Dewberry

Alternatives Analysis

for the

Local Concept Development Study for Bridge K0607
New Brunswick Road over Al's Brook
Franklin Township, Somerset County, NJ

April 15, 2015

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APPENDICIES

Introduction

Somerset County, in conjunction with the North Jersey Transportation Planning Authority (NJTPA) and the New Jersey Department of Transportation (NJDOT), sponsored a Local Concept Development (LCD) study of Bridge K0607 carrying New Brunswick Road over Al's Brook in Franklin Township. The LCD study was undertaken due to the serious condition of the bridge, which is classified as Structurally Deficient due to yielding of the aluminum structural plate arches and the resulting large deformations. In response to the structure's distortion, temporary supports were installed to stabilize the arches which continue to be monitored by the County via annual inspections.

The team of Greenman-Pedersen, Inc. (GPI), Dewberry Engineers Inc. (Dewberry), Stump-Hausman and GEOD was selected to conduct the study, gathering and generating sufficient data to evaluate viable alternatives that would address the bridge's deficiencies, assess impacts of the alternatives on the surrounding environment, and solicit input from local officials, community stakeholders and the general public to identify a Preliminary Preferred Alternative. The results of the study are summarized herein.

Existing Site Conditions

Somerset County Bridge K0607, which was built circa 1979, is located on a tangent section of New Brunswick Road approximately 400' east of the intersection with Cedar Grove Lane. An aerial view of the project site is provided as Figure 1 in Appendix A. In the immediate vicinity of the bridge, New Brunswick Road is classified as an Urban Major Collector and is posted for a 35 mph speed limit and a 4-ton weight restriction. Supporting an average daily two-way traffic volume of over 10,000 vehicles per day, New Brunswick Road is a critical link within the local roadway system, providing the community's residents and businesses with access to the County's major roadways. New Brunswick Road furnishes a 42' curb-to-curb width, accommodating a 12' lane and 9' shoulder in each direction of travel. A variable width berm extends from the curb lines to the bridge's upstream and downstream headwalls, which are protected by beam guide rail. A 4' wide bituminous sidewalk is located within the north berm, however sidewalk is not provided along the roadway's south side. Travelling east from the intersection with Cedar Grove Lane, New Brunswick Road's vertical profile can generally be described as a long sag curve having equal ahead and back grades of approximately 3%.

The existing bridge consists of two, corrugated aluminum structural plate arches, each spanning 21' at the base and furnishing a rise of 7'-5" at the crown. Per the as-built plans, included as Appendix B, the arches are founded on a heavily reinforced 2'-3" thick concrete slab extending the full width and length of the arches and bearing on rock. These plans also depict concrete cut-off walls and riprap aprons at the upstream and downstream ends of the structure. Reinforced concrete headwalls and wingwalls retain the roadway fill/pavement and side slopes. Within the roadway limits, the amount of fill over the arches is approximately 10'. The upstream headwall is constructed parallel with the roadway, whereas the downstream headwall is set normal to the centerline of the bridge. The wingwalls are founded on reinforced concrete spread footings, also bearing on rock. The bridge is aligned with Al's Brook and as a result is skewed approximately 27 degrees with respect to New Brunswick Road. The resulting length of the bridge, measured along its centerline, is 100'. As typically occurs with two barrel structures, a majority of the stream flow tends to pass through one of the barrels while the other barrel carries flow under higher storm events. In this particular case, based on the amount of sediment build-up it appears that the normal flow in Al's Brook is conducted by the west barrel.

At the outset of the project, base mapping depicting the existing topography and planimetric features of the project site was generated by GEOD using aerial survey supplemented by conventional ground survey. The available tax maps indicate that New Brunswick Road has a right-of-way width of 66'. The existing right-of-way and property lines obtained from the tax maps were graphically superimposed onto this base mapping. Similarly, a plan of the existing bridge was created in CAD, using pertinent information contained on the available as-built plans, and this view was also referenced into the base mapping.

Both aerial and underground utilities are present within the project limits. East of the bridge, aerial utilities are located along both sides of New Brunswick Road. However, these aerial lines all shift to the north side of the roadway prior to the bridge. Electrical, telephone, fiber optic and cable service lines, owned by PSE&G, Verizon, AT&T, Zayo and Comcast, are carried on these poles. Underground utilities consist of a 4"-diameter gas line, running within the berm along the north side of the roadway, and a 16"-diameter water main located approximately along the centerline of New Brunswick Road. The gas line and the water main are owned by PSE&G and Franklin Township, respectively. Roadway drainage is accomplished via a system of inlets and pipes which collects the runoff and discharges into the brook through outfalls at the downstream wingwalls.

The bridge site is bounded by a single property owner on the south side. The residence of this property owner is located on the southwest quadrant of the site with the remainder of the property being undeveloped. Cedar Grove Centre, a commercial development containing several businesses, and Colonial Homes at Quail Brook, a residential development, are located on the northwest and northeast quadrants of the bridge, respectively. The undeveloped land along Al's Brook between Cedar Grove Centre and Colonial Homes at Quail Brook is protected under a conservation easement, which was granted to Franklin Township when Cedar Grove Centre was developed and Bridge K0607 was constructed. The base mapping generated for the study is included as Figure 2 in Appendix A and photographs of the existing site conditions are furnished in Appendix C.

Existing Bridge Conditions

As documented in the 15th Cycle Bridge Re-evaluation Survey Report dated November 17, 2011, Somerset County Bridge K0607 is classified as Structurally Deficient and has a Sufficiency Rating of 47.1 out of 100. The report states that the overall condition of the structure is serious "due to the deformation and buckling of the aluminum structural plate arch sections," and recommends that the bridge be replaced. In response to the original identification of the structure's distortion, temporary shoring consisting of 4"-diameter steel pipes were installed in both arch barrels, intermittently along the longitudinal, bolted seams of the aluminum plates that make up the arches. The west arch is supported at eight locations, distributed along the entire length of the barrel, with six of the supports located along the east seam. The east arch has seven supports, all generally located within the southern half of the barrel, with four of the supports on the west seam. The maximum deformation reported in the 15th Cycle Inspection Report was 18½", and an interim inspection performed in November 2012 concluded that no further sagging or deformation had occurred.

New Brunswick Road's current 4-ton weight restriction is not due to the condition of the bridge. However, installation of the temporary supports avoided the initial need to impose further weight restrictions. Future rating evaluations of the structure may prompt increased restrictions or full closure of the structure, since these supports are not considered an acceptable long-term solution. Continued deterioration of the structure's condition would ultimately require closure of New Brunswick Road, resulting in a loss of

connectivity between its surrounding neighborhoods and the major roadways within Somerset County. Furthermore, deformation of the arches, in conjunction with the installation of temporary supports, has altered the hydraulic characteristics of the structure and introduced members that impede flow and increase the potential to trap debris. Additional manpower expenditures and associated costs will continue to be incurred by the County to remove debris and ensure that adequate flow is maintained in the brook until the structure's original hydraulic opening is restored.

Structural Assessment

With the project's purpose and need defined, the process of identifying and evaluating viable alternatives was undertaken. Since the project was initiated to restore the structural integrity of the bridge in compliance with current design standards, Dewberry first concentrated on identifying viable options that satisfied this purpose. Specifically, Dewberry focused on options that would eliminate the temporary supports and remove any concern regarding the long-term structural performance of the bridge. The following options were identified and evaluated:

In-Kind Repair

The concept of the in-kind repair option was to remove the deformed sections of the existing corrugated aluminum plate arches and replace these with new sections. To accomplish this repair the roadway pavement and fill would be excavated to remove the loads imposed on the deformed sections of the arches. With the arch "unloaded", new sections of plate would be installed and the arch subsequently backfilled with properly graded and compacted material. In-kind repairs are typically most economical when addressing isolated or localized areas of deterioration. Unfortunately, based on the extent of the deformations documented along both arches, this option would require excavation to expose a majority, and quite possibly the entirety, of both arches.

Accomplishing this repair option while maintaining traffic on New Brunswick would impose a significant constraint on the work zone available to the contractor, lengthening the overall duration of construction and increasing the project cost. In addition, as evidenced by the condition of the existing bridge, the performance of corrugated plate arch structures is extremely dependent on proper backfilling operations. As such, sufficient field inspection time must be allocated to ensure that the repaired sections are properly backfilled, further increasing both project duration and costs. Therefore, the in-kind repair option was eliminated.

Installation of a Liner

This option considered the viability of installing a liner, within the existing arches, designed to carry the imposed loads independent of the existing structure. Typical liners consist of standard precast concrete or corrugated metal elliptical pipe sections or corrugated plate arch sections, similar to the existing arches, or special shapes fabricated from steel plate. Under this scenario, the liner would be inserted within each arch and the area between the existing arch and the liner would be filled with non-shrink grout to ensure the loads are fully transferred to the new structural liner. In lieu of a prefabricated liner, the structural liner could also be constructed of reinforced, pneumatically applied mortar (shotcrete) applied directly to the existing corrugated plate arches.

The primary advantage of installing a liner would be that restoration of the bridge's structural integrity can be accomplished without any impacts to traffic on New Brunswick Road. However, installation of a liner would reduce the available waterway opening changing the bridge's hydraulic characteristics. As

described in the Hydrology and Hydraulic Analysis section presented later in this report, use of a liner was eliminated as a viable option because the reduced waterway opening would not satisfy the NJDEP's criteria for zero change in the pre and post-construction water surface elevations for the various design storms stipulated in the Flood Hazard Area rules.

Replace the Existing Arches

Under this option the existing distorted arches would be completely removed and replaced with a new structural system. In recognition of the past performance of the existing corrugated plate arches and this type of structure's vulnerability to distortion if backfilled improperly, this option only considered the use of precast concrete arch or rigid-frame units to replace the existing arches. The new precast concrete units would be supported on precast concrete footings anchored to the existing concrete slab, or as an alternative, keyways would be notched into the existing slab to accept the precast sections. In the unlikely event it was determined that the existing slab could not be reused, the slab would be removed as necessary and new footings constructed prior to installing the precast concrete arch or rigid-frame units.

Given the abundance of standard precast arch and rigid frame sections it was anticipated that both single and double barrel configurations would be capable of satisfying the structural and hydraulic design demands. However, a single barrel configuration would offer several advantages. Specifically, replacing the existing two barrel configuration with a single barrel avoided any conflict between the connections of the new precast units to the slab and the existing arches. As such, the modifications to the existing slab, required to accept the new precast sections, could be accomplished without any impacts to traffic on New Brunswick Road. The single barrel configuration would also minimize the number of locations where the existing slab would be modified. Furthermore, although larger and heavier than the individual units required for a two barrel configuration, the single barrel configuration would require fewer precast sections to fabricate, transport and install. These factors all contribute to shortening the construction duration. The disadvantage of the single barrel configuration is that the headwalls of the existing bridge would have to be reconstructed to conform to the geometry of the new precast concrete section.

Construct an Entirely New Bridge

Under this option the existing bridge would be completely replaced with a new structure. To avoid conflicts with the existing bridge, this option would position the abutments of the new bridge outside the limits of the concrete slab which supports the existing arches. The resulting span length of the new bridge would be approximately 75'. The superstructure of this new bridge would consist of either steel or precast concrete beams with a concrete deck supported on concrete, stub abutments founded on piles socketed into the existing rock. While this option would clearly satisfy the purpose of restoring the structural capacity of this crossing, it had many disadvantages. Building this entirely new bridge would have the highest initial construction cost, the longest construction duration, and the highest future maintenance costs.

At the conclusion of this structural assessment, it was evident that replacing the existing arches with a single barrel, precast concrete arch was the most appropriate course of action. Reusing the existing slab to support the new arch units and retaining the existing wingwalls would save both time and money by eliminating the need to construct new components, and would avoid permanent impacts on the surrounding properties by maintaining the existing structure's footprint. The use of precast concrete arch

units would remove any concern about the structure's vulnerability to distortion if backfilled improperly, and would improve overall quality by shop fabricating the units. Furthermore, the single barrel option applies the principles of Accelerated Bridge Construction by allowing the necessary modifications to the existing slab to be accomplished without any impacts to traffic on New Brunswick Road, minimizing the number of locations where the existing slab must be modified, and minimizing the number of precast units to fabricate, transport and install.

Hydrology and Hydraulic Analysis

As Dewberry advanced the structural assessment, GPI simultaneously evaluated the hydrology and the hydraulic characteristics of the bridge site. Utilizing the project's base mapping, supplemented with available Lidar mapping, GPI developed a model using HEC computer software to establish the existing hydraulic conditions. Once the existing conditions model was established, various waterway openings corresponding to the structural options being evaluated by Dewberry were analyzed to determine whether or not the NJDEP's criteria for zero change in the pre and post-construction water surface elevations for the various design storms stipulated in the Flood Hazard Area rules would be satisfied. Through these analyses GPI determined that installing a liner within the existing arches was not viable hydraulically. It was also established that the structure was inlet controlled, and that maintaining an arched-shaped waterway opening was necessary. The following configurations were deemed viable:

- Match the existing twin barrel configuration, with each arch measuring 21' wide at the base by 7'-5" high at the crown;
- Furnish a twin barrel arch configuration, with each arch measuring 20'± wide at the base by 8'-2"± high at the crown; or
- Furnish a single barrel arch measuring 32'± wide at the base by 8'-2"± high at the crown.

Furthermore, since the structure was inlet controlled, as long as one of the three configurations identified above was provided at the upstream face of the bridge, the configuration of the remainder of the bridge would have no influence on the hydraulics. Thus, installing a façade at the upstream end of the bridge providing any of the three viable waterway openings would satisfy the hydraulic requirements and theoretically allow the existing bridge to be replaced by essentially any structure type. However, most importantly, these hydraulic analyses confirmed that the preferred structural restoration option using a single barrel arch was hydraulically viable and therefore the NJDEP permits required for its construction were obtainable.

Environmental Screening

In association with the structural and hydraulic engineering investigations, an environmental screening of the bridge site was also conducted by Dewberry to assess the project's potential to impact socioeconomics, noise and ecologically-sensitive sites, air quality, hazardous waste and cultural resources. The screening consisted of both desktop analysis, consulting data available through the NJDEP's GIS program, and field assessment including wetlands delineation. As a result of the screening, it was determined that the project's only environmental issue is the potential to impact the floodplain and wetlands associated with Al's Brook. The following permits and approvals are anticipated, and would be confirmed through a pre-application conference with the NJDEP arranged during the project's subsequent design phase:

- NJDEP General Freshwater Wetlands Permit with 401 Water Quality Certificate;
- NJDEP General Flood Hazard Area Permit;

- Somerset-Union Soil Conservation District Soil Erosion and Sediment Control Approval; and
- D&R Canal Commission Exemption Letter.

Since it is expected the project will be advanced using federal funds, it will be subject to review pursuant to NEPA, as well as Section 106 of the National Historic Preservation Act. Based on the level of potential impacts, it is anticipated that the appropriate NEPA document would be a Categorical Exclusion Document. As the project advances, consultation with the regulatory agencies will be performed.

Development of Alternatives

With the critical technical issues advanced, multiple meetings were held with stakeholders, including local officials, adjacent residents and business owners, to notify them of the project's purpose and solicit any concerns they wished to express regarding the project. The main concern expressed by these stakeholders was the need to minimize impacts to traffic on New Brunswick Road, as well as the overall construction duration. Therefore, in addition to a "no-build" alternative, various "build" alternatives were studied to determine the most beneficial method of constructing the single barrel, precast concrete arch option, while striving to achieve these goals. In the discussion which follows, each alternative is described and its advantages and disadvantages are highlighted. The figures depicting each alternative present the right-of-way and easements required for the alternative. With the exception of the "no-build" alternative, an estimate of the probable construction cost is also furnished for each alternative. These estimates are based on preliminary quantities, formulated from conceptual sketches, and prices obtained from relevant county and NJDOT bids. The detailed breakdown of each cost estimate is provided in Appendix D.

Alternative 1 – No Build

A "no build" alternative would clearly have no immediate impact on vehicular or pedestrian traffic utilizing New Brunswick Road. However, this alternative does not address the project need of restoring the structural integrity of the existing deficient bridge. At a minimum, the existing bridge will continue to require annual inspections to monitor the performance of the temporary shoring. In addition, County maintenance forces will need to regularly visit the site to clear any debris trapped by the temporary supports. In the event funding is reduced and maintenance is deferred, further degradation of the structure would ultimately require that the County close the bridge to all users, thereby eliminating New Brunswick Road's critical role within the regional roadway system.

Alternative 2 – On-Line, Temporary Bridge

(See Figure 3, Appendix A. Est. Construction Cost: $2,350,000)

The intent of Alternative 2 is to stage the proposed work such that the two lanes of traffic currently provided along New Brunswick Road remain operational throughout construction. Given the width of New Brunswick Road, this alternative initially considered shifting the traffic lanes to one side of the road while construction occurs along the other side. During the first stage a portion of the existing bridge would be demolished and replaced with the precast arch. Once the new section of the bridge was sufficient in width to carry the two lanes, traffic would be shifted onto this new section and the process repeated on the opposite side to complete the bridge's rehabilitation.

Unfortunately, several factors significantly increase the complexity of employing this side-to-side construction staging. Temporary sheeting must be installed along the stage line to accomplish the excavation needed to remove and replace the existing arches, while retaining the active portion of New Brunswick Road. However, as noted earlier, the existing arches are supported on a massive, reinforced

concrete slab extending the full width and length of the structure. The presence of this slab precludes the installation of temporary sheeting by traditional driving operations. The existing structure type, and its alignment with respect to New Brunswick Road, further complicate this staging. The arches are comprised of multiple plate sections, bolted together, and set normal to the centerline of the bridge. Thus, cutting the arches along a stage line/temporary sheeting line running parallel with the roadway, impacts the internal stability of the arches, requiring the installation of additional temporary shoring and bracing. Furthermore, the need to maintain flow in Al's Brook during construction must also be accommodated by the temporary sheeting system.

Acknowledging these difficulties and the associated costs that would be incurred, Dewberry determined that using a temporary bridge was a more economically justifiable staging solution to maintain vehicular, bicycle and pedestrian traffic on New Brunswick Road during construction. Under this concept, a two-lane, temporary bridge would be constructed to span over the existing structure allowing the contractor to work beneath and adjacent to the temporary bridge. Pedestrian access would be achieved by cantilevering a sidewalk off the temporary bridge, and signage would be provided directing bicyclists to dismount and walk their bicycles through the construction zone using the temporary bridge's sidewalk.

The abutments of the temporary bridge would be positioned beyond the limits of the existing slab supporting the arches to avoid any conflict between the slab and the piles supporting the abutments. The resulting span of the temporary bridge would be approximately 90'. The stub abutments of the temporary bridge would be founded on rock-socketed piles and perched behind soldier pile and lagging walls. To provide sufficient clearance for the contractor to work the temporary bridge would be set 5'± higher than the present roadway elevation and fill would be brought in to create approach ramps to the temporary bridge. The soldier pile and lagging walls at the abutments would extend along New Brunswick Road to retain the temporary fill.

Once traffic was shifted to the temporary bridge, the contractor would be able to excavate and demolish the existing arches and headwalls, install the new precast concrete arch segments and headwalls, and backfill a majority of structure. Following the removal of the temporary bridge and its approach ramps, backfilling operations would be completed and the roadway's pavement restored.

Although this alternative maintains two-way vehicular traffic, as well as pedestrian and bicycle traffic, on New Brunswick Road for a majority of the construction, multiple closures would be necessary to install and remove the temporary bridge/ramps. In addition, during construction the speed limit on the roadway would be reduced to 25 MPH. A total of eight (8) weekend closures are anticipated and the total construction duration, exclusive of temporary utility relocations, is projected to be ten (10) months.

Alternative 2's advantage is:

- New Brunswick Road remains open to vehicular, bicycle and pedestrian traffic during construction.

The disadvantages of this alternative include:

- Multiple weekend closures are needed to install and subsequently remove the temporary bridge;
- Use of the temporary bridge increases the construction duration and costs; and

- Maintaining vehicular, bicycle and pedestrian traffic within the construction zone reduces the safety of both the contractor and the public.

Alternative 3 – On-Line, Accelerated Construction

(See Figure 4, Appendix A. Est. Construction Cost: $1,370,000)

Alternative 3 sought to minimize the overall impacts to traffic by fully closing New Brunswick Road to all users, detouring traffic, and utilizing Accelerated Bridge Construction to accomplish the bridge rehabilitation in the shortest possible time frame. As is the case for all the alternatives being considered, all temporary and permanent easements would be secured prior to construction authorization. In addition, to minimize the overall impacts to traffic, all temporary utility relocations would be accomplished prior to closing. Furthermore, the existing slab would also be prepared to accept the new precast concrete arch units, while New Brunswick Road is fully open to all users. It is also assumed that the contractor would be required to obtain the necessary shop drawing approvals and ensure that the precast components are fabricated and available for delivery to the site, before requesting to close the road. Once closure of the roadway was authorized, the contractor would have complete control over the site and could sequence the operations to expeditiously accomplish the work. Incentive/disincentive clauses within the contract would reward or penalize the contractor based on compliance with the established duration of the roadway's closure. Under this alternative, it is estimated that New Brunswick Road would be closed for a period not to exceed three (3) weeks, and the total construction duration, exclusive of the temporary utility relocations, would be four (4) months.

The proposed detour route identified for this alternative, consisting of Cedar Grove Lane, Amwell Road, Demott Lane and Easton Avenue, is presented as Figure 5 in Appendix A. Utilizing data collected in the field, analyses and simulations of the traffic flow on the surrounding roadways were performed and Levels-of-Service (LOS) for the existing and detoured conditions were generated at the major intersections. As expected, the analyses of the detoured condition confirmed that the existing LOS for specific movements at certain intersections along the detour would be negatively affected. However, the analysis did not identify any fatal flaws in the proposed detour and given that total duration of the detour would not exceed three (3) weeks, the goal of minimizing overall impacts to traffic is satisfied.

Alternative 3 also offers the following advantages:

- It enhances safety by eliminating all public traffic within the construction zone;
- It requires the shortest total construction duration; and
- It is the most economical alternative.

The disadvantage is:

- New Brunswick Road is fully closed to all users for a maximum of three (3) weeks.

Alternative 4 – Off-Line Construction

(See Figure 6, Appendix A. Est. Construction Cost: $2,930,000)

While Alternative 2 maintained the flow of all traffic through the construction zone, and Alternative 3 removed all traffic from New Brunswick Road to perform the work, Alternative 4's concept shifted the construction zone, thereby maximizing the duration that all traffic on New Brunswick Road remains unaffected. Under this alternative a completely new structure would be built either immediately upstream or downstream from the existing bridge and the roadway realigned accordingly.

Positioning the new bridge downstream and realigning New Brunswick Road to the north would impact the existing conservation easement, the Colonial Homes at Quail Brook residential development, and Cedar Grove Center. In contrast, as shown on Figure 6, constructing the new bridge upstream offered significant benefits in that it would only impact a single property owner, shifted the work away from the existing utilities, thus removing these relocations as a constraint on the start of work, and eliminated the undesirable geometry of the intersection with Cedar Grove Lane. Considering the extent of the bridge and roadway improvements resulting from this alignment shift, the anticipated construction duration is twelve (12) months from the acquisition of the required right-of-way. However, by constructing the improvements along a new alignment, the impacts to all traffic on New Brunswick Road would be limited to a single weekend closure to tie the new alignment into the existing on the east end of the project.

To summarize, Alternative 4's advantages include:

- Minimal impacts to all traffic on New Brunswick Road;
- Separation of the work zone from the public way, enhancing safety; and
- Improved geometry at the intersection of New Brunswick Road and Cedar Grove Lane.

Alternative 4's disadvantages are:

- Acquisition of significant right-of-way and relocation of a resident;
- Increased permitting requirements; and
- Longest construction duration and highest construction cost.

Selection of Preliminary Preferred Alternative

The matrix provided on the following page summarizes the critical facts associated with each of the alternatives. As shown in the matrix, Alternatives 2, 3, and 4 all achieve the project's purpose of restoring the structural integrity of the bridge in compliance with current design standards. In addition, these alternatives fully restore the hydraulic capacity of the structure by furnishing a waterway opening satisfying NJDEP's criteria for zero change in the pre and post-construction water surface elevations for the various design storms stipulated in the Flood Hazard Area rules.

Although Alternative 3 proposes to close New Brunswick Road to all users for a three (3) week period, it minimizes right-of-way impacts and permit requirements, and offers the lowest construction cost and shortest construction duration. Furthermore it eliminates the complexities and safety concerns, associated with staging construction to maintain all traffic on New Brunswick Road, presented in the discussion of Alternative 2, reducing the total construction duration by six (6) months and producing a $1 million savings in construction cost as compared with Alternative 2. In recognition of these attributes, Alternative 3, On-line Accelerated Construction was selected as the Preliminary Preferred Alternative (PPA).

The process utilized to identify and evaluate the various alternatives discussed herein, and the methodology applied to recommend Alternative 3 as the PPA, was presented to the Franklin Township Engineer and subsequently to the adjacent property and business owners and the general public. Based upon the results of this public outreach, Franklin Township is preparing a Resolution of Support for Alternative 3, and it is anticipated that Somerset County will issue a similar resolution.

ALTERNATIVE ANALYSIS MATRIX

Local Concept Development Study for Bridge K0607
New Brunswick Road over Al's Brook
Franklin Township, Somerset County, New Jersey

Criteria → / Alternatives ↓	Satisfies Purpose & Need	Impacts to New Brunswick Rd. Traffic during Construction		Accelerates Bridge Construction	Total Construction Duration	Permits Required						Right-of-Way Impacts				Estimated Construction Cost	Other
		Open to Vehicles/Bikes/Peds.	Duration of Closures			FWW	FHA	SESC	D&RCC	SWM	Mitigation	Temporary Easements	Permanent Easements	Fee Parcels	Estimated Cost		
Alternative 1 - No-Build	NO	N / A		N / A	N / A	N / A						N / A				N / A	County continues to incur maintenance costs.
Alternative 2 - On-Line, Temporary Bridge	YES	YES	8 weekends	NO	10 Months	✓	✓	✓	Exempt	N / A	N /A	YES UTILITY ESM'T 10,725 SF CONSTR. ESM'T 8,150 SF	YES BRIDGE ESM'T 11,800 SF	NO	$25,000	$2,350,000	Requires Contractor to work adjacent to, and below, active traffic.
Alternative 3 - On-Line, Accelerated Construction	YES	NO	3 weeks	YES	4 Months	✓	✓	✓	Exempt	N / A	N / A	YES UTILITY ESM'T 10,725 SF CONSTR. ESM'T 11,775 SF	YES BRIDGE ESM'T 11,800 SF	NO	$25,000	$1,370,000	Most economical. Shortest duration of traffic impact.
Alternative 4 - Off-Line Construction	YES	YES	1 weekend	NO	12 Months	✓	✓	✓	✓	✓	✓	YES CONSTR. ESM'T 13,225 SF	NO	YES 4 ACRES (174,000 SF)	$755,000	$2,930,000	Greatest impacts and highest cost. Requires residential relocation. Improves intersection of New Brunswick Rd. / Cedar Grove Lane.

NOTES:

1. Anticipated Duration of Construction Contract excludes time to temporarily or permanently relocate utilities.
2. Estimated Right-of-Way cost for Alternative 4 does not include any cost associated with resident relocation.

PERMITS LEGEND:

FWW : NJDEP Freshwater Wetlands.
FHA : NJDEP Flood Hazard Area.
SESC : Somerset-Union Soil Conservation District certification.
D & RCC : Delaware and Raritan Canal Commission review.
SWM : NJDEP Stormwater Management compliance
Mitigation : Mitigation required for Wetlands and/or Riparian Zone impacts.

Conclusions and Recommendation

As a result of the investigations summarized in this report, it is concluded that Alternative 3 consisting of temporarily closing New Brunswick Road to all users and utilizing Accelerated Bridge Construction to rehabilitate the bridge is the most prudent and feasible course of action to satisfy the purpose and need defined for the project. The bridge will be rehabilitated by replacing the existing corrugated plate arches with a single barrel precast concrete arch. Therefore, the rehabilitated bridge will consist of prefabricated, precast concrete arch units, measuring 32'± wide at the base by 8'-2"± high at the crown, supported on the existing concrete slab. The headwalls will be reconstructed, of either cast-in-place or precast concrete, to match the waterway opening of the proposed single barrel arch. The existing wingwalls will remain. The NJDOT's standard 4-Bar Open Steel Bridge Railing will be installed along the new upstream headwall to enhance safety. The alignment of the structure with respect to the centerline of New Brunswick Road will be unchanged. With the exception of a minor adjustment to the roadway profile, to correct the existing substandard sag vertical curve length, no other modifications to New Brunswick Road are warranted. Figure 7, in Appendix A depicts the limits of the proposed improvements and presents photo-renderings of pre- and post-construction views of the bridge.

It is assumed that all aerial utilities and the 4" gas line along the north side of New Brunswick Road would be temporarily relocated, prior to closing New Brunswick Road to all users, to provide the contractor with an obstruction free work zone and limit the duration of the roadway's closure. A temporary utility easement is envisioned north of the bridge, within the conservation easement, to facilitate these temporary utility relocations. Based on discussions with Franklin Township, it is anticipated that their 16" water main can be taken out of service, avoiding the need to temporarily support the main during construction.

Based on the environmental screening conducted for this study, and the public support for the project, it is expected that the appropriate NEPA document would be a Categorical Exclusion Document. Considering the level of potential impacts, the following permits and approvals would be necessary to advance the project to construction:

- NJDEP General Freshwater Wetlands Permit with 401 Water Quality Certificate;
- NJDEP General Flood Hazard Area Permit;
- Somerset-Union Soil Conservation District Soil Erosion and Sediment Control Approval; and
- D&R Canal Commission Exemption Letter.

The estimated construction cost of the recommended improvements is $1,370,000 exclusive of the utility relocation costs.

Appendix A: Figures

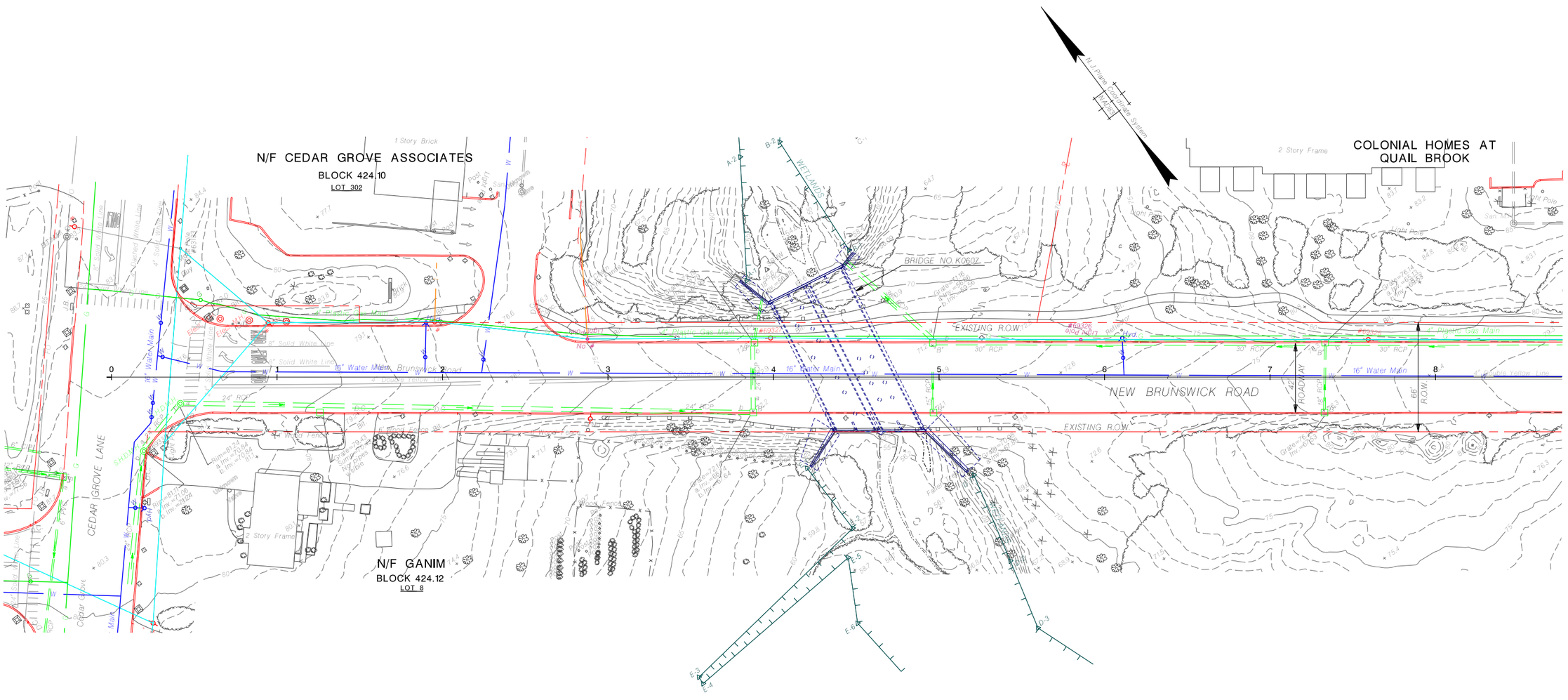
PROJECT SITE MAP

NOT TO SCALE

FIGURE 1

NJTPA

GPI Dewberry



SITE PLAN
SCALE: 1"=30'

SITE PLAN

FIGURE 2

GPI Dewberry

N/F
THOMAS

N/F
SMITH

NEW BRUNSWICK ROAD

CEDAR HILL LANDSCAPING
N/F
JANHO

72' R.O.W.

CEDAR GROVE LANE

65' R.O.W.

CEDAR GROVE CENTRE
N/F
CEDAR GROVE ASSOCIATES LLC

N/F
CHERRY HILL CLUB

N/F
KUMAR

RELOCATED OVERHEAD
UTILITY LINES

TEMPORARY SHEETING
(TYP.)

EXCAVATION
LIMITS (TYP.)

TEMPORARY TRUSS
BRIDGE

BRIDGE EASEMENT
(TYP.)

AL'S BROOK

TEMPORARY
UTILITY EASEMENT

TEMPORARY
UTILITY POLE

CONSERVATION
EASEMENT

EXISTING BRIDGE NO. K0607
TO BE RECONSTRUCTED

TEMPORARY
PAVEMENT (TYP.)

CHAIN–LINK FENCE

TEMPORARY
CONSTRUCTION
EASEMENT (TYP.)

PEDESTRIAN ROUTE
DURING CONSTRUCTION

TEMPORARY CONCRETE
BARRIER CURB (TYP.)

TEMPORARY CRASH
CUSHION (TYP.)

CEDAR HILL
PREP SCHOOL

WELLS ROAD

N/F
GANIM

NEW BRUNSWICK ROAD

COLONIAL HOMES
AT QUAIL BROOK

66' R.O.W.

LYNDHURST DRIVE

SUGGESTED SEQUENCE OF CONSTRUCTION

PERFORM THE FOLLOWING PRIOR TO INITIATING TEMPORARY BRIDGE CONSTRUCTION:

* OBTAIN REQUIRED EASEMENTS AND PERMITS.
* RELOCATE GAS, WATER AND OVERHEAD UTILITIES.
* ESTABLISH TEMPORARY STREAM DIVERSION AND REMOVE EXISTING SEDIMENTATION.
* MODIFY EXISTING SLAB TO ACCEPT NEW PRECAST ARCH SECTIONS.

SUBSEQUENTLY, USING FULL WEEKEND CLOSURES OF NEW BRUNSWICK ROAD:

* CONSTRUCT PILE FOUNDATIONS TO SUPPORT TEMPORARY BRIDGE.
* INSTALL SHEETING TO ALLOW EXCAVATION AND RETAIN TEMPORARY APPROACH ROADWAYS.
* PLACE TEMPORARY APPROACH FILL AND PAVEMENT.
* ERECT TEMPORARY TRUSS BRIDGE.
* PLACE BARRIER CURB AND TRAFFIC PROTECTIVE DEVICES.

WITH TRAFFIC UTILIZING THE TEMPORARY BRIDGE:

* EXCAVATE AND REMOVE EXISTING PLATE ARCHES.
* DEMOLISH EXISTING HEADWALLS.
* INSTALL NEW PRECAST CONCRETE ARCH SECTIONS.
* CONSTRUCT NEW HEADWALLS.
* PARTIALLY BACKFILL ARCH.
* RESTORE STREAM FLOW.

FINALLY, USING FULL WEEKEND CLOSURES OF NEW BRUNSWICK ROAD:

* REMOVE TEMPORARY BRIDGE.
* COMPLETE PLACEMENT OF BACKFILL.
* REMOVE TEMPORARY APPROACHES.
* RECONSTRUCT ROADWAY.
* REOPEN NEW BRUNSWICK ROAD.

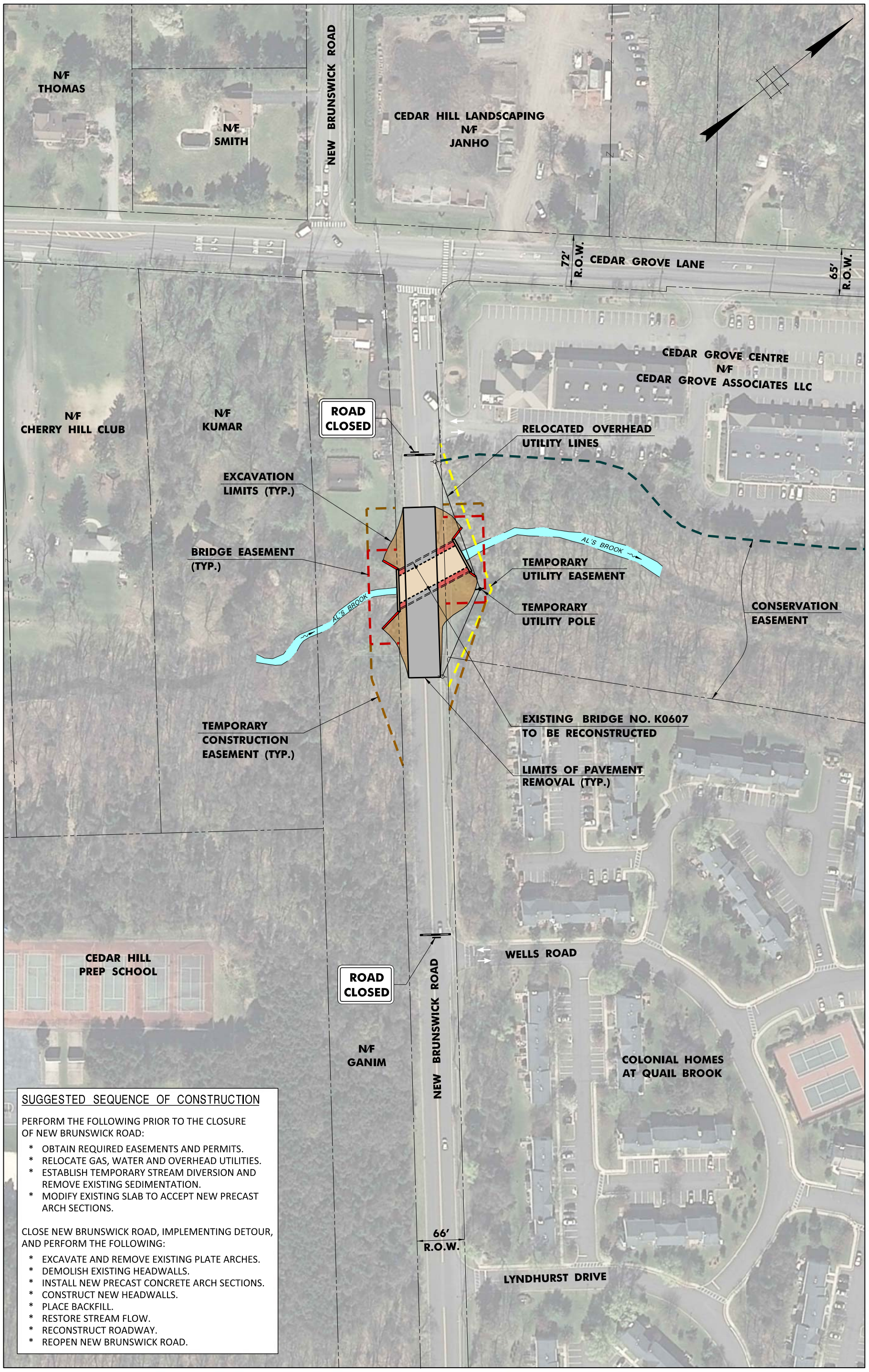
ALTERNATIVE 2: ON-LINE, TEMPORARY BRIDGE

SCALE: 1"=60'

FIGURE 3

NJTPA

GPI Dewberry



SUGGESTED SEQUENCE OF CONSTRUCTION

PERFORM THE FOLLOWING PRIOR TO THE CLOSURE OF NEW BRUNSWICK ROAD:

* OBTAIN REQUIRED EASEMENTS AND PERMITS.
* RELOCATE GAS, WATER AND OVERHEAD UTILITIES.
* ESTABLISH TEMPORARY STREAM DIVERSION AND REMOVE EXISTING SEDIMENTATION.
* MODIFY EXISTING SLAB TO ACCEPT NEW PRECAST ARCH SECTIONS.

CLOSE NEW BRUNSWICK ROAD, IMPLEMENTING DETOUR, AND PERFORM THE FOLLOWING:

* EXCAVATE AND REMOVE EXISTING PLATE ARCHES.
* DEMOLISH EXISTING HEADWALLS.
* INSTALL NEW PRECAST CONCRETE ARCH SECTIONS.
* CONSTRUCT NEW HEADWALLS.
* PLACE BACKFILL.
* RESTORE STREAM FLOW.
* RECONSTRUCT ROADWAY.
* REOPEN NEW BRUNSWICK ROAD.

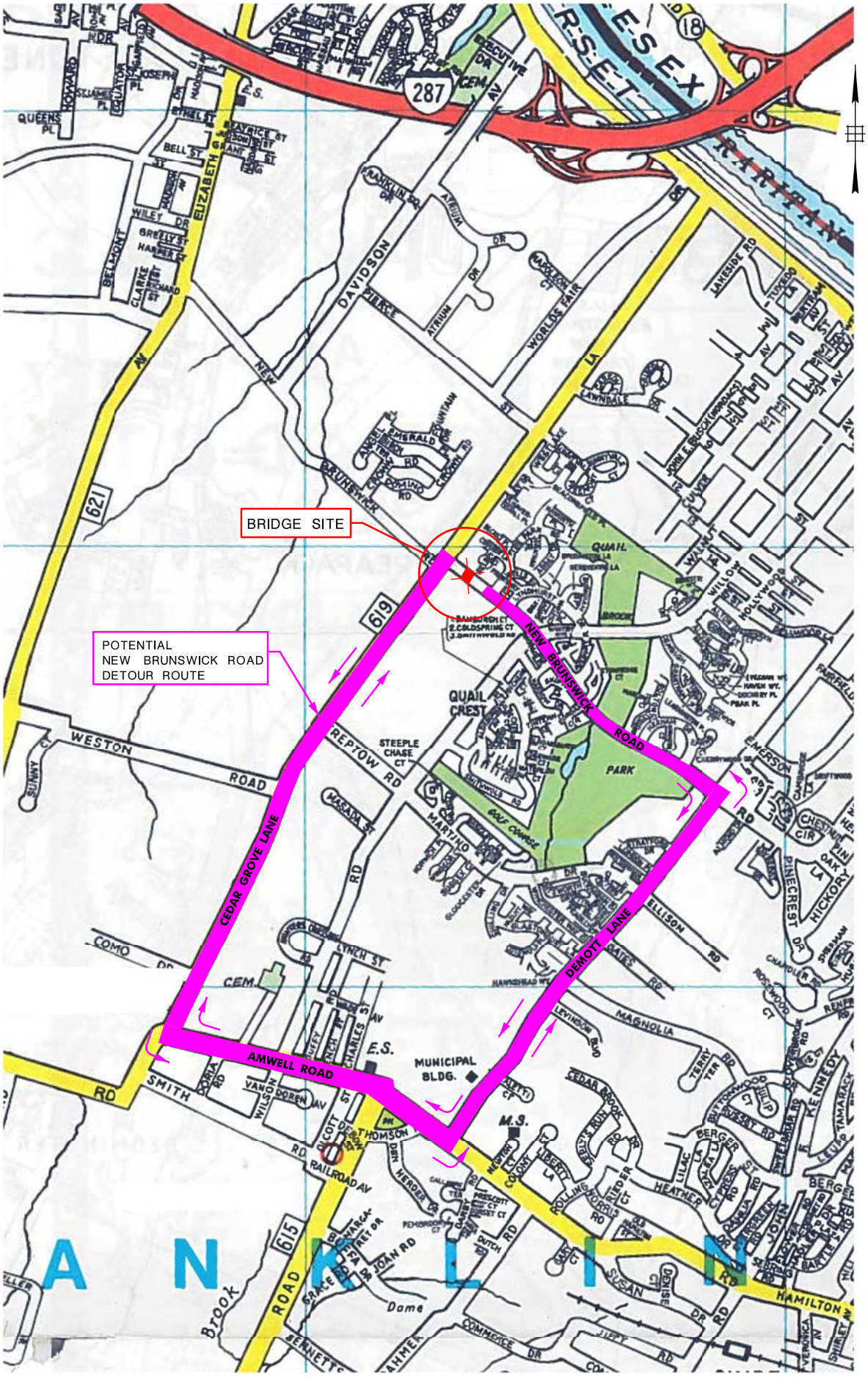
ALTERNATIVE 3: ON-LINE, ACCELERATED CONSTRUCTION

SCALE: 1"=60'

FIGURE 4

NJTPA

GPI Dewberry



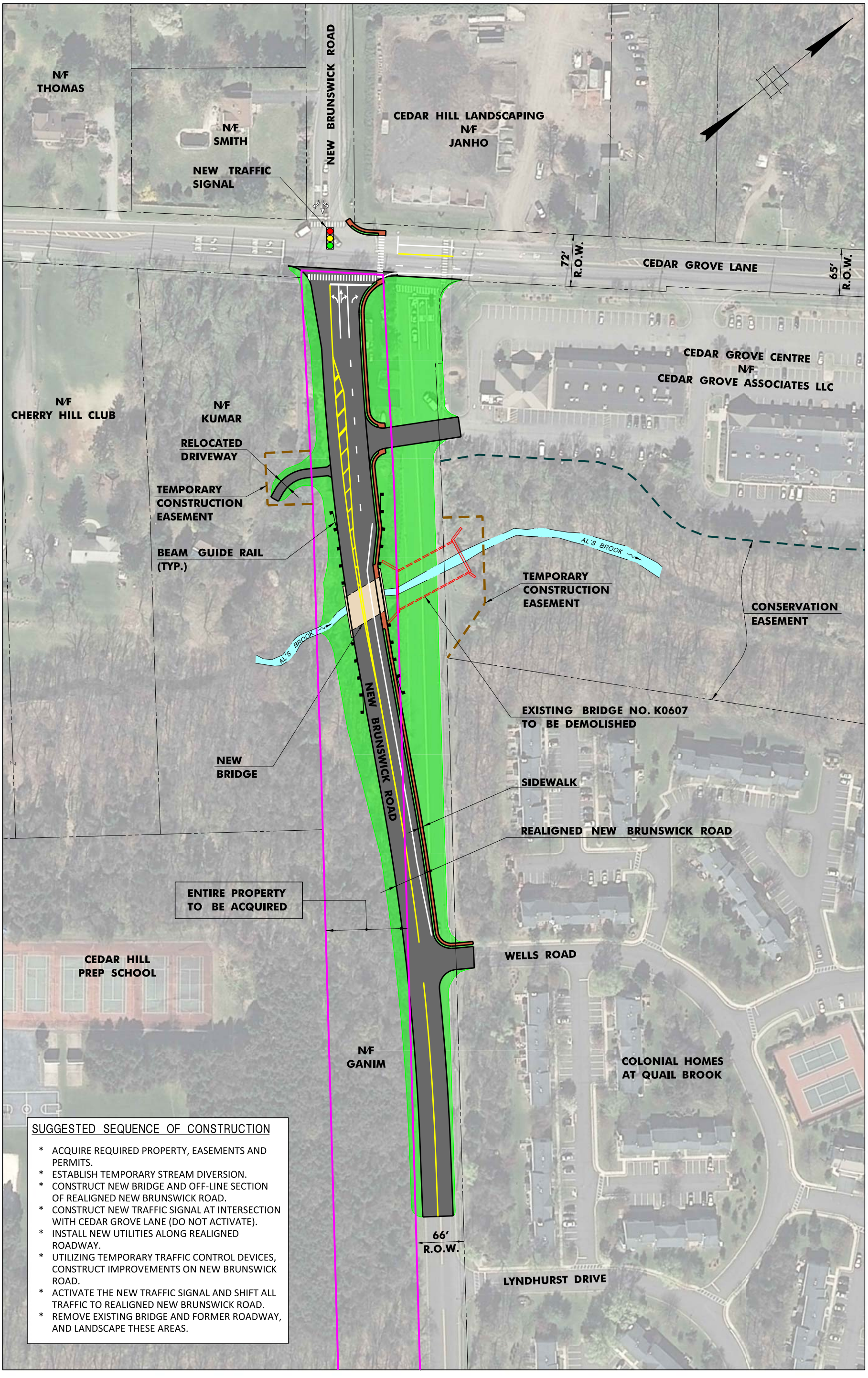
NEW BRUNSWICK ROAD POTENTIAL DETOUR MAP

NOT TO SCALE

FIGURE 5

NJTPA

GPI Dewberry



SUGGESTED SEQUENCE OF CONSTRUCTION

* ACQUIRE REQUIRED PROPERTY, EASEMENTS AND PERMITS.
* ESTABLISH TEMPORARY STREAM DIVERSION.
* CONSTRUCT NEW BRIDGE AND OFF-LINE SECTION OF REALIGNED NEW BRUNSWICK ROAD.
* CONSTRUCT NEW TRAFFIC SIGNAL AT INTERSECTION WITH CEDAR GROVE LANE (DO NOT ACTIVATE).
* INSTALL NEW UTILITIES ALONG REALIGNED ROADWAY.
* UTILIZING TEMPORARY TRAFFIC CONTROL DEVICES, CONSTRUCT IMPROVEMENTS ON NEW BRUNSWICK ROAD.
* ACTIVATE THE NEW TRAFFIC SIGNAL AND SHIFT ALL TRAFFIC TO REALIGNED NEW BRUNSWICK ROAD.
* REMOVE EXISTING BRIDGE AND FORMER ROADWAY, AND LANDSCAPE THESE AREAS.

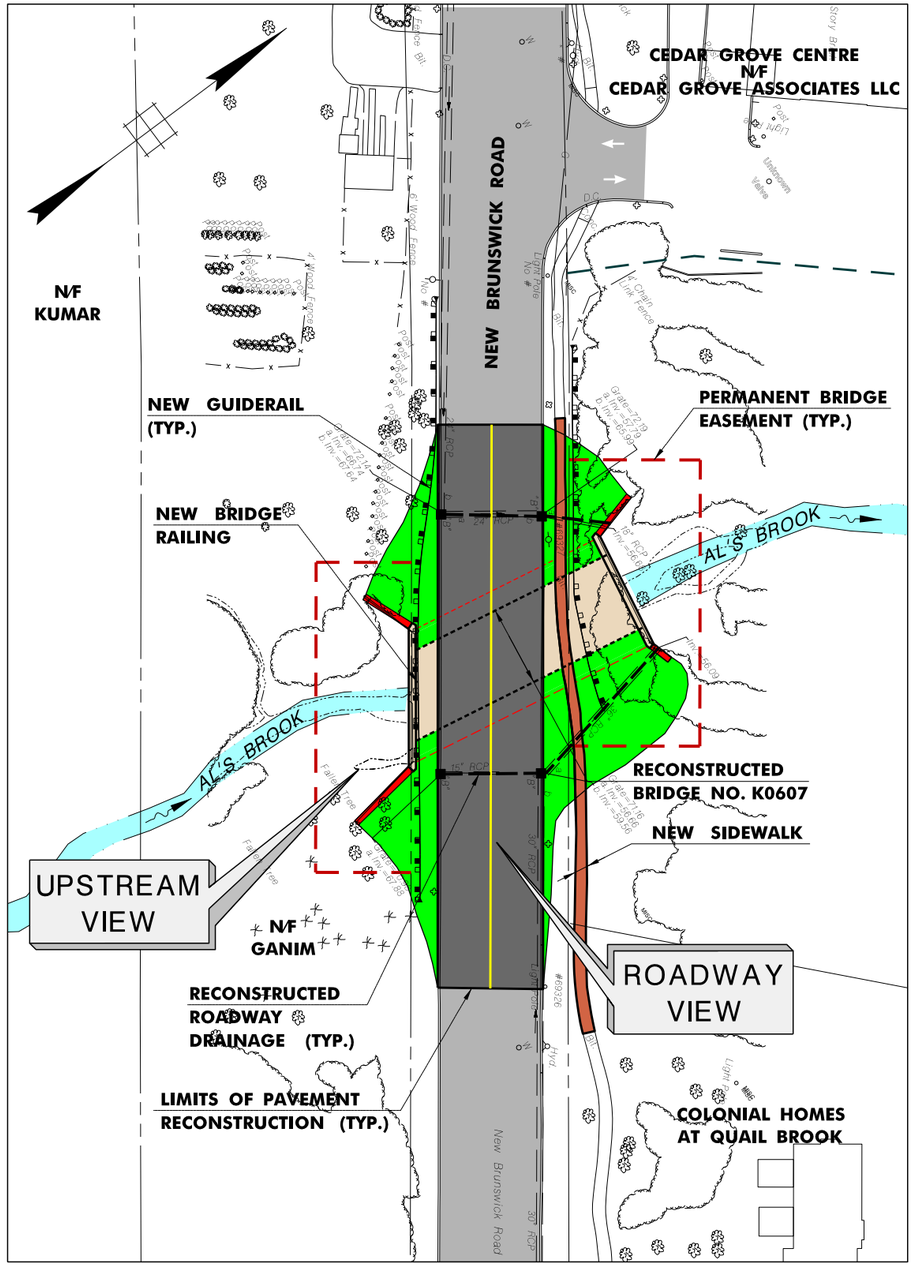
ALTERNATIVE 4: OFF-LINE CONSTRUCTION

SCALE: 1"=60'

FIGURE 6

NJTPA

GPI Dewberry



PLAN

SCALE: 1″=30′

BEFORE

AFTER

UPSTREAM VIEW

BEFORE

AFTER

ROADWAY VIEW

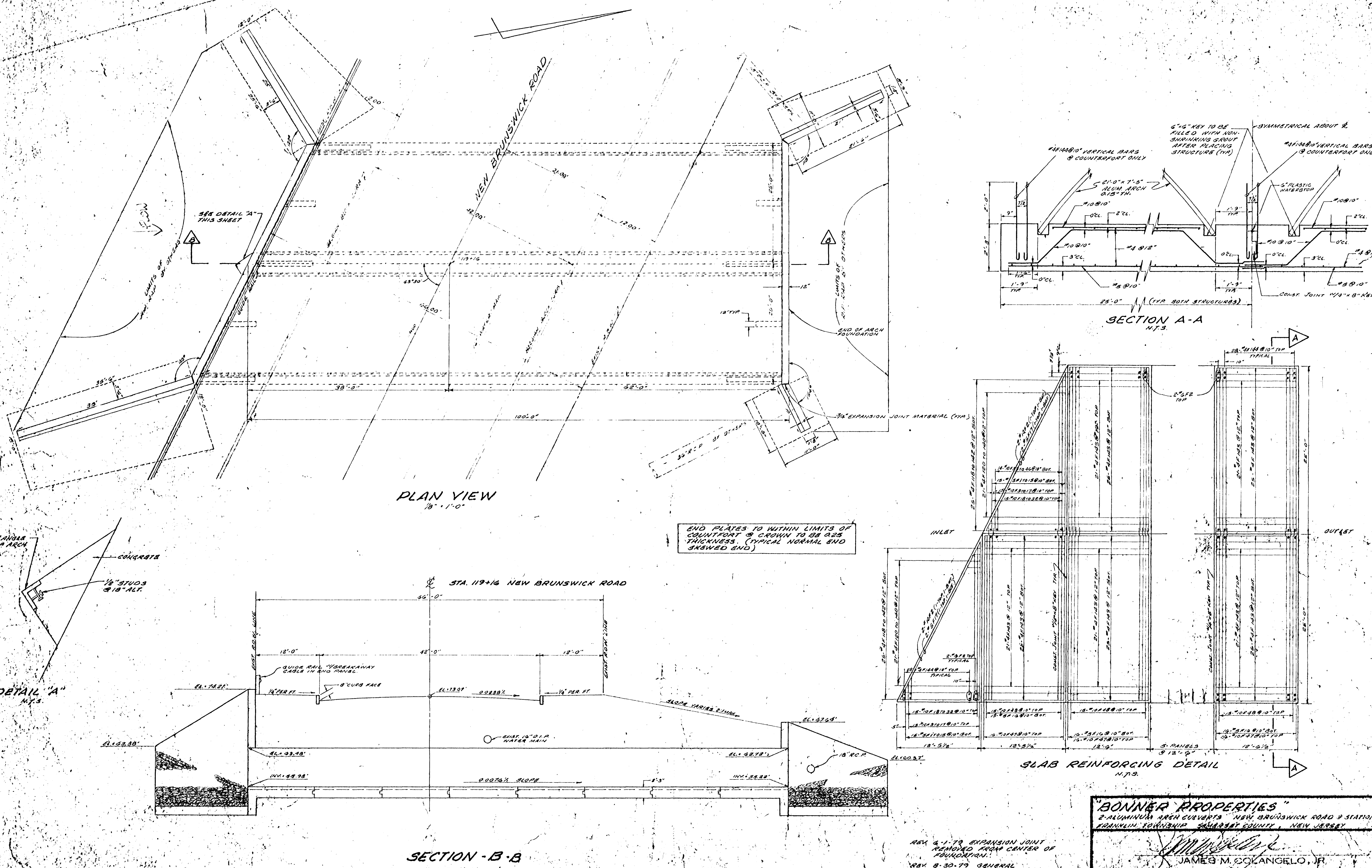
PROPOSED IMPROVEMENTS - PRELIMINARY PREFERRED ALTERNATIVE

FIGURE 7

NJTPA

GPI Dewberry

Appendix B: As-built Plans



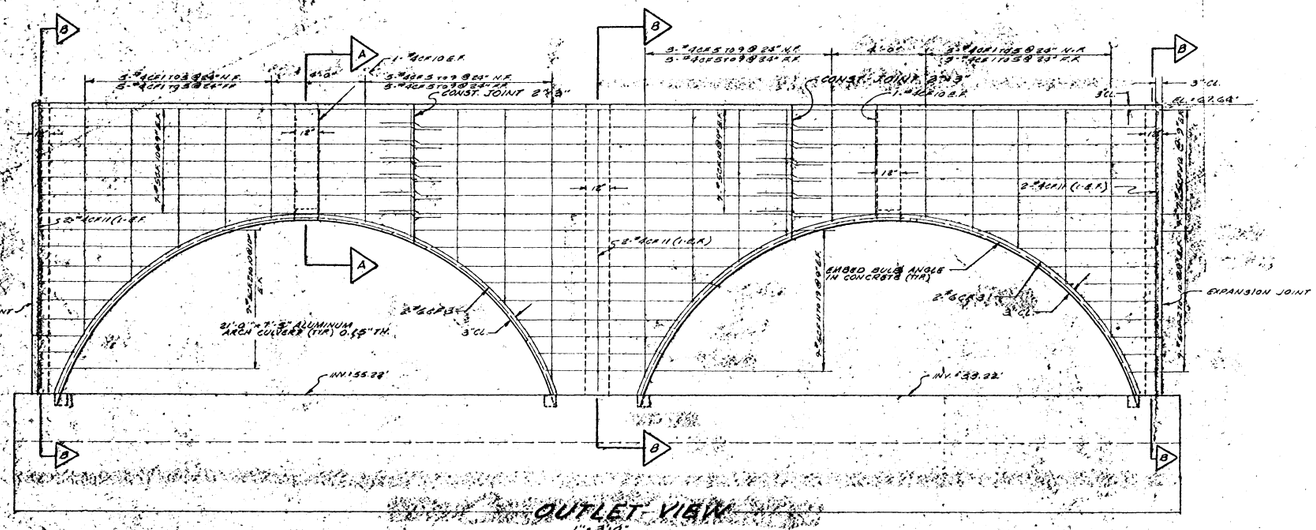
REV. 6-1-79 EXPANSION JOINT REMOVED FROM CENTER OF FOUNDATION.
REV. 8-30-79 GENERAL
REV. 9-27-79, ADDED BAR #10F3 & 3F17

"BONNER PROPERTIES"
2-ALUMINUM ARCH CULVERTS NEW BRUNSWICK ROAD @ STATION 119+16
FRANKLIN TOWNSHIP SOMERSET COUNTY, NEW JERSEY

JAMES M. COLANGELO, JR.
PROFESSIONAL ENGINEER, NEW JERSEY LIC. NO. 10542

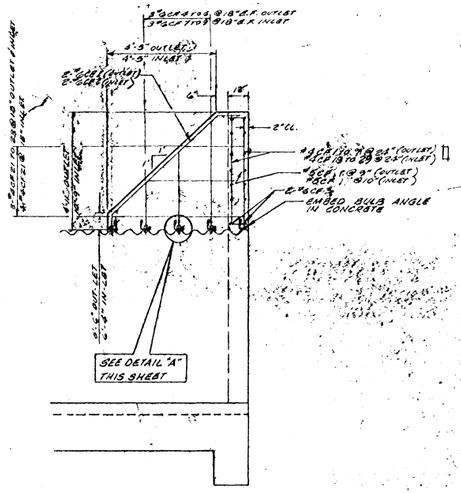
PREPARED BY
CONSULTING ENGINEER SERVICES
PROFESSIONAL ENGINEERS & PLANNERS
SEWELL, N. J. 08080

K0607



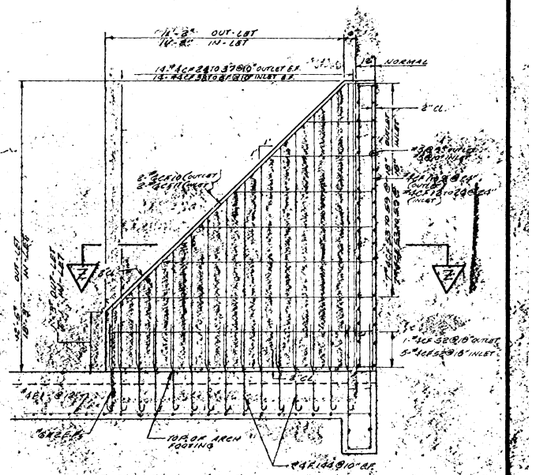
OUTLET VIEW

1"=3'-0"



SECTION A-A

N.T.S.



SECTION B-B

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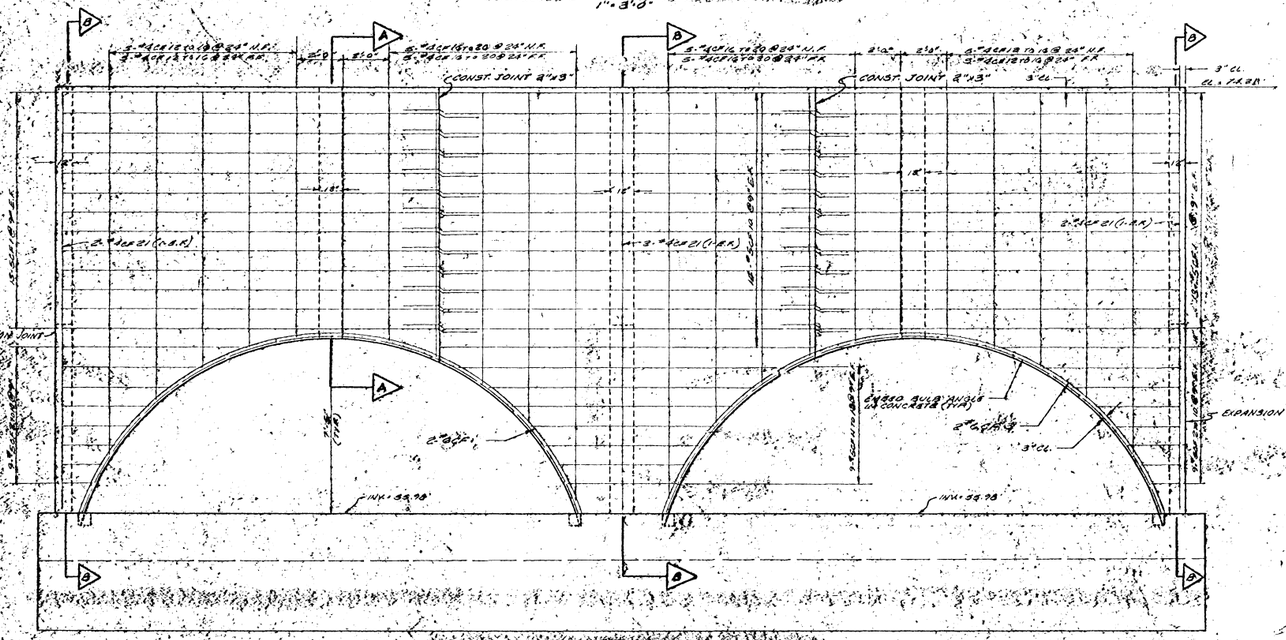
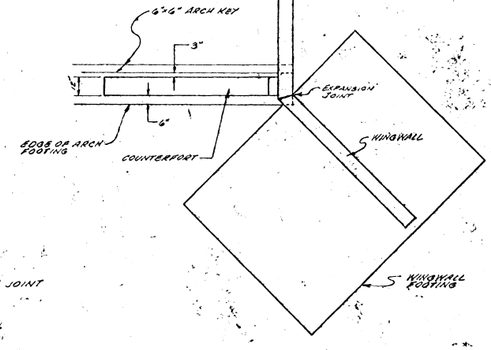


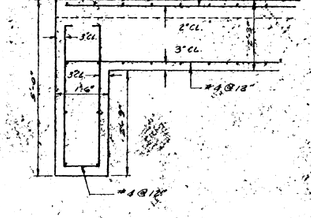
INLET VIEW

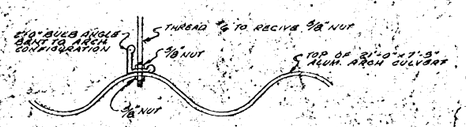
1"=3'-0"



TYPICAL WINGWALL JUNCTION

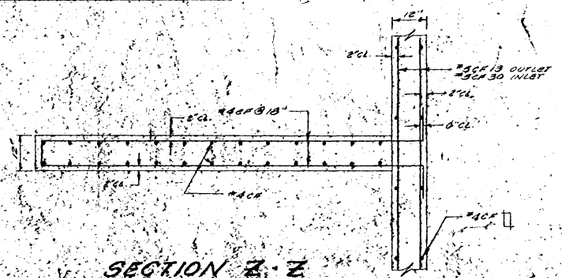
1"=4'-0"





DETAIL "A"

N.T.S.



SECTION Z-Z

1"=2'-0"

NOTES:

1) ASSUMED BEARING CAPACITY OF 2 KIPS PER SQUARE FOOT AS PER REPORT OF SOIL INVESTIGATION BY TECHNICAL TESTING, INC.
2) REINFORCEMENT DETAILED AS TYPICAL FOR EACH SECTION.
3) STEEL REINFORCEMENT SHALL CONSIST OF GRADE 60 BARS FREE FROM RUST DIRT, ETC.
4) CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS.
5) ALL CONCRETE FOUNDATION TO BEAR A MINIMUM OF 6-INCH INTO ROCK SHALE.
6) PAINT ALL SURFACES OF ALUMINUM PLATE IN CONTACT WITH CONCRETE WITH A HEAVY COAT OF ALUMINUM PIGMENTED ALKALINE RESISTANT BITUMINOUS PAINT EQUAL TO MILITARY SPECIFICATIONS: MIL.P-6883.
7) POROUS FILL SHALL CONFORM TO N.J.D.O.T. SPECIFICATIONS FOR SAND.
8) THE SOMERSET COUNTY ENGINEER SHALL BE NOTIFIED IN WRITING AT LEAST 2 DAYS PRIOR TO START OF CONSTRUCTION.

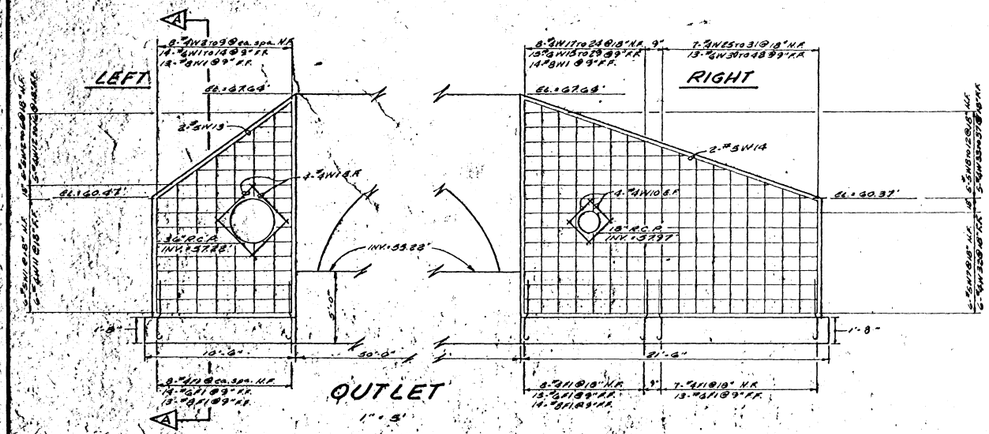
REV. 6-1-79 COUNTERFORTS ADDED TO END OF HEADWALLS
REV. 8-30-79 GENERAL

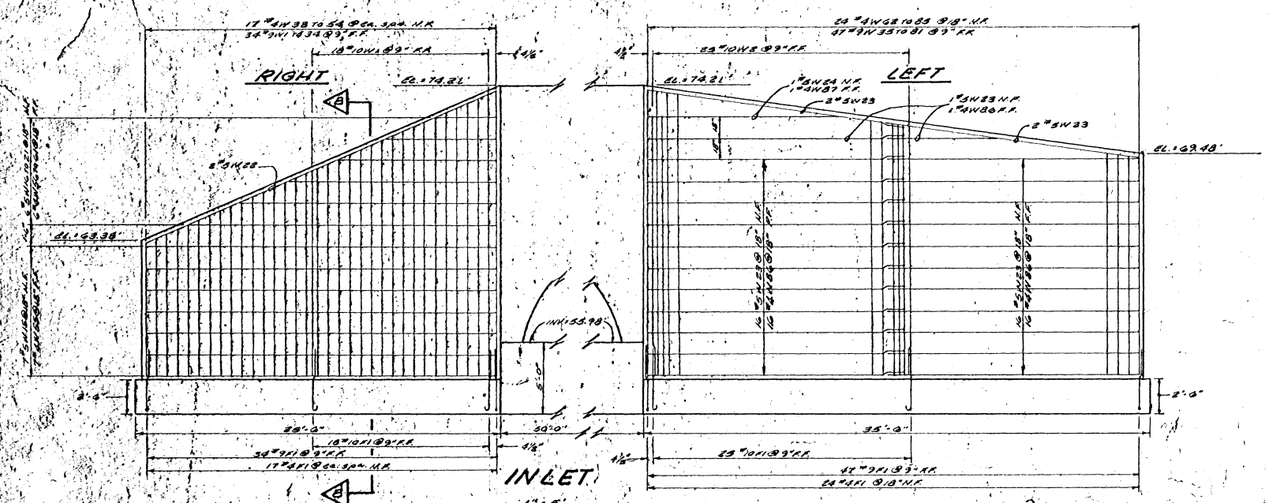
"BONNER PROPERTIES"
2 ALUMINUM ARCH CULVERTS - NEW BRUNSWICK ROAD @ STATION 103+16
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NEW JERSEY

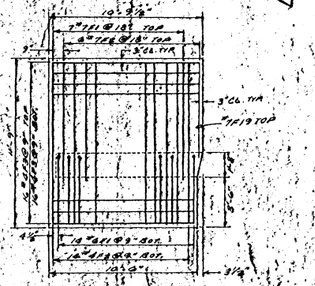
JAMES M. COLANGELO, JR.
PROFESSIONAL ENGINEER, NEW JERSEY LIC. NO. 10542

PREPARED BY
CONSULTING ENGINEER SERVICES
PROFESSIONAL ENGINEERS & PLANNERS
SEWELL, N. J. 08080

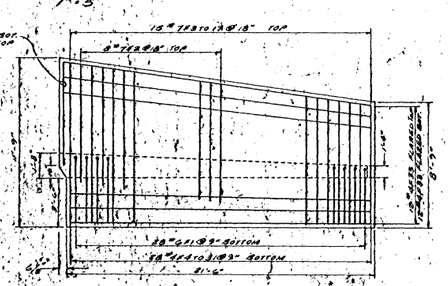
BY: CES-TS | CHKD: JMC | APPVD: CES
SCALE: AS NOTED | DATE: 4-13-79



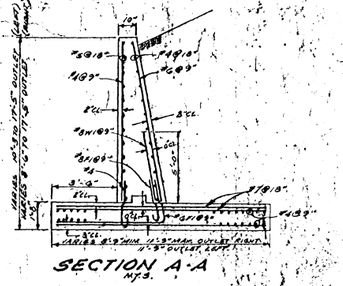




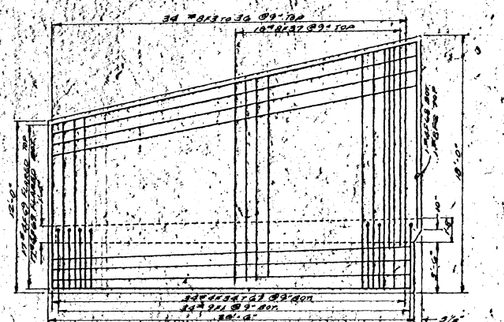
FOOTING REINFORCEMENT PLAN
OUTLET - LEFT
1" = 5'



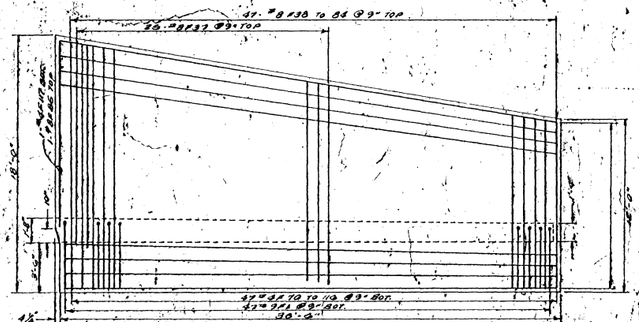
FOOTING REINFORCEMENT PLAN
OUTLET RIGHT
1" = 5'



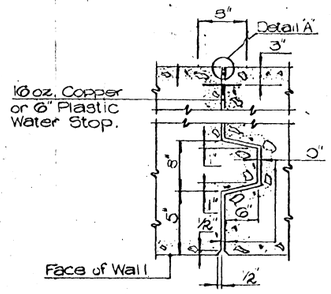
SECTION A-A
N.T.S.



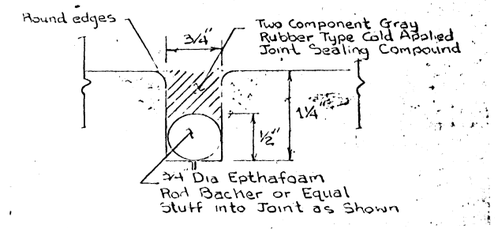
FOOTING REINFORCEMENT PLAN INLET RIGHT



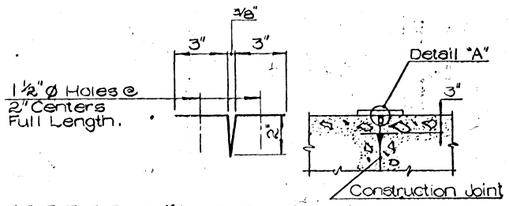
FOOTING REINFORCEMENT PLAN INLET LEFT



CONTRACTION JOINT
DETAIL
N.T.S.

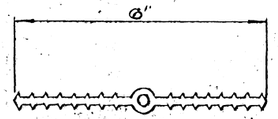


DETAIL-"A"
N.T.S.

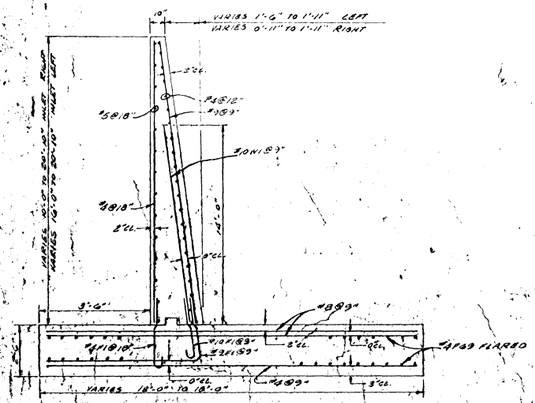


16 oz. COPPER 10" WIDE
N.T.S.

CONSTRUCTION JOINT
N.T.S



PLASTIC WATERSTOP DETAIL
N.T.S.



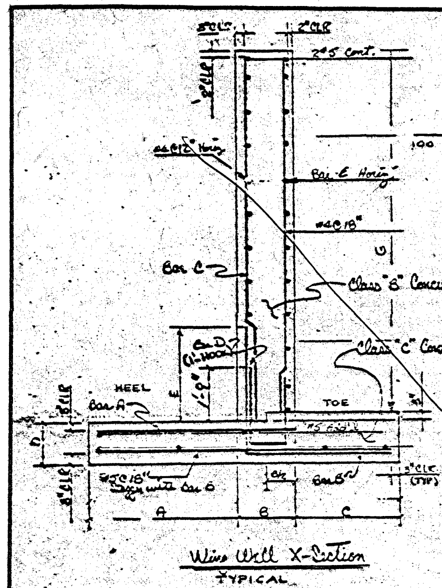
SECTION B-B
N.T.S.

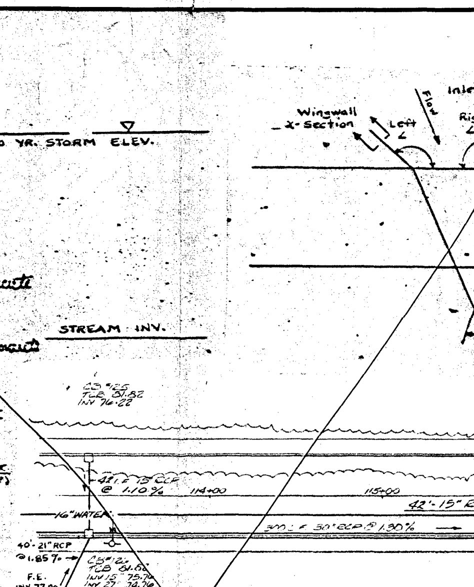
BONNER PROPERTIES
2-ALUMINUM ARCH CULVERT NEW BRUNSWICK RD. STA. 119+16
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NEW JERSEY

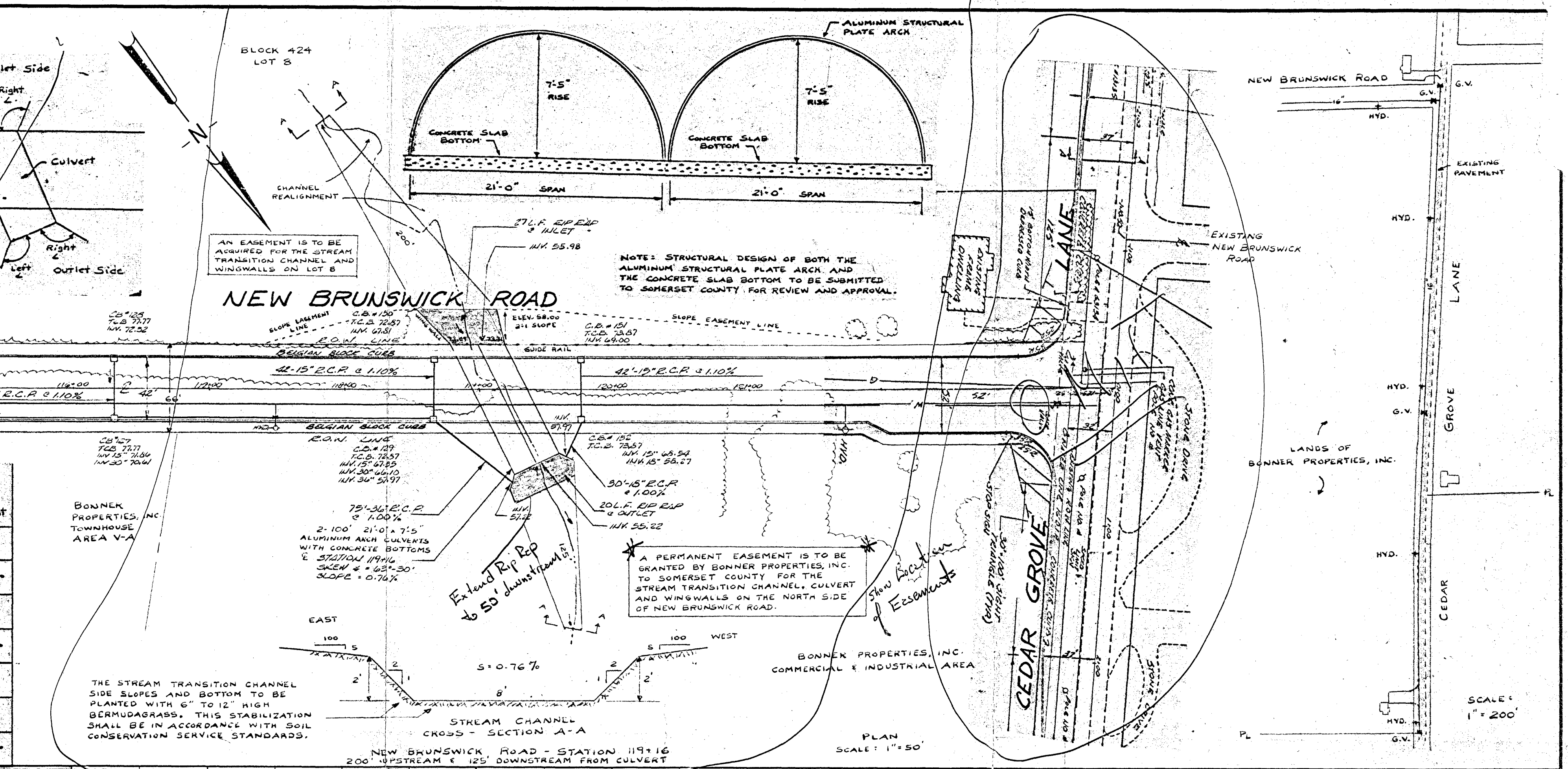
JAMES M. COLANGELO, JR.
PROFESSIONAL ENGINEER, NEW JERSEY LIC. NO. 16642

PREPARED BY
CONSULTING ENGINEER SERVICES
PROFESSIONAL ENGINEERS & PLANNERS
SEWELL, N. J. 08080

DRWN. BY: S.T.B. CHKD. J.M.C. SHT. NO. 24 of 5
DATE: 6-3-74 SCALE: AS NOTED 483-1084

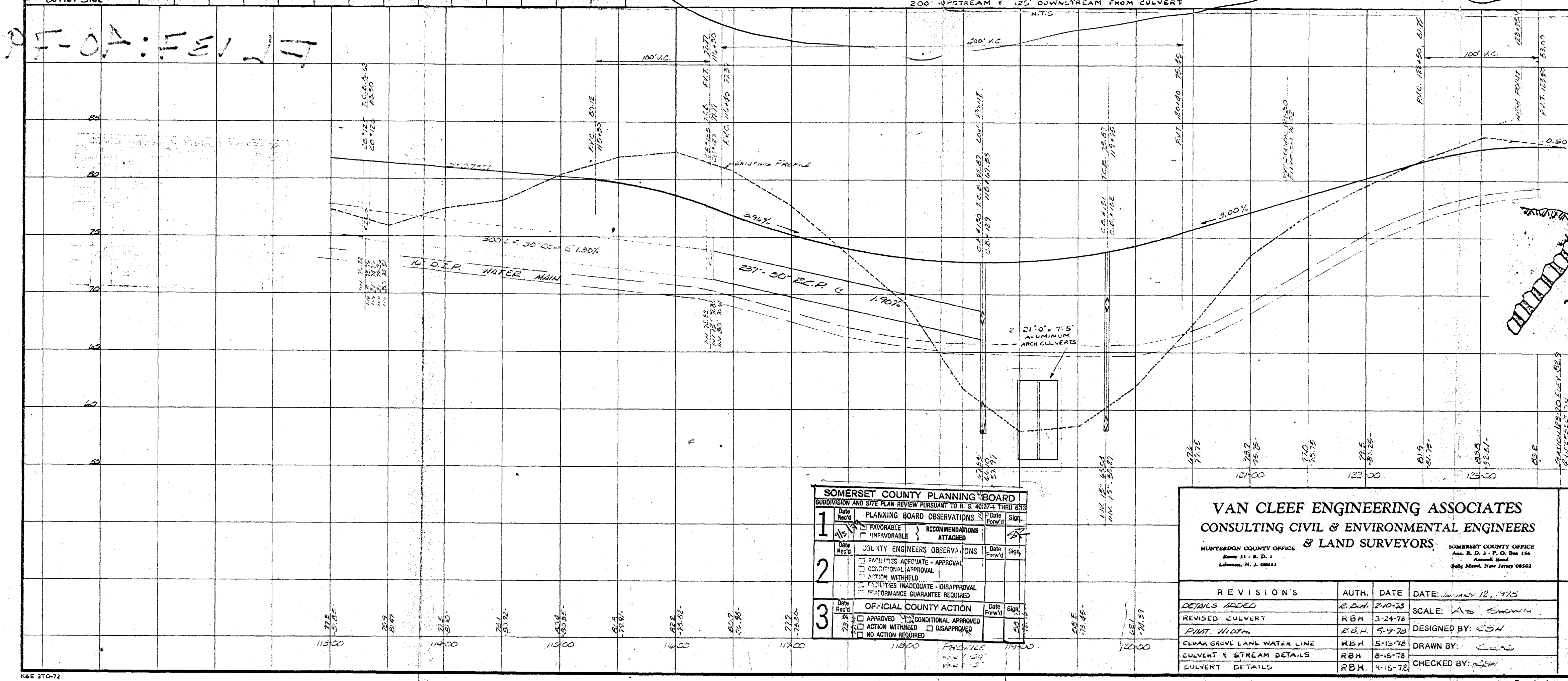


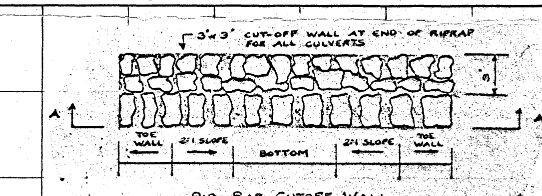




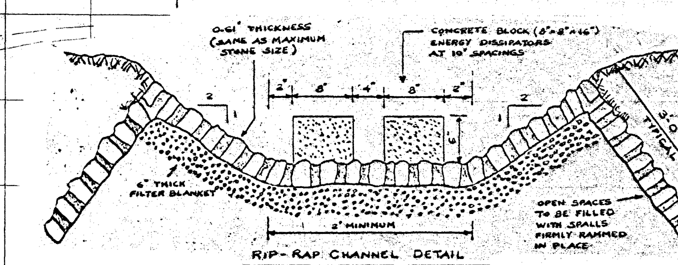
	A	B	C	D	F	G	Top of Heel Elev.	Top of Toe Elev.	Stream Inv.	100 Yr. Storm Elev.	Wingwall Angles Inlet Left	Inlet Right	Outlet Left	Outlet Right
New Brunswick Road Station 119+16 Inlet Side	7.25'	1.83'	5.67'	1.67'	1.92'	20.00'	52.73	52.98	55.98	61.18	135°	116°		
New Brunswick Road Station 119+16 outlet Side	7.25'	1.83'	5.67'	1.67'	1.92'	20.00'	51.97	52.22	55.22	60.42			135°	135°
Ellison Road Station 23+00 Inlet Side	2.83'	1.00'	2.25'	1.00'	1.25'	10.17'	78.75	79.00	82.00	87.00	135°	135°		
Ellison Road Station 23+00 outlet Side - Right	2.83'	1.00'	2.25'	1.00'	1.25'	10.17'	78.10	78.35	81.35	86.35				135°
Ellison Road Station 23+00 outlet Side - Left	3.50'	1.00'	2.33'	1.00'	1.25'	10.17'	78.10	78.35	81.35	86.35			135°	
Ellison Road Station 47+87 Inlet Side	3.75'	1.17'	2.75'	1.00'	1.25'	10.33'	77.35	77.60	80.60	84.20	120°	77°		
Ellison Road Station 47+87 outlet Side	2.67'	1.17'	2.00'	1.00'	1.25'	10.33'	77.35	77.60	80.30	87.88			135°	135°

42 PF-OA:FEI JT





RIP-RAP CUTOFF WALL
N.T.S.



RIP-RAP CHANNEL DETAIL
WITH ENERGY DISSIPATORS
N.T.S.

RIP-RAP GRADATION

D_{100} = 0.61 (35 lbs)
D_{85} = 0.51 (20 lbs)
D_{50} = 0.40 (10 lbs)
D_{15} = 0.32 (5 lbs)
D_{0} = 0.20 (1 lbs)

FILTER BLANKET GRADATION

D_{100} = 1-1/4"
D_{85} = 1"
D_{50} = 1/4"
D_{15} = 1/8"

SOMERSET COUNTY PLANNING BOARD
SUBDIVISION AND SITE PLAN REVIEW PURSUANT TO R. S. 40:27-4 THRU 6.13

	Date Rec'd		Date Forw'd	Sign.
1	9/15/79	PLANNING BOARD OBSERVATIONS: ☒ FAVORABLE ☐ UNFAVORABLE } RECOMMENDATIONS ATTACHED		
2		COUNTY ENGINEERS OBSERVATIONS: ☐ FACILITIES ADEQUATE - APPROVAL ☐ CONDITIONAL APPROVAL ☐ ACTION WITHHELD ☐ FACILITIES INADEQUATE - DISAPPROVAL ☐ PERFORMANCE GUARANTEE REQUIRED		
3		OFFICIAL COUNTY ACTION: ☐ APPROVED ☒ CONDITIONAL APPROVED ☐ ACTION WITHHELD ☐ DISAPPROVED ☐ NO ACTION REQUIRED		

VAN CLEEF ENGINEERING ASSOCIATES
CONSULTING CIVIL & ENVIRONMENTAL ENGINEERS
& LAND SURVEYORS

HUNTERDON COUNTY OFFICE
Route 31 - R. D. 1
Lebanon, N. J. 08833

SOMERSET COUNTY OFFICE
Aux. R. D. 3 - P. O. Box 156
Amwell Road
Belle Mead, New Jersey 08502

REVISIONS	AUTH.	DATE
DETAILS ADDED	R.B.H.	2-10-78
REVISED CULVERT	RBH	3-24-78
PVMT. WIDTH	R.B.H.	5-9-78
CEDAR GROVE LANE WATER LINE	RBH	5-15-78
CULVERT & STREAM DETAILS	RBH	8-15-78
CULVERT DETAILS	RBH	9-15-78

DATE: January 12, 1978
SCALE: As Shown
DESIGNED BY: CSH
DRAWN BY: CSC
CHECKED BY: CSH

PLAN AND PROFILE
NEW BRUNSWICK ROAD IMPROVEMENTS
STA 113+00 TO 123+70.32
FOR BONNER LANDS
FRANKLIN TOWNSHIP - SOMERSET COUNTY
NEW JERSEY

619-010

BY:
NEIL I VAN CLEEF P.E. & L.S. 13856

BK. & PG. – ALUMINUM CULVERT RBH 12-26-78 CULVERT DETAILS 9-4-79
ALUMINUM CULVERT RBH 2-27-79
JOB NO. – 158
FILE NO. – 2817

K&E 3TO-72

60

Appendix C: Photographs

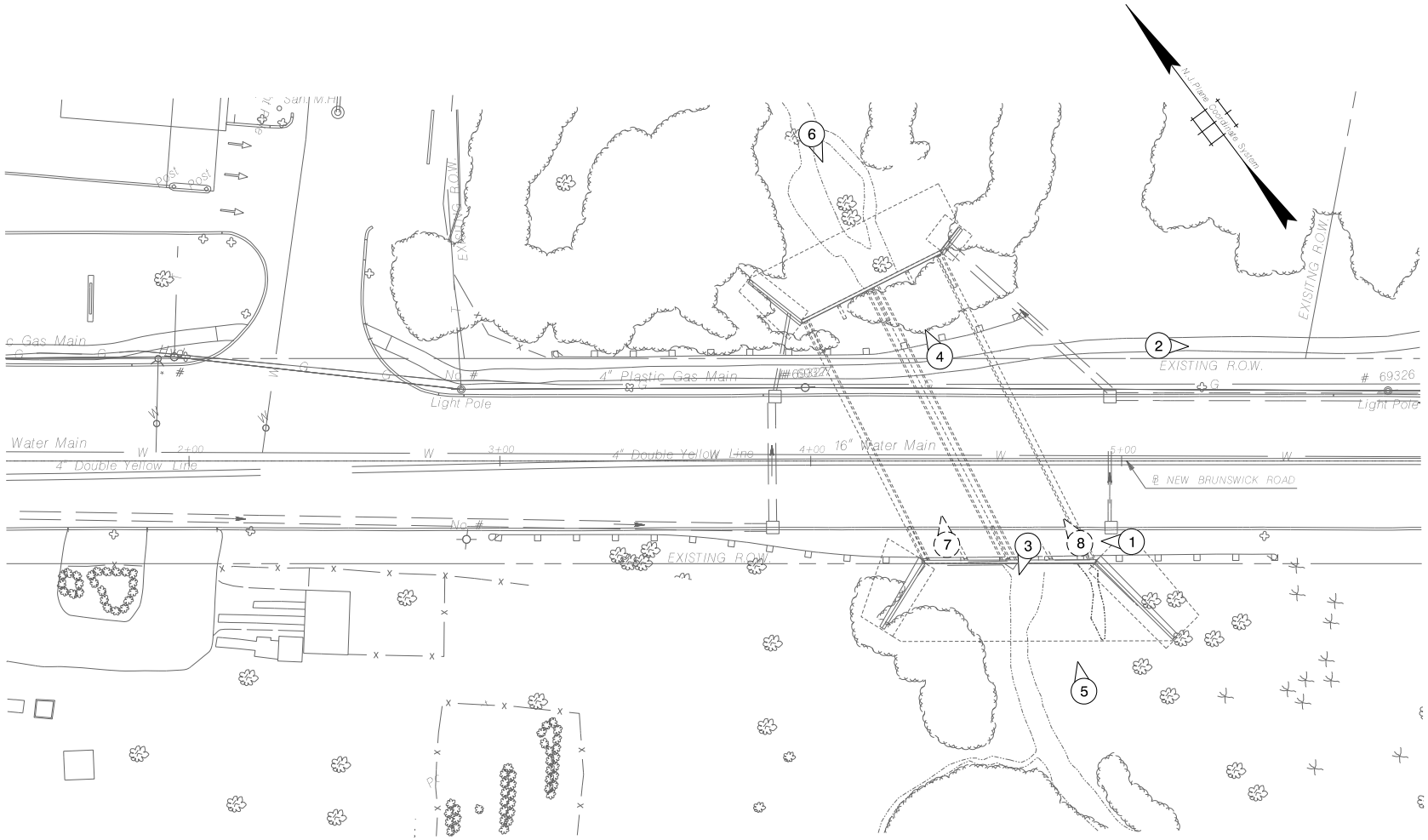


PHOTO LOCATION PLAN
NOT TO SCALE

LEGEND:

(#) - PHOTO TAKEN ABOVE STRUCTURE

(#) - PHOTO TAKEN BELOW STRUCTURE

NJTPA

GPI Dewberry

Photo No. 1:
View looking west along New Brunswick Road from bridge towards Cedar Grove Lane.

Photo No. 2:
View looking east along New Brunswick Road from Bridge.

Photo No. 3:
Upstream view of Al's Brook from the bridge.

Photo No. 4:
Downstream view of Al's Brook from the bridge.

Photo No. 5:
Upstream elevation view of bridge.

Photo No. 6:
Downstream elevation view of bridge.

Photo No. 7:
View looking downstream through west arch. Note temporary shoring.

Photo No. 8:
View looking downstream through east arch. Note temporary shoring.

Appendix D: Cost Estimates

LOCAL CONCEPT DEVELOPMENT STUDY FOR BRIDGE K0607
NEW BRUNSWICK ROAD OVER AL'S BROOK
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NJ

ESTIMATED CONSTRUCTION COST
FOR

ALTERNATIVE 2 - ON-LINE, TEMPORARY BRIDGE

ITEM NO.	ITEMS	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	ROADWAY ITEMS				
1	BONDS, MOBILIZATION AND CONSTRUCTION LAYOUT	L.S.	L.S.	$150,000.00	$150,000.00
2	EROSION CONTROL MEASURES	L.S.	L.S.	$15,000.00	$15,000.00
3	MAINTENANCE AND PROTECTION OF TRAFFIC	L.S.	L.S.	$75,000.00	$75,000.00
4	CLEARING SITE	L.S.	L.S.	$15,000.00	$15,000.00
5	EXCAVATION, UNCLASSIFIED	C.Y.	300	$50.00	$15,000.00
6	DENSE-GRADED AGGREGATE BASE COURSE, 6" THICK	S.Y.	814	$15.00	$12,210.00
7	HMA MILLING, 3" OR LESS	S.Y.	500	$45.00	$22,500.00
8	HOT MIX ASPHALT 9.5 M 64 SURFACE COURSE, 2" THICK	TON	30	$130.00	$3,900.00
9	HOT MIX ASPHALT 19 M 64 BASE COURSE, 6" THICK (2 LIFTS)	TON	80	$100.00	$8,000.00
10	ROADWAY DRAINAGE	L.S.	L.S.	$20,000.00	$20,000.00
11	HOT MIX ASPHALT SIDEWALK, 5" THICK	S.Y.	155	$40.00	$6,200.00
12	9" X 20" CONCRETE VERTICAL CURB	L.F.	400	$40.00	$16,000.00
13	NON-VEGETATIVE SURFACE, HOT MIX ASPHALT	S.Y.	490	$25.00	$12,250.00
14	BEAM GUIDE RAIL	L.F.	150	$50.00	$7,500.00
15	BEAM GUIDE RAIL ANCHORAGE	UNIT	1	$3,000.00	$3,000.00
16	TANGENT GUIDE RAIL TERMINAL	UNIT	3	$3,000.00	$9,000.00
17	TRAFFIC STRIPING	L.F.	600	$2.00	$1,200.00
18	LANDSCAPING	L.S.	L.S.	$5,000.00	$5,000.00
				SUBTOTAL ROADWAY ITEMS	**$396,760.00**
	BRIDGE ITEMS				
19	CLEARING SITE, BRIDGE (STRUCTURE NO. K0607)	L.S.	L.S.	$60,000.00	$60,000.00
20	EXCAVATION, UNCLASSIFIED	C.Y.	5,700	$50.00	$285,000.00
21	TEMPORARY SHEETING	S.F.	4,400	$100.00	$440,000.00
22	TEMPORARY BRIDGE AND ROADWAY	L.S.	L.S.	$500,000.00	$500,000.00
23	MAINTENANCE OF STREAM FLOW	L.S.	L.S.	$30,000.00	$30,000.00
24	PRECAST CONCRETE ARCH	L.F.	100	$6,000.00	$600,000.00
25	4-BAR OPEN STEEL PARAPET	L.F.	120	$300.00	$36,000.00
				SUBTOTAL BRIDGE ITEMS	**$1,951,000.00**
				TOTAL COST	**$2,347,760.00**
				SAY	**$2,350,000**

LOCAL CONCEPT DEVELOPMENT STUDY FOR BRIDGE K0607
NEW BRUNSWICK ROAD OVER AL'S BROOK
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NJ

ESTIMATED CONSTRUCTION COST
FOR

ALTERNATIVE 3 - ON-LINE, ACCELERATED CONSTRUCTION

ITEM NO.	ITEMS	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	ROADWAY ITEMS				
1	BONDS, MOBILIZATION AND CONSTRUCTION LAYOUT	L.S.	L.S.	$150,000.00	$150,000.00
2	EROSION CONTROL MEASURES	L.S.	L.S.	$10,000.00	$10,000.00
3	MAINTENANCE AND PROTECTION OF TRAFFIC	L.S.	L.S.	$35,000.00	$35,000.00
4	CLEARING SITE	L.S.	L.S.	$15,000.00	$15,000.00
5	EXCAVATION, UNCLASSIFIED	C.Y.	300	$50.00	$15,000.00
6	DENSE-GRADED AGGREGATE BASE COURSE, 6" THICK	S.Y.	800	$15.00	$12,000.00
7	HMA MILLING, 3" OR LESS	S.Y.	500	$45.00	$22,500.00
8	HOT MIX ASPHALT 9.5 M 64 SURFACE COURSE, 2" THICK	TON	30	$130.00	$3,900.00
9	HOT MIX ASPHALT 19 M 64 BASE COURSE, 6" THICK (2 LIFTS)	TON	80	$100.00	$8,000.00
10	ROADWAY DRAINAGE	L.S.	L.S.	$20,000.00	$20,000.00
11	HOT MIX ASPHALT SIDEWALK, 5" THICK	S.Y.	155	$40.00	$6,200.00
12	9" X 20" CONCRETE VERTICAL CURB	L.F.	400	$40.00	$16,000.00
13	NON-VEGETATIVE SURFACE, HOT MIX ASPHALT	S.Y.	490	$25.00	$12,250.00
14	BEAM GUIDE RAIL	L.F.	150	$50.00	$7,500.00
15	BEAM GUIDE RAIL ANCHORAGE	UNIT	1	$3,000.00	$3,000.00
16	TANGENT GUIDE RAIL TERMINAL	UNIT	3	$3,000.00	$9,000.00
17	TRAFFIC STRIPING	L.F.	600	$2.00	$1,200.00
18	LANDSCAPING	L.S.	L.S.	$5,000.00	$5,000.00
			SUBTOTAL ROADWAY ITEMS		**$351,550.00**
	BRIDGE ITEMS				
19	CLEARING SITE, BRIDGE (STRUCTURE NO. K0607)	L.S.	L.S.	$60,000.00	$60,000.00
20	EXCAVATION, UNCLASSIFIED	C.Y.	5,900	$50.00	$295,000.00
21	MAINTENANCE OF STREAM FLOW	L.S.	L.S.	$30,000.00	$30,000.00
22	PRECAST CONCRETE ARCH	L.F.	100	$6,000.00	$600,000.00
23	4-BAR OPEN STEEL PARAPET	L.F.	120	$300.00	$36,000.00
			SUBTOTAL BRIDGE ITEMS		**$1,021,000.00**
				TOTAL COST	**$1,372,550.00**
				SAY	**$1,370,000**

LOCAL CONCEPT DEVELOPMENT STUDY FOR BRIDGE K0607
NEW BRUNSWICK ROAD OVER AL'S BROOK
FRANKLIN TOWNSHIP, SOMERSET COUNTY, NJ

ESTIMATED CONSTRUCTION COST
FOR

ALTERNATIVE 4 - OFF-LINE CONSRUCTION

ITEM NO.	ITEMS	UNIT	QUANTITY	UNIT PRICE	AMOUNT
	ROADWAY ITEMS				
1	BONDS, MOBILIZATION AND CONSTRUCTION LAYOUT	L.S.	L.S.	$225,000.00	$225,000.00
2	EROSION CONTROL MEASURES	L.S.	L.S.	$20,000.00	$20,000.00
3	MAINTENANCE AND PROTECTION OF TRAFFIC	L.S.	L.S.	$100,000.00	$100,000.00
4	CLEARING SITE	L.S.	L.S.	$130,000.00	$130,000.00
5	EXCAVATION, UNCLASSIFIED	C.Y.	3,000	$50.00	$150,000.00
6	DENSE-GRADED AGGREGATE BASE COURSE, 6" THICK	S.Y.	5,000	$15.00	$75,000.00
7	HMA MILLING, 3" OR LESS	S.Y.	2,000	$45.00	$90,000.00
8	HOT MIX ASPHALT 9.5 M 64 SURFACE COURSE, 2" THICK	TON	600	$130.00	$78,000.00
9	HOT MIX ASPHALT 19 M 64 BASE COURSE, 6" THICK (2 LIFTS)	TON	2,000	$100.00	$200,000.00
10	ROADWAY DRAINAGE	L.S.	L.S.	$60,000.00	$60,000.00
11	HOT MIX ASPHALT SIDEWALK, 5" THICK	S.Y.	600	$40.00	$24,000.00
12	9" X 20" CONCRETE VERTICAL CURB	L.F.	3,000	$40.00	$120,000.00
13	NON-VEGETATIVE SURFACE, HOT MIX ASPHALT	S.Y.	500	$25.00	$12,500.00
14	BEAM GUIDE RAIL	L.F.	400	$50.00	$20,000.00
15	TANGENT GUIDE RAIL TERMINAL	UNIT	4	$3,000.00	$12,000.00
16	TRAFFIC STRIPING	L.F.	6,100	$2.00	$12,200.00
17	TRAFFIC SIGNAL MODIFICATION	L.S.	L.S.	$125,000.00	$125,000.00
18	LANDSCAPING	L.S.	L.S.	$30,000.00	$30,000.00
19	DRIVEWAY MODIFICATIONS	L.S.	L.S.	$50,000.00	$50,000.00
				SUBTOTAL ROADWAY ITEMS	**$1,533,700.00**
	BRIDGE ITEMS				
20	CLEARING SITE, BRIDGE (STRUCTURE NO. K0607)	L.S.	L.S.	$60,000.00	$60,000.00
21	EXCAVATION, UNCLASSIFIED	C.Y.	5,900	$50.00	$295,000.00
22	MAINTENANCE OF STREAM FLOW	L.S.	L.S.	$30,000.00	$30,000.00
23	NEW BRIDGE	L.F.	70	$14,500.00	$1,015,000.00
				SUBTOTAL BRIDGE ITEMS	**$1,400,000.00**
				TOTAL COST	**$2,933,700.00**
				SAY	**$2,930,000**