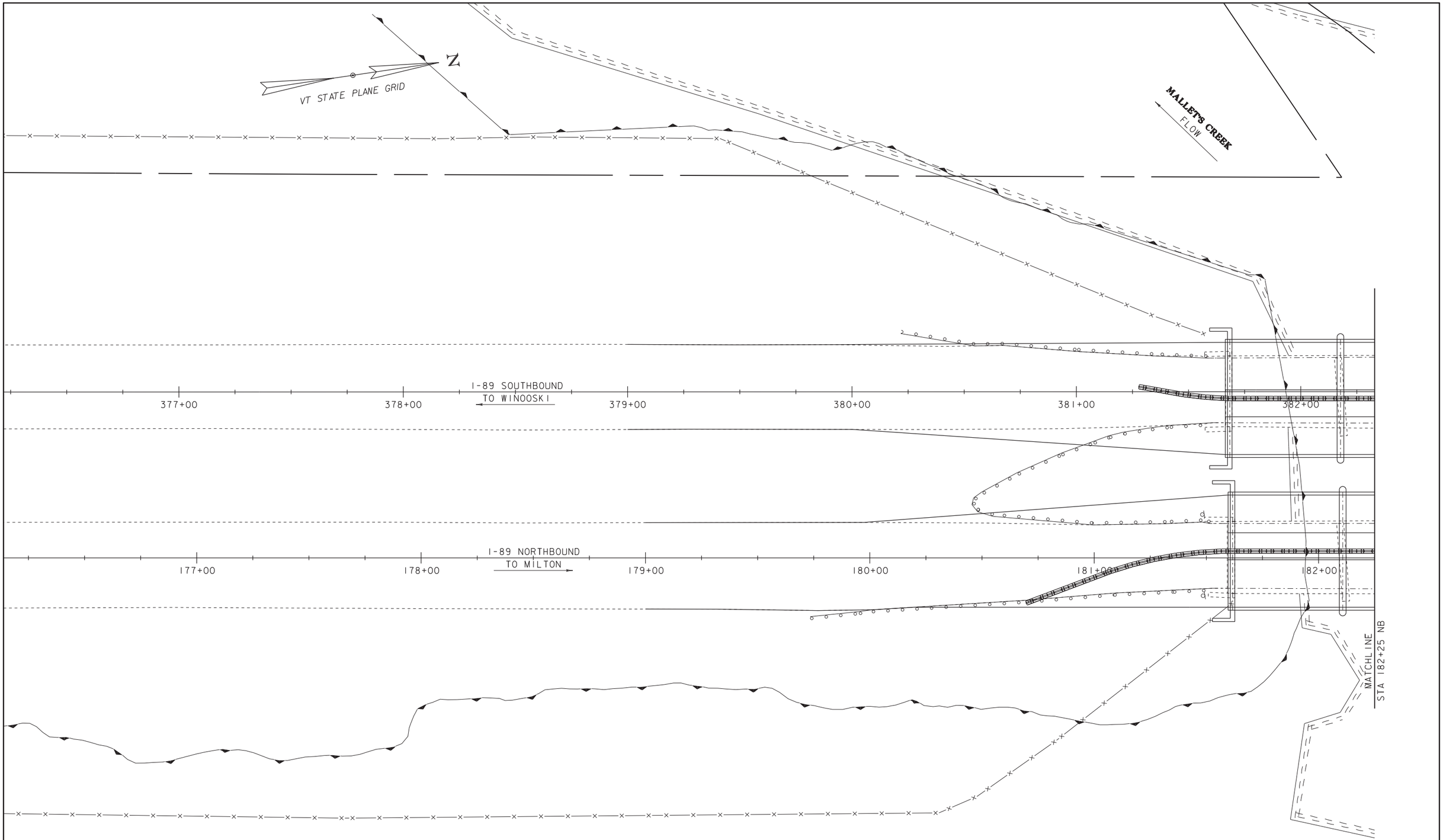
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 PHASE #3 LAYOUT	SHEET 47 OF 50



BRIDGE 76 PHASE #3

SCALE 1" = 20'-0"
20 0 20

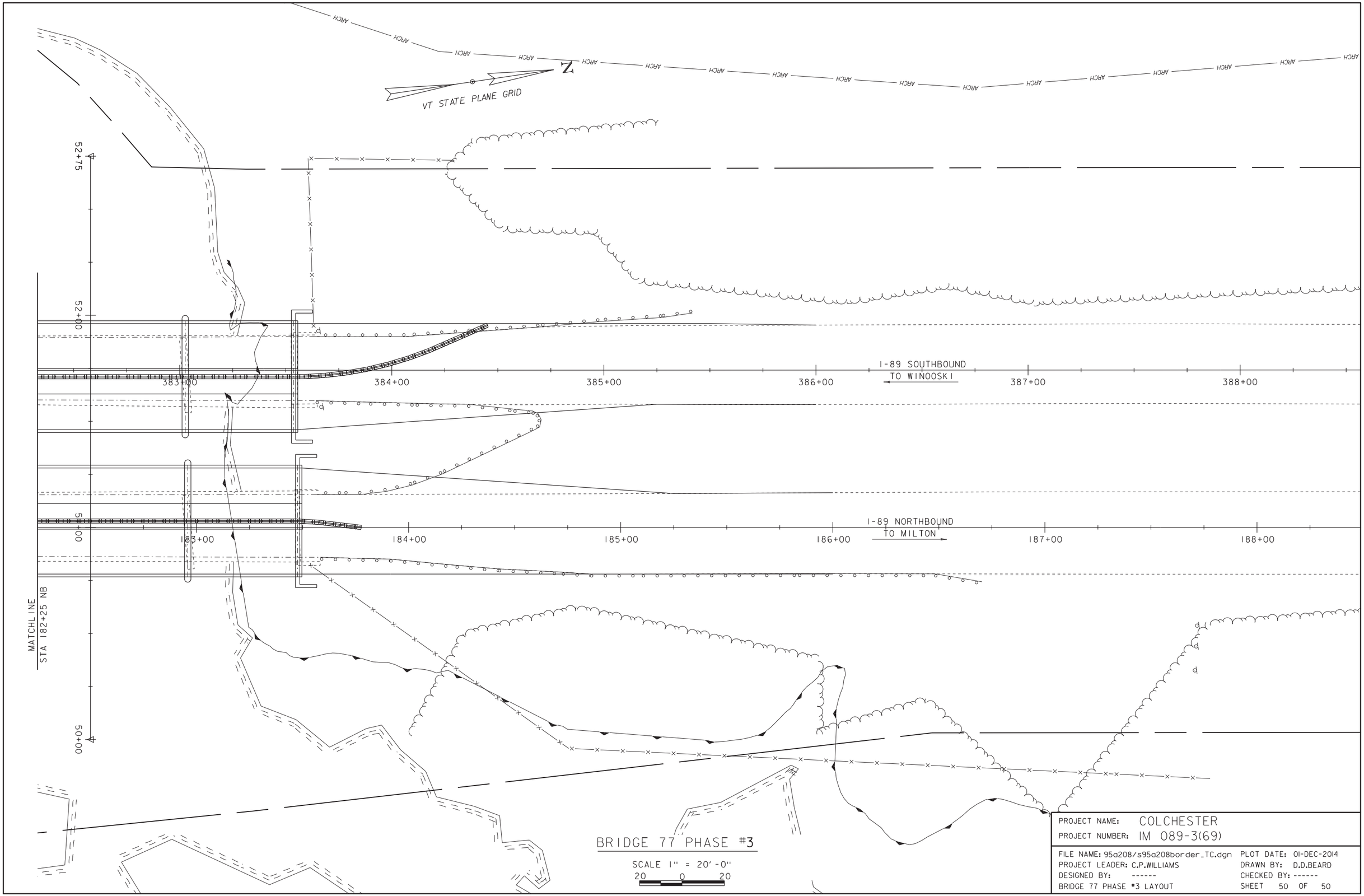
PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 76 PHASE #3 LAYOUT	SHEET 48 OF 50



BRIDGE 77 PHASE #3

SCALE 1" = 20'-0"
20 0 20

PROJECT NAME: COLCHESTER	
PROJECT NUMBER: IM 089-3(69)	
FILE NAME: 95a208/s95a208border_TC.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
BRIDGE 77 PHASE #3 LAYOUT	SHEET 49 OF 50



PROJECT NAME: COLCHESTER
PROJECT NUMBER: IM 089-3(69)

FILE NAME: 95a208/s95a208border_TC.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
BRIDGE 77 PHASE #3 LAYOUT

PLOT DATE: 01-DEC-2014
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 50 OF 50