SECTION 1 - GENERAL

1.0 – CAPITAL PROJECT PROCESS:

The Capital Project Process is the process for which all new construction projects are identified, developed, and built. The process includes five stages from beginning to end. The details of these stages can be found in the Authority's **Design Reference Manual (TAP-423) (DRM)**. In general, the following describes the five stages:

1. **Project Identification –** Projects are primarily identified by the **Division Capital Program Manager (DCPM)** and submitted for inclusion into the Capital Plan by the completion of a **Capital Plan Project Proposal (CP^3)** form. Engineering staff should not begin work on a project until receipt of an approved **CP^3**.

2. **Scoping –** The Scoping Bureau initiates the Scoping Process with the issuance of Scoping **Request for Information (RFI)** to the appropriate project stakeholders. (Note: Formal scoping for some element-specific projects (i.e., bridge washing, in-kind roof replacements, etc.) may be waived upon concurrence of the Scoping Bureau, Design Bureau and HQ Maintenance and Operations.) Upon receipt of the completed **RFI**'s, the Scoping Bureau will schedule the Project Stakeholders Meeting. The purpose of this meeting is to reach concurrence of the scope of the project, and identify any issues that either need to be resolved prior to the completion of the **Scoping Summary Memorandum (SSM)** or **Scoping Summary Memorandum/Design Recommendation**

(SSM/DR), or that will be evaluated in the **SSM** or **SSM/DR**. Designers may schedule a site visit prior to the Stakeholders meeting. The Constructability Review Process begins concurrently with the Stakeholders meeting. Following the Stakeholders meeting, the Scoping Bureau will develop an **SSM** or **SSM/DR** depending on the complexity of the Project.

A. **Simple, Single Element Repairs, Minor Bridge Rehabilitations and SEQRA Type II Major Bridge Rehabilitations without need for evaluation by full Design Report process:** On these types of projects, the required work is usually quickly identified by the stakeholders. As a result, **Scoping** and **Preliminary Engineering** are completed concurrently. Subsequent to the Stakeholders meeting, the Scoping Bureau develops an **SSM/DR** that describes the general scope of the project, lists possible design alternatives, and identifies the recommended alternative. A template of this document can be found in ProjectWise. The **SSM/DR** is submitted to the stakeholders for review and comment. Upon concurrence from the stakeholders, this document is distributed for approval through the Structures Bureau Secretary. Upon approval, the designer may begin **Detailed Design**.

B. **Major Bridge Rehabilitations & Bridge Replacements requiring Design Report and/or meet SEQRA Unlisted or Type I Environmental Classification:** Following the Stakeholders Meeting and any site visits or other meetings, the Scoping Bureau develops an **SSM** that defines the extent of recommended work and/or studies to be developed during **Preliminary Engineering**. This report

also lists and evaluates possible design alternatives that will be further studied in **Preliminary Engineering** . A template of this document can be found in ProjectWise. The **SSM** is submitted to the stakeholders for review and comment. Upon concurrence from the stakeholders, this document is distributed for approval through the Structures Bureau Secretary. Upon approval, the designer may begin **Preliminary Engineering** activities not already performed as a part of Scoping.

C. **NYSDOT Shared and Federally Funded Projects:** Follow the process in the **NYSDOT Project Design Manual (PDM)** Appendix 10.

3. **Preliminary Engineering –** Upon concurrence from the stakeholders of the **SSM,** Design is responsible to begin **Preliminary Engineering** activities for the project. The Project Manager is responsible to investigate all of the design alternatives, and work with other stakeholders to develop and choose the appropriate alternative for the project, consistent with the approved scope. Project development during this phase of the project will be documented in a **Design Report (DR)**. A template of this document can be found in ProjectWise. Upon concurrence from the stakeholders, the **(DR)** is distributed for approval through the Bureau Secretary. Upon approval of the **(DR)**, the designer may begin **Detailed Design.**

4. **Detailed Design –** The detailed design consists of development of the contract documents for the project from the **Preliminary Plan** submission to the **Plans,**

Specifications, & Estimate(PS&E) submission. The details of this process are outlined in the Checklists located in ProjectWise. Changes to the approved scope of work, chosen alternative, or Letting Date must follow the procedure in the **Engineering Directive – Communicating Changes for Projects in Design (ED 2010-1).** The initiator of the change must complete the **Change Request for Projects in Design (TA-N4405-9)** form as part of this process.

5. **Construction –** The construction stage begins with advertising the project for letting. Upon a successful letting and award, ownership of the project is transferred to Construction Management for execution of the contract. The designer may be called upon to assist Construction Management with issues that may arise during construction of the project that cannot otherwise be answered by the Project Engineer. At the project's 50% - 75% completion point, the designer shall meet with the appropriate personnel to review the progress and possible issues with the construction of the project. At this time the designer will fill out the **Project Visitation Report (PVR) (TA-N44132-0)**. The **PVR** form is located in ProjectWise and on the Intranet under "Forms – Engineering". This form provides questions about the project documents and the project construction that will be used to identify positive and negative items related to the project. Refer to the current **Engineering Directive (ED)** for instructions on filling out the **PVR**, conducting the meeting, and a list of those who are required to attend the meeting. A database of this information will be used to improve the quality of the contract documents and the working dynamics between Design and Construction on future

projects. Upon completion of the contract, ownership of the finished product is transferred back to the Division.

1.1 - AESTHETICS:

Bridges are functional structures. At the same time, every bridge has an aesthetic impact on the environment. The most memorable bridges are those that successfully combine function and form. Bridge design is an art, which uses science and mathematics to support many of its decisions. By considering aesthetic factors during the design phase, along with judgments about structural members, safety, and initial and long-term maintenance costs, bridge designers can have a long-term impact on the quality and attractiveness of communities.

The Maryland Department of Transportation has developed a comprehensive document entitled "Aesthetic Bridges - Users Guide". As the guide states: "[This] guide is intended to be a thought provoker rather than a thought inhibitor." Authority design staff may review a copy of this document in the Engineering Library.

Designers should note that structural treatments suggested in the "AestheticBridges - Users Guide" that conflict with the Authority's current practices indicated elsewhere in this Manual are not to be used. Acceptable aesthetic treatments include: (See Details 1.1.a thru 1.1.c)

1. **Concrete Scoring** - Scoring of pier and abutment faces and deck fascias using saws or form inserts of simple wood shapes can be done to create a variety of attractive patterns.

2. **Varied Concrete Shapes** - The overall shape of a pier can be varied in conjunction with scoring to create a visual effect. Abutment faces and wingwalls can also be modified to add aesthetic treatments.

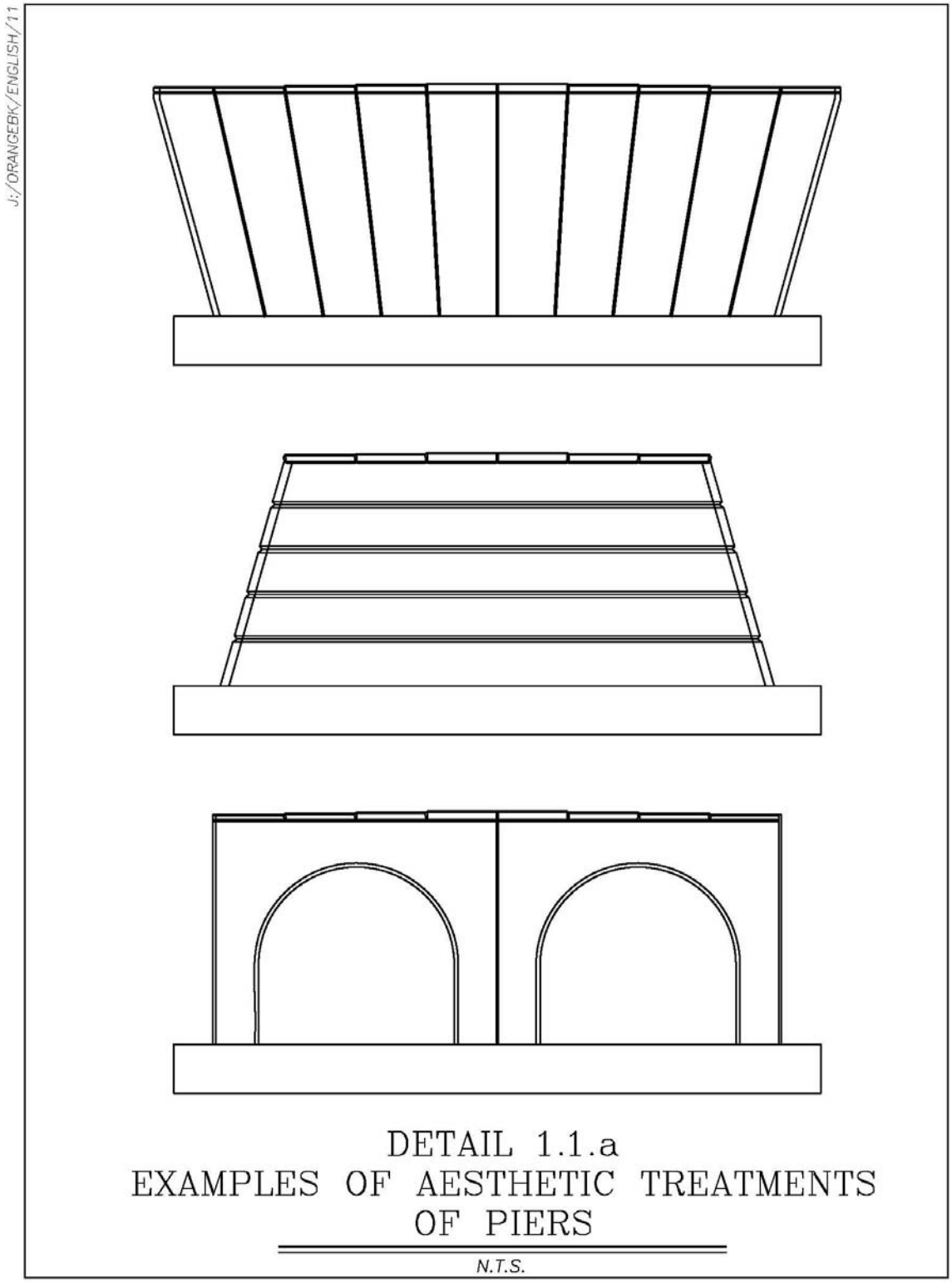
3. **Slope Protection** – Options for slope protection in the vicinity of the abutments include block pavers and stamped concrete. While block pavers are usually placed in a standard staggered brick pattern, stamped concrete is available in several patterns. Refer to the current stamped concrete special specification for pattern choices and construction details.

4. **Varied Steel Shapes** - Haunched or fish-bellied girders (where appropriate by design) may be used on continuous span bridges at the piers. When considering the use of these shapes, the designer shall ensure that the minimum vertical clearance under the structure will allow for the addition of future lanes. As shown on Detail 1.1.c, the haunched girder requires complete penetration groove welds at the support. For this reason, haunched girders should only be used when traffic below the bridge is at or near the face of the pier.

5. **Lighting** - Where lighting is required on or under a structure for vehicular or pedestrian traffic, a variety of different applications are available. Consulting with the Architectural Design Bureau in this area will help ensure the use of fixtures that are both functional and resistant to weather and vandals.

6. **Abutment Plantings** - See Section 1.2.

The use of aesthetic concrete dyes and form liners shall only be used with the concurrence of the **Director of the Office of Design (DOD)**. Whatever the treatment, it shall not require any special maintenance efforts and shall be resistant to degradation due to time, weather, or vandals.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DETAIL 1.1.a
EXAMPLES OF AESTHETIC TREATMENTS
OF PIERS
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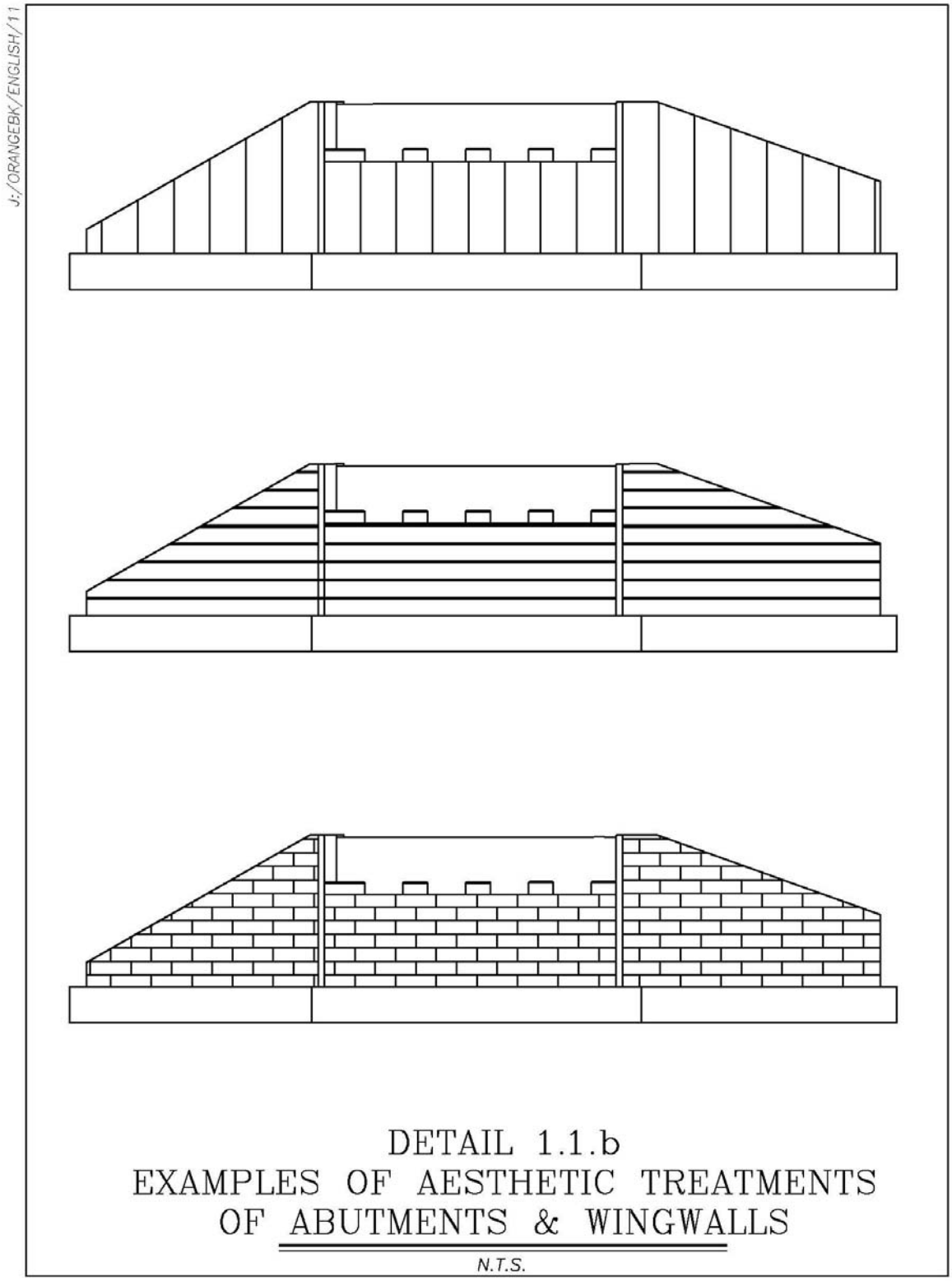
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DETAIL 1.1.b
EXAMPLES OF AESTHETIC TREATMENTS
OF ABUTMENTS & WINGWALLS
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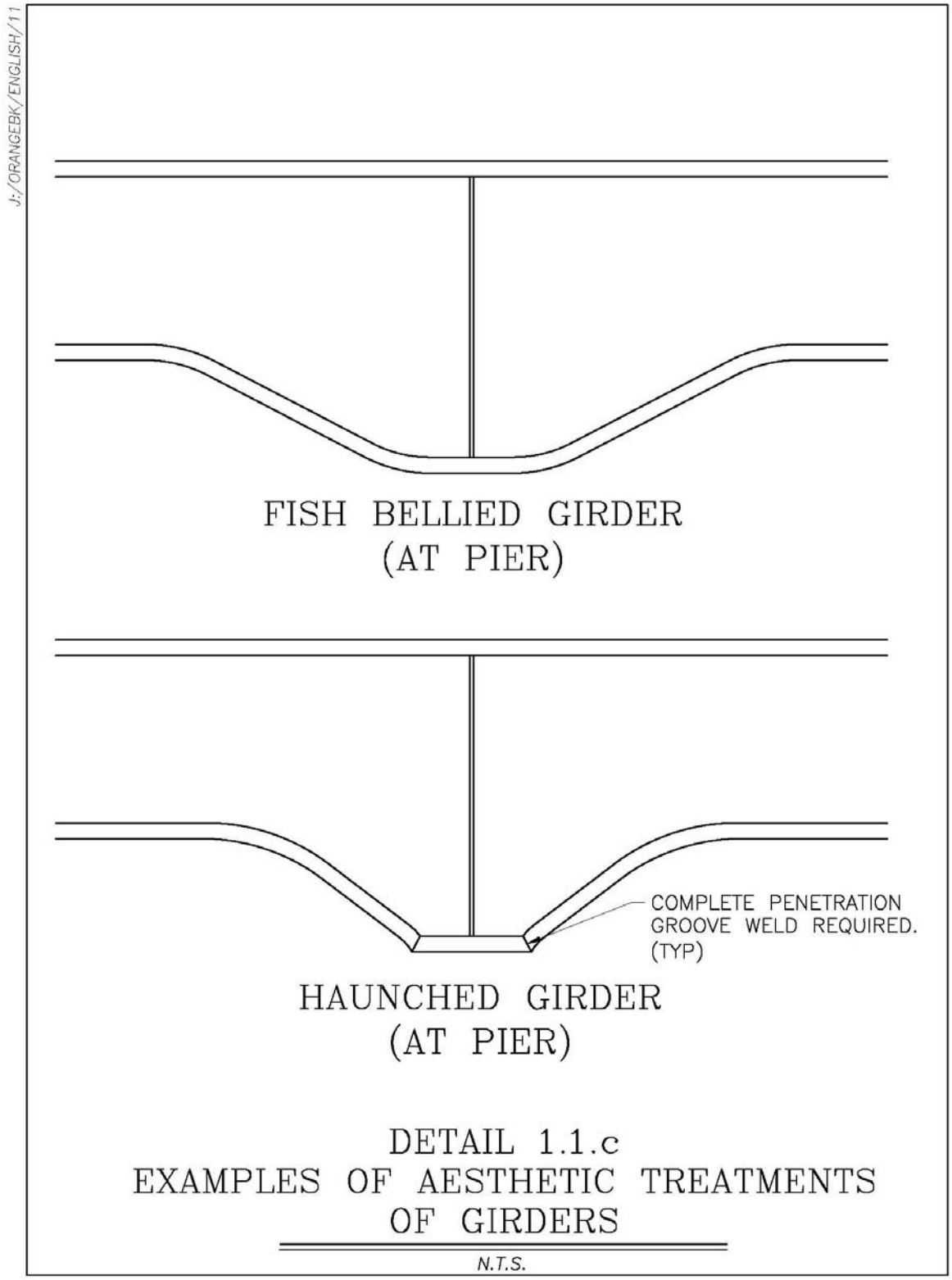
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FISH BELLIED GIRDER
(AT PIER)
COMPLETE PENETRATION
GROOVE WELD REQUIRED.
(TYP)
HAUNCHED GIRDER
(AT PIER)
DETAIL 1.1.c
EXAMPLES OF AESTHETIC TREATMENTS
OF GIRDERS
N.T.S.

1.2 - ABUTMENT PLANTINGS

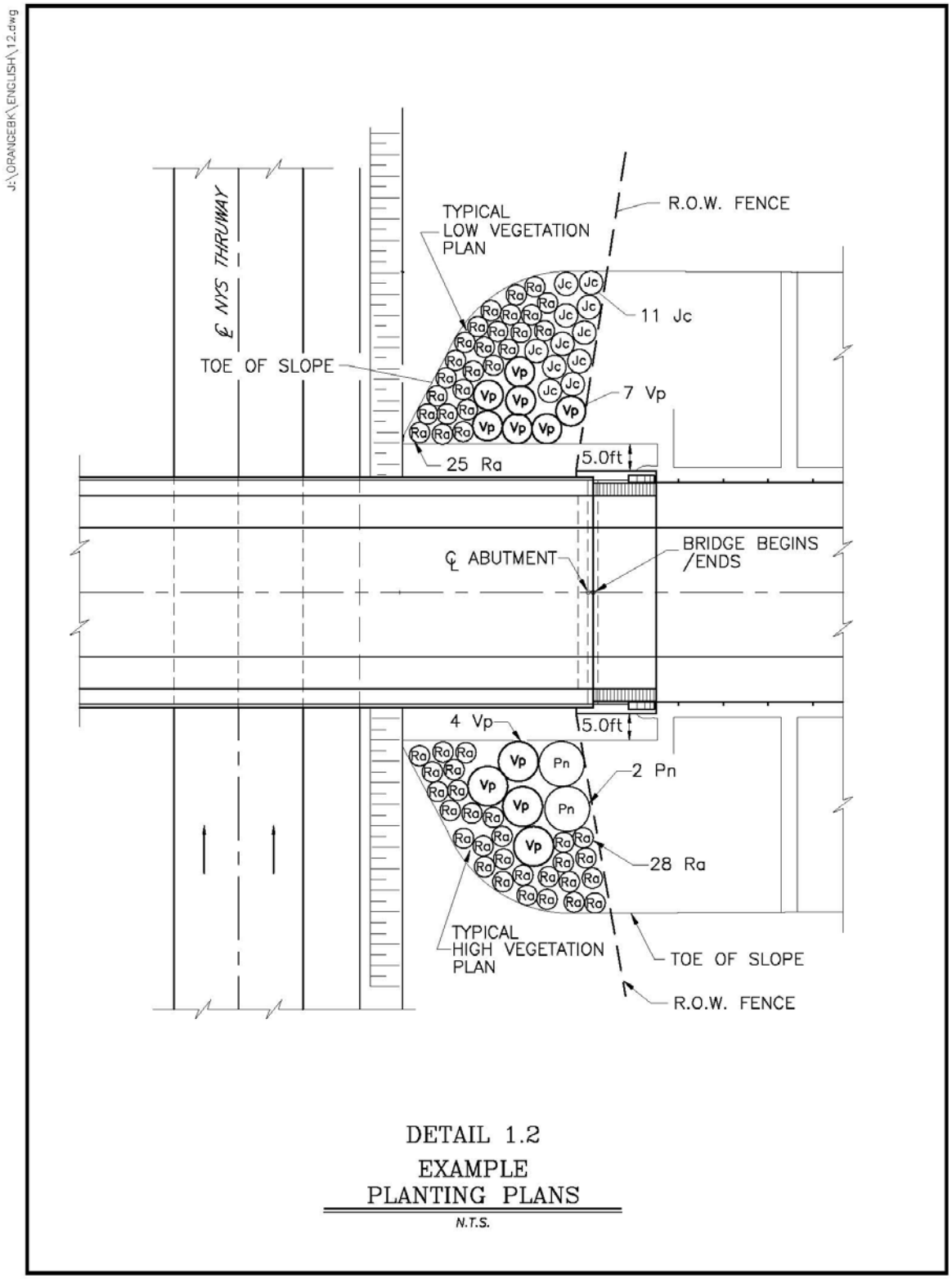
Abutment plantings are an integral feature of the finished bridge product. Appropriate plantings, in addition to serving as slope stabilization, also soften the visual impact of structures over the Thruway and help blend the public work with the natural environment.

These plantings will provide an attractive addition to the typical abutment slopes, while reducing future maintenance efforts. Normal maintenance on the Thruway includes regular mowing of the grass adjacent to the shoulders and in the median. On traversable slopes of one on four and flatter, in open spaces, this mowing can be done quickly and efficiently with tractors. Steeper slopes, as well as confined areas, require the use of hand push mowers which are very labor intensive. The sloped areas around the abutments are an example of areas that tractors cannot easily access. Low or zero maintenance plantings in these areas eliminate the need for push mowers.

The designer, in cooperation with the Division and Headquarters Maintenance Engineers and environmental specialists, should agree on materials that achieve a hearty, attractive, low maintenance planting scheme that is non-invasive. Invasive species such as crown vetch shall not be used on Thruway projects.

The designer shall develop a site solution with assistance from landscape design resources (in house or consultant).

The challenge to the designer is to provide plantings that are easy to establish, hearty, economical, and able to survive in a roadside environment that is frequently sloped and comprised of various types of soil. The design treatments should maintain a universal "feel" or "image" relative to the structures, with allowance for occasional dramatic plantings to be featured at prominent locations. For example, gateway interchanges should have a different presence than typical lower volume interchanges. Snow and ice requirements (or snow storage area) may dictate a need for different types of specialized plantings on the sides of the bridge depending upon the pattern of prevailing winds. The following detail and tables provide an example of plantings involving selected trees and shrubbery. Similar figures for grasses and/or low growing ground cover are not shown because these materials are seed broadcast in a blanket application with no particular pattern.



DETAIL 1.2
EXAMPLE
PLANTING PLANS
N.T.S.

EXAMPLE PLANT LISTS

LOW VEGETATION PLANTING PLAN						
KEY	**ITEM NO.**	**COMMON NAME**	**BOTANICAL NAME**	**QTY. PER QUADRANT**	**SIZE**	**NOTES***
Jc	611.052241	GOLD TIP PFITZER JUNIPER	JUNIPERUS CHINESIS "PFITZERIANA AUREA"	11	2.0FT HT.	B & B
Ra	611.046342	GRO-LOW FRAGRANT SUMAC	RHUS AROMATICA "GRO-LOW"	25	2.0FT HT.	B & B 5.0FT O.C.
Vp	611.049662	MARIES DOUBLEFILE VIBURNUM	VIBURNUM PLICATUM TOMENTOSUM "MARIESII"	7	4.0FT HT.	B & B

TABLE 1.2.a

HIGH VEGETATION PLANTING PLAN						
KEY	**ITEM NO.**	**COMMON NAME**	**BOTANICAL NAME**	**QTY. PER QUADRANT**	**SIZE**	**NOTES***
Pn	611.034163	AUSTRIAN PINE	PINUS NIGRA	2	6.0FT HT.	B & B
Ra	611.046342	GRO-LOW FRAGRANT SUMAC	RHUS AROMATICA "GRO-LOW"	28	2.0FT HT.	B & B 5.0FT O.C.
Vp	611.049662	MARIES DOUBLEFILE VIBURNUM	VIBURNUM PLICATUM TOMENTOSUM "MARIESII"	4	4.0FT HT.	B & B

TABLE 1.2.b

*NOTES
1. "B & B" - BALLED AND BURLAPPED
2. "B & B 5.0FT O.C." - BALLED AND BURLAPPED, PLACED AT 5.0 FEET ON CENTER.

The example planting layout on the previous page consists of three varieties of trees and shrubbery, placed on the abutment slope in a height-progressive manner. This serves to frame the structure, add color and contrast to the site during all seasons and, in varying degrees, screen the abutment and wingwalls from Thruway patrons.

Flora shall not be located in a manner that will affect clearances or site distances. In these cases, plantings such as those shown on the Low Vegetation Planting Plan (Table 1.2.a) may be used. Planting plans in urban areas should also be reviewed for resistance to vandals and environmental effects. In some situations, the establishment of turf may be the most appropriate course of action. At any site where a planting plan is used, there must be a minimum 5.0 ft clearance between the mature plants' outer extent and the structure's fascia and wingwalls for ease of structural maintenance and inspection. In addition, plantings that will eventually result in a 4 inch diameter trunk thickness are considered fixed objects and must be carefully placed and/or protected in accordance with the latest criteria for protecting fixed object hazards.

1.3 - HYDROLOGY & HYDRAULICS

An important aspect of any design project involving a structure over or in a body of water is the interaction that the structure and the water body will have on each other. With this in mind, every design project of this type requires an in-depth look at the relationship between these two elements.

1.3.1 – HYDRAULIC ANALYSIS AND DESIGN REPORTS

Projects involving changes to existing waterway openings below will require a **Hydraulic Analysis and Design Report (HADR)**. A licensed Water Resources Engineer must complete this report. Detailed requirements of the report are as follows:

A. General project information.

B. Field observations and findings.

C. Subsurface investigations.

D. Stream stability evaluation.

E. Hydrological analysis, calculations, maps, and supporting documentation.

F. Hydraulic analysis of 2, 10, 50, 100, and 500 year recurrence interval discharges.

G. Scour calculations of existing and proposed conditions.

H. Counter-measure design as appropriate.

I. In addition, the report shall satisfy the following requirements:

1. Scour calculations shall be quantified as a depth and elevation. The results shall be discussed and agreed upon during the meeting between the Project Manager, Project Designer, Hydraulic Engineer, and Geotechnical Engineer.
2. The stream stability evaluation shall be in conformance with the **Federal Highway Administration (FHWA) Hydraulic Engineering Circular (HEC)** HEC-20, "Stream Stability at Highway Structures".
3. The hydraulic analysis shall be performed using a "Step-Backwater Method" (HEC-RAS), using generally accepted engineering practices.
4. The scour analysis shall be in conformance with the **FHWA** HEC-18, "Evaluating Scour at Bridges".
5. Countermeasure design shall be in conformance with **FHWA** HEC-23, "Bridge Scour and Stream Instability Countermeasures".

All projects shall be in compliance with (**New York Codes of Rules and Regulations**) **6NYCRR Part 502**. The base flood is defined in **Part 502**. One hundred year recurrence is understood.

1.3.2 - FREEBOARD

Freeboard is defined as the vertical clearance from the lowest superstructure member to the design high water elevation. Freeboard is provided to allow clearance for floating debris and ice. To satisfy normal hydraulic requirements, a structure over a non-navigable stream shall provide a minimum of 2.0 feet of freeboard for a 50 year design flood.

In some cases, the 2.0 foot minimum may not be practically obtained. Reasons for this would include geometric restrictions that would prevent raising of the roadway profile or prohibitive costs in doing so. If this is the case, a thorough analysis of the site should be performed to determine if a lower freeboard could be justified. The Project Designer, Hydraulic Engineer, and Geotechnical Engineer shall review the information in the **HADR** and determine the probability and potential damage of debris impacting the structure and clogging the flow of water. Stream velocities given in the **HADR** shall be used to determine the transverse loading on the structure during a peak event. The superstructure elements as well as the connections to the substructure shall be designed to resist those loads. Refer to Section 3 of the **AASHTO Standard Specifications for Highway Bridges 17th Edition (AASHTO 17 th Edition)** and Section 3 of the **AASHTO LRFD Bridge Design Specifications 4th Edition** including all current interims **(AASHTO LRFD 4 th Edition)** for the appropriate application of hydrologic loads. In extreme cases where the structure may be partially under water (negative freeboard) during an event, the connections to the substructure shall also be designed for uplift due to buoyancy. Where appropriate, the bridge rail should also be designed to resist transverse loading due to direct contact with ice or floating debris.

1.3.3 - OTHER DESIGN CONSIDERATIONS

Careful design consideration is also required for the impact of interim conditions on the stream during construction. Cofferdams, temporary bridges, temporary shoring, and stream or streamside excavations are some of the possible situations to consider during design. These interim conditions shall be analyzed and evaluated in the **HADR**. Clearly worded notes are required in the contract documents to protect not only the water quality of the stream, but also any existing and newly constructed waterway protection systems. These systems include bank protection, scour countermeasures, energy dissipaters, streambed lining, etc. The Project Designer shall work with the Hydraulic Engineer and Geotechnical Engineer to develop the required plan notes for the project. In addition, the existing and proposed bridge elevation drawings shall include the scour elevation for future reference. This information is useful for future inspection reference, and for future work at the site.

1.3.4 – HYDRAULIC AND SCOUR ASSESSMENT REPORTS

The Authority completed a comprehensive program to evaluate the scour potential of all Thruway bridges over waterways. A **Hydraulic And Scour Assessment Report (HASAR)** has been compiled for each bridge and copies are available at Headquarters and the corresponding Division offices. Where an existing structure is to be rehabilitated, this report shall be reviewed prior to design initiation to evaluate any scour preventative measures proposed in the report. The **HASAR** is not to be used in place of the **HADR** referred to in Subsection 1.3.1 above for new and replacement structures. Equally important is a review of the General Bridge Inspection Reports and contact with the **Division Bridge Engineer (DBE)** to determine any changes that may have occurred since the

completion of the **HASAR**.

The following is a brief summary of the information contained in each **HASAR**:

A. The hydraulic conditions and potential scour depths associated with the 10, 50, 100, and 500 year recurrence interval discharges . This information is used to identify those bridges that are hydraulically deficient and/or scour critical.

B. Specific scour countermeasures for bridges vulnerable to scour damage or failure.

C. Recommendations to address problems such as inadequate hydraulic capacity, ice or debris jamming, or structures that cross over unstable streams.

D. HEC-2 and scour analysis in conformance with **FHWA HEC**'s 18 & 20.

E. General project information.

F. Field observations and findings.

G. Subsurface investigation.

H. Hydrology, hydraulics, and scour analysis.

1.4 - BRIDGE FENCING AND RIGHT-OF-WAY FENCING

Three types of fencing are typically used on Thruway bridge projects. The first, snow fencing, is installed on bridge barrier or rail to help protect the under feature from snow as it is plowed on the bridge above. The second, protective screening, is installed on bridge barrier or rail to help protect the under feature from snow and objects which may be thrown from the bridge above. The third, right-of-way fencing, is installed in the ground along the Thruway right-of-way running parallel to

the mainline in the vicinity of the bridge project. The designer must evaluate existing right-of-way fencing in the vicinity of the structure and replace as necessary. The purpose of right-of-way fencing is two-fold. It is used to indicate the boundaries of Authority property and to discourage trespassing onto Authority property.

1.4.1 - SNOW FENCING

The Authority's policy on the use of snow fencing on overhead and mainline bridges is presented in the following subsections.

1.4.1.1 - OVERHEAD STRUCTURES

Permanent snow fencing shall be installed on all Thruway interchange bridges spanning the Thruway mainline, other roads, bike paths, and railroads, at the Authority's expense.

1.4.1.2 - MAINLINE STRUCTURES

Permanent snow fencing shall be installed on mainline bridges spanning roads, bike paths, and railroads, at the Authority's expense.

1.4.2 -PROTECTIVE SCREENING

The Authority's policy on the use of protective screening on overhead and mainline bridges is presented in the following subsections. Protective screening shall be installed on bridges with pedestrian access to help protect the under roadway from objects being thrown from the bridge.

1.4.2.1 - OVERHEAD STRUCTURES

Protective screening shall be installed on all overhead pedestrian bridges and overhead local vehicular bridges carrying pedestrian traffic. The installation of protective screening is not required on overhead Thruway interchange bridges because they are part of a closed highway system where pedestrians are not allowed. The length or use of protective screening shall also consider sight distance requirements especially where side roads intersect the overhead roadway in the vicinity of the structure. In general, protective screening shall extend from abutment to abutment unless sight distance requirements limit its length.

1.4.2.2 - MAINLINE STRUCTURES

Protective screening shall only be placed on mainline structures over railroads, when specifically requested and paid for by the track owner. The designer should verify the railroad's requirements at the time of project scoping. Otherwise, snow fencing shall be installed as stated in Subsection 1.4.1.2.

1.4.3 – RIGHT-OF-WAY FENCING

Most of the original Thruway right-of-way was defined by right-of-way fencing along its outer-most property limits paralleling the Thruway mainline. The original fencing, particularly in the vicinity of overhead structures has deteriorated to the point of needing replacement. For a bridge project, the disposition of the fencing existing should be defined in the **SSMDR** or **DR**. Replacement, repair, or installation of new fencing within a bridge project shall be limited to distances within 300 feet of the

structure. Work required beyond that point should be addressed in future highway rehabilitation projects. **Replacement of existing right-of-way fencing shall be with 6 foot tall "Optional Chain Link Fence, Type 1, with Top Tension Wire" as designated in the NYSDOT Standard Specifications**. This new fence shall be connected to the existing fence (regardless of type) a maximum of 300 feet from the bridge at all four quadrants and extend up the slope 18 inches behind the back of wingwalls and end at the back of the bridge transition rail. The gap between this new right-of-way fencing and the bridge rail/barrier/parapet will allow access over the transition rail for future bridge inspection. Refer to Detail 1.4.3. For additional information on right-of way fencing policies, please refer to the current **ED** on the Intranet.

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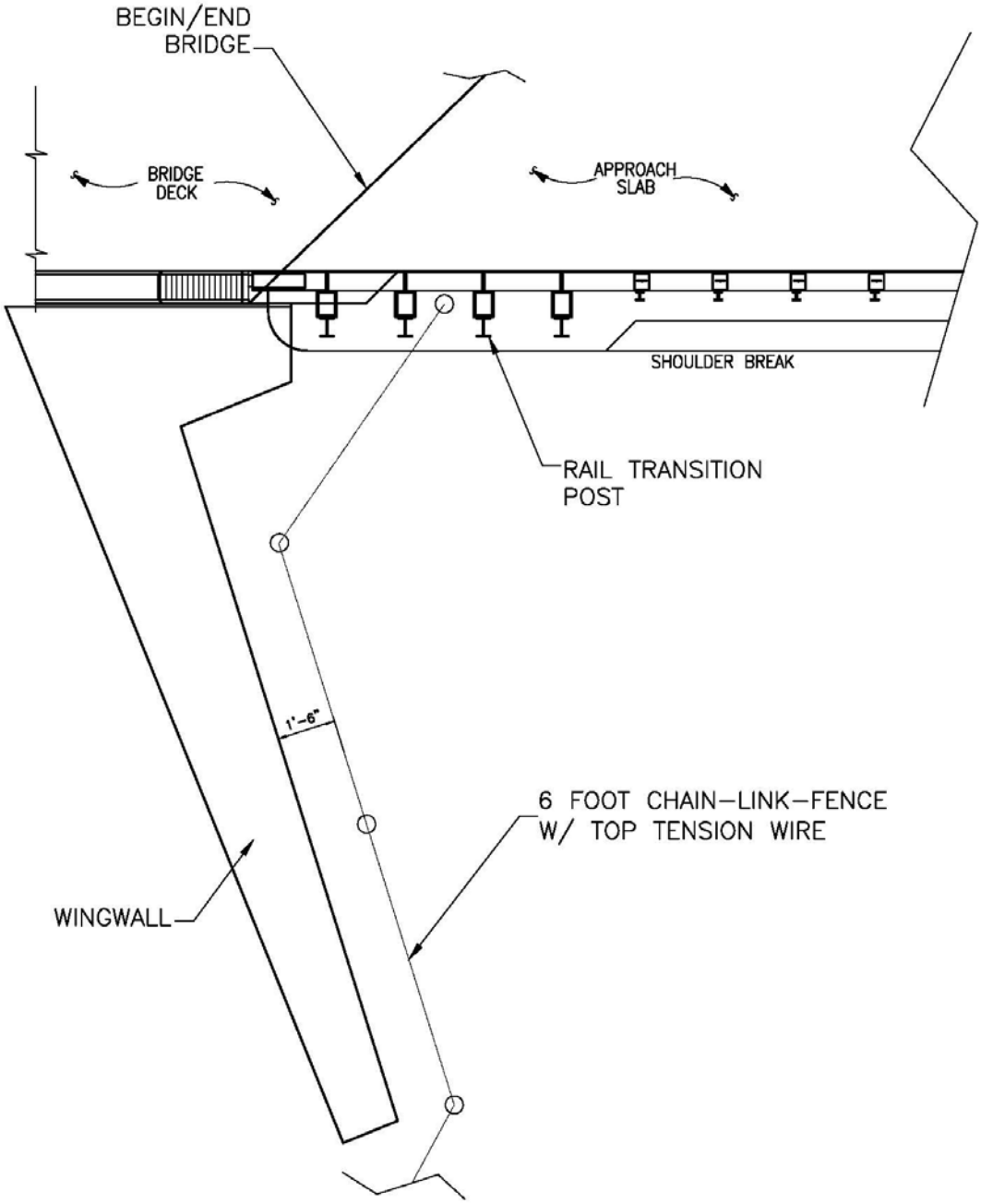


DETAIL 1.4.3
ROW FENCING
TERMINATION DETAIL
N.T.S.

1.5 - MUNICIPALITY COORDINATION AND COMMUNICATION

Effective communication and coordination with local officials is essential to the timely and successful completion of a project affecting a local community. All bridge projects involving local roads require contact with local officials at the start of the design process. As the design progresses, local officials should be involved in the following:

A. Project Initiation Letter including:

a) Schedule of Project;

b) Preferred Traffic Control Plan (staged vs. detoured) with a request for approval;

c) Request that they notify and obtain approval from those impacted (e.g., schools, fire, police, and business) from the Preferred Traffic Control Plan;

d) Proposed Share Breakdown;

e) Request for local public notice, involvement, and support; and

f) That previous maintenance responsibility will upon completion of the work revert to, and become their responsibility again (per Article 2 Title 9 Section 359 of the **Public Authorities Law (PAL)** for the Thruway Authority).

B. Review comments and approvals as appropriate on Preliminary and Advanced Detail Plans.

C. Identification and resolution of local concerns. Concerns that cannot be addressed due to technical or financial reasons shall be presented in writing by the Authority to the municipality.

D. Written approval for detours and bridge closures including acknowledgement of support and approval from any other municipalities.

E. Review and approval of agreements for funding shares when appropriate.

For additional details, please refer to the **DRM** for the Municipality Communication and Coordination Checklist.

1.5.1 - PROJECT INITIATION LETTER - (Municipality Coordination)

After the scope has been finalized, a signed letter from the **DOD** describing the scope, design, and construction schedule of the project shall be sent to the municipality's public works or engineering department and their highest official (e.g., mayor, supervisor, Board, etc.). The Authority's Office of Government Relations maintains a database of local officials with names, titles, mailing addresses and phone numbers to prepare this letter. The designer shall draft this letter and, after internal review, send a copy of the approved draft to Government Relations and the appropriate Division Director for their review and concurrence.

Bridge closures or detours can become a concern to the local community for many reasons. Typically, the concerns come from increased response time to emergencies, increased school bus travel time, increased traffic on other roads, and general inconvenience. While one jurisdiction will be responsible for the roadway on the bridge staged construction, detour, or closure may affect other adjacent municipalities. For example, the bridge may carry a county-maintained roadway through a village, which if closed will require a detour onto a state highway and/or local town road. In this example, all of these municipalities and the community must be notified and approve the

preferred closure and detour route. Therefore, it is very important to notify and request that the municipality responsible for the road coordinate comments from all impacted parties and communicate any local issues to the Authority's Project Designer. The designer may need to follow up with the coordinating municipality to ensure the proper notifications were made and approvals obtained. The designer should also ask Government Relations and the Division Director if they are aware of any other past, ongoing, or potential related local issues.

1.5.2 - MUNICIPALITY ENHANCEMENTS AND BRIDGE CLOSURES

Article 2 Title 9 Section 359 of the **PAL** describes the funding of municipality requested enhancements and NYSDOT involvement with construction closures for municipal bridges. This law affects the design process as follows:

A. Item 4 of the **PAL** requires that, *"In the case of municipal highways, the responsibility for rehabilitation and reconstruction of the wearing surface, sidewalks, curbs and railings shall be the responsibility of the Authority."* The municipality may request that the bridge be enhanced with additional shoulder width or an additional travel lane. This request should be received in writing and forwarded to the Chief Engineer for review and further direction. Depending on the circumstances, if AASHTO requires a 4.0 foot wide shoulder and the municipality requests a 6.0 foot shoulder, the Authority will request that the municipality pay all costs associated with providing the additional 2.0 feet of shoulder width. It is very important that enhancement requests be addressed carefully and in writing so that the project can be designed, funded, and constructed, and that future maintenance and

maintenance funding responsibility can be established.

B. Item 4 of the **PAL** also requires that, *"Whenever the Authority determines that a separation structure carrying a highway under the jurisdiction of a municipality requires major repair or reconstruction, the Authority, with the approval of the Commissioner of Transportation and after consultation with such municipality, may close the bridge and provide adequate alternative detour routing and signing."* Under such circumstances, the designer shall draft a letter from the Chief Engineer to the Regional Director of **NYSDOT** requesting their approval of the closure and include copies of written approval from the municipality.

1.5.3 – MAINTENANCE RESPONSIBILITY

Maintenance responsibility on bridges was initially defined and established during the original construction of the Thruway. In the recent past, this responsibility was reaffirmed during subsequent repair, rehabilitation, and replacement work using a 'Maintenance and Repair Agreement'. It is important that these responsibilities are reviewed and documented in the **SSMDR** or **FDR**. Any municipality requested enhancements as discussed in the previous section should also be reviewed with current responsibilities. It is also important to identify whether any proposed or final bridge details require municipality notification of a change in their current responsibilities. Even though recent experience has been that these Agreements are not being endorsed, a document stating the maintenance responsibilities shall still be prepared and sent to the municipality as part of their review of the final contract documents. In addition to this document, Authority and municipal maintenance responsibility shall also be included in the contract drawings. According to Article 2

Title 9 Section 359 of the **PAL**, the last sentence re-establishes their responsibility upon construction contract completion:

> *"In the case of municipal highways, the responsibility for rehabilitation and reconstruction of the wearing surface, sidewalks, curbs and railings shall be the responsibility of the Authority. Highways combined, relocated or carried over or under a thruway section or connection, or a highway connection, under the provisions of the preceding subdivision, shall, upon completion of the work, revert to and become the responsibility, with regard to maintenance and repair, of the state or municipality, as the case may be, formerly having jurisdiction there over."*

1.6 - UTILITY COORDINATION AND COMMUNICATION

Effective early communication and coordination with utility companies is essential to the timely and successful completion of a bridge project.

It is extremely important to identify the existence of utilities during the initial stage of project scoping. Utilities are identified by: contact and coordination with the Headquarters Utility Coordinator located in the **Capital Plan Support Unit (CPSU)**. The **CPSU** will obtain a listing of Occupancy Permits and Utility Agreements maintained by the Authority's Headquarters Permit Coordinator in Office of Real Property Management and provide it to the Project Designer. The Project Designer may also obtain utility information by reviewing record drawings from original

construction and subsequent rehabilitations; contacting the Division Offices; and performing a site inspection. It is imperative that all utilities within the Authority's right-of-way (embedded in the sidewalks or slab, attached to the structure, underground, or overhead) be identified and shown in the contract documents.

After all utilities are identified, copies of the supporting documentation (i.e., Utility Agreement or Occupancy Permit) should be requested as appropriate from the Authority's Permit Coordinator through the **CPSU**. The New York State Thruway Authority Occupancy And Work Permit Accommodation Guidelines (TAP-401), the Utility Occupancy Supplement (TAP-4010), and the General Design And Construction Requirements for Occupancies (TAP-421A-E) provide additional information with which the utility companies must comply. Contact with the utility companies should begin as soon as the project scope has been finalized. Initially, a letter including the following information should be sent to the utility company:

A. Notice of project scope and schedule along with existing site plan.

B. Impacts on utility and proposed utility relocation details (as needed).

C. Request for details of utilities at site.

As the design progresses, utility company representatives should be involved with the following as appropriate:

A. Request for utility relocation including details and cost estimate of relocation.

B. Comments on Preliminary, Advanced Detail, and PS&E Plans.

C. Identification and resolution of utility company concerns.

D. Written approval of utility protection, rehabilitation, relocation, etc. and financial responsibilities.

E. Completion of Occupancy Permit Application (TA-W41337) will be submitted to the Division Permit Coordinator for processing.

F. Updated permit information with new location details shall be sent to the Division Permit Coordinator

G. A Utility Betterment Agreement (also known as "Agreement For Utility Work") prepared and negotiated with the utility by the **CPSU**.

Please refer to the **DRM** for additional information on Utility Communication and Coordination.

1.6.1 - PROJECT INITIATION LETTER - (Utilities)

After the project scope has been finalized, a letter, signed by the Supervisor of the **CPSU** describing the scope of the project and the design and construction schedule should go to all affected utility companies. Copies of all utility related correspondence should be provided to the **CPSU** and the Authority's Headquarters and Division Permit Coordinators.

1.6.2 - OCCUPANCY PERMITS

An Occupancy Permit is required for all utilities attached to, above, below, or within Thruway bridges and right-of-way. Occupancy permits are generally issued through the Division offices.

1.6.3 - THRUWAY POLICY ON UTILITY RELOCATION

The Authority's policy on new utility installations, modifications, replacement or upgrades to

existing facilities on or over the mainline is that all new utilities will be placed underground. Exceptions will be made for transmission lines or hardships such as boring through rock. If a utility company expresses a hardship for rock, the project engineer should review the soil logs to confirm and then consult with the **CPSU** and the Headquarters Permit Coordinator. The main objectives of relocating utilities underground are to:

A. Avoid having fallen utilities block Thruway traffic;

B. Remove utilities that are on (or around) bridges that hinder bridge maintenance; and

C. Avoid having to repeatedly pay temporary relocation costs.

When an existing aerial facility is to be disturbed, it will be placed underground. This is required whether the activity is the result of a modification such as a utility up-grade, adding or removing a utility line, replacement of the utility, or relocation of the utility whether temporary or permanent. Typically, a Utility Betterment Agreement is prepared by the **CPSU** who then negotiates and finalizes the agreement with the affected utility.

1.6.3.1 - REHABILITATION/REPLACEMENT PROJECTS

Aerial lines traversing the Thruway and/or existing utilities on a bridge shall be relocated underground for major rehabilitation/replacement projects whether or not the utility interferes with construction. As stated earlier, exceptions will be made for high voltage electrical transmission lines or hardships such as boring through rock. The designer will determine whether or not the utility will interfere with construction. Refer to the **Occupational Safety and Health Administration (OSHA)** regulations for construction work clearance requirements for the various utility types. On

projects where the utility interferes with construction, the **CPSU** will notify the utility company of the Authority's policy to relocate all utilities underground by a specific date. On projects where the utility will not interfere with construction, the **CPSU** will notify the utility company of the Authority's policy to relocate all utilities underground and request that they do so as soon as possible.

1.6.3.2 - FINANCIAL RESPONSIBILITY

If the utility pre-existed the original construction of the Thruway; The Authority shall pay the entire cost of underground relocation or an equivalent percentage if the utility is being, or has been upgraded since the original construction of the Thruway. Relocation work done during the contract should be paid for through appropriate pay items added to the contract. The Authority shall only pay for capacity at the utility's level of service when the Thruway was originally constructed. The installation of new spare conduits or excess capacity since the Thruway's original construction is paid for by the utility owner. Relocation work that must be done prior to, after, or in the absence of a construction contract, will be paid for under the Utility Budget Items in the Annual Bridge Contracts Program. If the utility was constructed after the original construction of the Thruway, and occupies the property pursuant to an occupancy permit, the utility owner will pay the costs of relocating the utility to an underground installation. The **CPSU** must establish an estimate or share work-up for the utility portion ofthe work. *Note*: There is a budget in place to pay for the relocation of the Authority/Adesta fiber optic line.

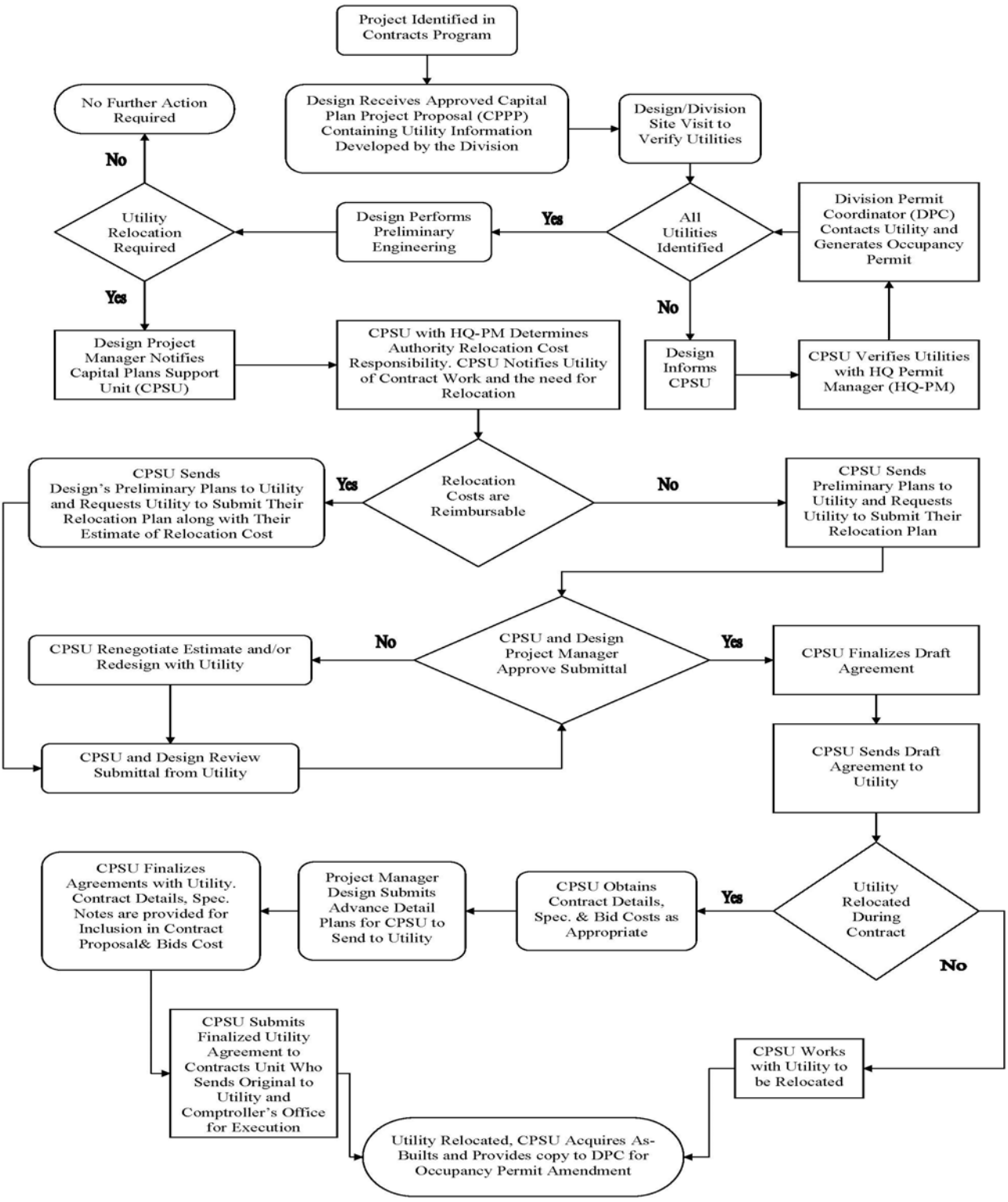
1.6.3.3 - NEW LOCATIONS OF UNDERGROUND UTILITIES

Underground utility installations should be placed a minimum depth of: (Whichever is greatest.)

- 6.0 feet below the surface of Thruway pavement;
- 4.0 feet below the sub-grade; or
- 3.0 feet below the invert elevation of a ditch/culvert.

The underground utility should also be placed a minimum of 3.0 feet away in all directions from the Authority/ADESTA fiber optic line. For overhead bridges, a utility running parallel to the bridge should be relocated underground a minimum of 50.0 feet away from the toe of slope of the abutment and/or the pier footings. Increasing the distance should be considered if there is a potential of widening the overhead bridge. New utilities should not be placed longitudinally within the Thruway right-of-way. Replacement of existing longitudinal utility installations may be permitted although consideration of future Authority or other transportation related projects must be given first priority. Questions regarding longitudinal installations should be discussed with the Division Permit Coordinator and the **CPSU**. See the Utility Relocation Process flow chart on the next sheet.

Utility Relocation Process



Based on the Guidelines for Roles and Responsibilities.

1.7 - HORIZONTAL ROADSIDE CLEARANCES

An important aspect of any design project is roadside design. The current roadside design criteria provides guidance on measures to reduce the number and/or severity of accidents when vehicles leave the traveled way.

The following describes the bridge design engineer's responsibilities for roadside design for Authority bridge projects:

A. Locate any potential roadside hazards outside the Design Clear Zone Width of the approach roadways on and under the bridges.

B. Select the appropriate guide railing and/or shielding treatments for potential hazards within the Design Clear Zone; design appropriate protection utilizing "Point of Need" or "Run-out Length" criteria, depending upon the degree of hazard.

C. Inspect existing guiderail systems and evaluate for retention, upgrade or replacement.

D. Consult with Roadside Safety Unit for guidance pertaining to all under and over bridge approach guide rail, transition rail, and clear zone issues.

Use **Chapter 10** of the **HDM** for definitions and current design criteria.

Refer to the **DRM** for the Roadside Design Checklist.

1.7.1 - CLEAR ZONE REQUIREMENTS

Details of this information (Chapter 10 of the **HDM**) and how it pertains to the Authority can be found in **Design Bulletin (DB)** 03-01. The clear zone is the total roadside border width starting at the edge of the traveled way, available for safe use by errant vehicles. This width, generally 30.0 feet on the Thruway, will usually include a shoulder and a recoverable slope. Recoverable fill slopes are generally one on four, or flatter. Traversable but non-recoverable fill slopes are generally steeper than one on four but not steeper than one on three. Thruway fill slopes steeper than one on four will usually require guide rail protection. Exceptions may be considered if approved by the **DOD**. Fill slopes as steep as one on three along facilities other than the Thruway can be considered without guiderail protection provided "clear run-out width" is provided as detailed in Chapter 10, Figure 10-1 of the **HDM**. Cut slopes as steep as one on two along the Thruway or any facility may extend into the clear zone provided the slope is free and clear of obstacles, and a smooth transition from traveled way to cut slope is provided.

1.7.1.1 - AT OVERHEAD STRUCTURES

Refer to Detail 1.7 on the next page. The clear zone under overhead structures should be greater than or equal to 30.0 feet. On new or reconstructed bridges, where space permits, hinged one on four to one on two under bridge backslopes should be provided. If this becomes impractical (i.e., extremely tall abutment walls), a one on three under bridge backslope may be used with prior approval from the **DOD**.

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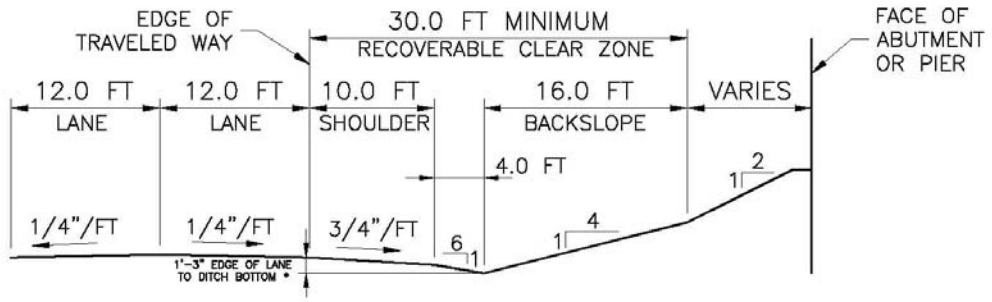
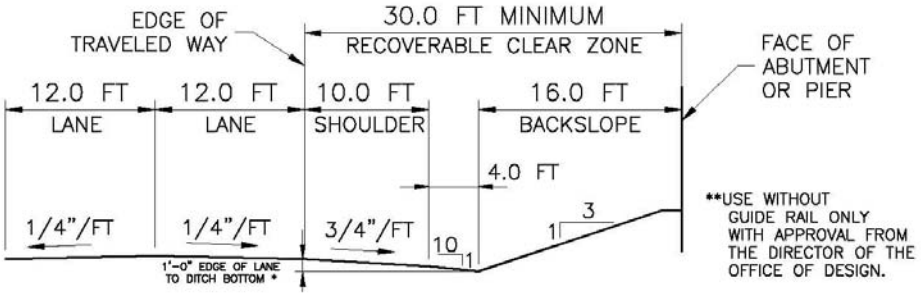
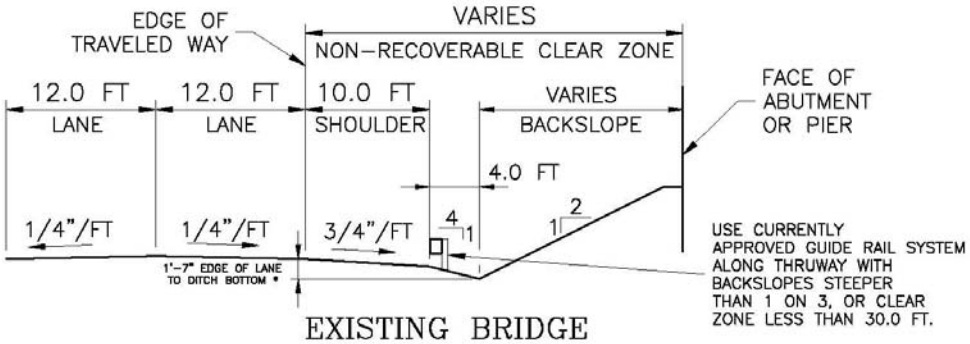


NEW AND REPLACEMENT BRIDGES
(PREFERRED SECTION)



NEW AND REPLACEMENT BRIDGES
(LIMITED SPACE)**

* NOTE TO DESIGNER
CHECK THESE VALUES AGAINST ADEQUATE DRAINAGE CRITERIA FOR THE SITE.



EXISTING BRIDGE
(WITH OR WITHOUT SHOULDER PIER)

DETAIL 1.7
RECOMMENDED SLOPES AND CLEAR ZONES
AT OVERHEAD BRIDGES
(LEFT AND RIGHT SHOULDERS)

N.T.S.

Where rehabilitation work is being done on an existing structure, the existing backslope is usually steeper than one on three and will remain. This condition is not considered safe and must be shielded from traffic with an approved rail system. Clear zone requirements at the median are identical to shoulder requirements. If roadside hazards such as steep slopes or pier stems are within 30.0 feet from the inside edge of a travel lane, the hazard must be removed or shielded from traffic with an approved rail system.

1.7.1.2 - AT OTHER LOCATIONS ALONG MAINLINE

The clear zone described above applies along the full length of the Thruway. If the clear zone cannot be maintained, an approved rail/barrier system must be installed to protect the traffic from any off-pavement permanent hazards.

1.7.2 - ROADSIDE HAZARDS

Roadside hazards are those objects off the travel lanes within the minimum required clear zone that can cause vehicle damage and/or personal injury when encountered by a vehicle traveling at highway speeds. Roadside hazards are categorized into two groups: fixed objects and roadside obstacles. Fixed objects are hazardous installations of limited lateral extent. Safe passage lies just beyond the hazard or the object can be relocated or removed from the site. Fixed objects include trees, overhead sign supports, non-breakaway signs, headwalls, etc. “Point of Need” method is utilized to design guiderail protection for fixed objects. Roadside obstacles are non-bypassable hazards of considerable length, breadth, and/or large lateral extent. They are hazards that have no

safe route around or through them, are less practical to remove or relocate than fixed objects, and are potentially fatal if encountered at any speed. Examples are non-recoverable embankments, non-traversable ditches, retaining walls, rock cuts, dense woods, rows of large trees, cliffs, and bodies of water within or in close proximity to the clear zone. "Run-out Length" method is utilized to design guiderail to shield roadside obstacles. All roadside hazards within or adjacent to a clear zone must be either removed/relocated or protected from traffic with an approved barrier system. Refer to Chapter 10 of the **HDM**.

1.8 - MINIMUM BRIDGE VERTICAL UNDERCLEARANCE FOR STRUCTURES ON THE THRUWAY SYSTEM

Minimum vertical underclearance at structures along the Thruway have been established for mainline, ramp, overhead, sign, and pedestrian structures. These minimum clearances have been established to increase the safety of the Thruway System as well as to allow for the ever increasing size of vehicles traveling on and around the Thruway. The bridge designer's task is to attain the minimum clearances on every project whenever possible. Where practical (a new or replacement structure or one undergoing a major rehabilitation), the structure and over-roadway profile can be raised to attain these minimums. On new structures on new alignments, minimum vertical clearance can be attained through a combination of profile design and shallow superstructure design. On replacement structures, these two methods may also be used unless the local geography limits or prohibits raising the existing over-roadway profile. In this situation, the use of extremely shallow superstructures utilizing innovative design and construction techniques are encouraged. Rigid

frames, channel bridges, Inverset™, arches, and trusses are some examples of shallow structures that can be considered at these locations. The type of structure used must be approved by the **DOD**. In addition, the designer shall seek input from the Division and address any maintainability and/or constructability concerns. On major bridge rehabilitation projects (defined in this case as structures where at least the deck if not more of the structure is being replaced) the existing superstructure may be jacked up with modifications to the over roadway profile and existing substructures where profile changes are not restricted by the local geography. Another option for increasing vertical clearance is to lower the profile of the under roadway in the vicinity of the structure. Where this may be an economical solution in some situations, the cost may be formidable in others. The designer shall consider construction costs as well as constructability when choosing the best course of action.

With all of the options listed above, the designer is expected to achieve the minimum required vertical clearance when designing new or replacement structures. Recognizing that work on existing structures limits options for the designer to improve vertical clearance, every effort shall be made to increase the vertical clearance as much as possible if not attain the minimum underclearances as described below. The Authority is required to notify the **NYSDOT** Division Structures Engineer of any bridge projects on the **Strategic Defense Highway Network (STRANET)** where the proposed vertical clearance will be less than 16'-0". **NYSDOT** will in turn request approval to retain the substandard vertical clearance by submitting a justification to the **Federal Highway Administration (FHWA)**. Under no circumstance shall the vertical clearance of an existing structure with substandard vertical clearance be reduced. Existing structures undergoing minor rehabilitation work

that have less than 14'-2" of vertical underclearance must be raised to a minimum of 14'-6". Additionally, designers will attempt to further improve the vertical underclearance of these structures to a minimum 15'-0" where doing so does not significantly increase the cost of the project or impact negatively on the geometry of adjoining facilities or pavement grades.

1.8.1 – VEHICLE STRUCTURES OVER THE THRUWAY MAINLINE AND RAMPS

The minimum vertical underclearance for new and replacement vehicle structures over the Thruway mainline and ramps shall be 16'-6". Where a major rehabilitation is being done on a vehicle structure over the Thruway mainline or ramp, every effort shall be made to achieve the 16'-6" vertical clearance. Where a minor rehabilitation is being done on a vehicle structure over the Thruway mainline or ramp, the designer shall consider and investigate the cost of lowering the Thruway mainline or ramp profile in the vicinity of the bridge to improve the vertical clearance as much as possible.

1.8.2 – PEDESTRIAN AND SIGN STRUCTURES OVER THE THRUWAY MAINLINE AND RAMPS

The minimum vertical underclearance for new and replacement pedestrian and sign structures over the Thruway mainline and ramps shall be 17'-6". Where a major rehabilitation is being done on a pedestrian or sign structure over the Thruway mainline or ramp, every effort shall be made to achieve the 17'-6" vertical clearance. Where a minor rehabilitation is being done on a pedestrian or sign structure over the Thruway mainline or ramp, the designer shall consider and investigate the

cost of lowering the Thruway mainline or ramp profile in the vicinity of the bridge to improve the vertical underclearance as much as possible.

1.8.3 – THRUWAY MAINLINE AND RAMP STRUCTURES

New and replacement mainline and ramp structures over interstate highways and ramps shall have a minimum vertical underclearance of 16'-6". Those over state and local roads shall have a minimum vertical underclearance of 15'-0". Where a major rehabilitation is being done on a mainline or ramp structure over an interstate highway or ramp, every effort shall be made to achieve the minimum vertical underclearances described above. Where a minor rehabilitation is being done on a mainline or ramp structure over an interstate highway or ramp, the designer shall consider and investigate the cost of lowering the roadway beneath in the vicinity of the bridge to improve the vertical underclearance as much as possible. Vertical under clearance less than 14'-2" must be increased to a minimum of 14'-6". Additionally, designers shall attempt to further improve vertical underclearances to a minimum 15'-0" where doing so does not significantly increase the cost of the project or impact negatively on the geometry of adjoining facilities or pavement grades. Under no circumstances shall a design be progressed with a vertical underclearance of less than 14'-6".

1.9 - MINIMUM CLEARANCES AT RAILROAD TRACKS

Minimum design requirements can be obtained from the current edition of the "Manual for Railway Engineering" from the **American Railway Engineering Association (AREA)**. A current copy of this manual is located in the Metals Unit for the designer's reference. However, specific vertical and

horizontal clearance requirements for structures over railroad tracks should be verified with the owner of the tracks. In general, the following requirements will apply.

1.9.1 - VERTICAL UNDERCLEARANCES

Original Thruway as-built plans show a typical minimum vertical underclearance of 22'-0" for structures over railroad tracks. During construction operations, this minimum vertical underclearance shall be maintained at all times. New and replacement structures over railroads shall be designed such that, upon completion of construction, the final minimum vertical underclearance will be no less than 23'-0". The minimum vertical clearance shall be measured from the top of the rail (or from the top ofthe highest rail where the tracks are superelevated) to the lowest point on the structure above the same rail. Where a major rehabilitation is being done on a mainline or ramp structure over a railroad, every effort shall be made to achieve the minimum vertical clearances described above. The designer shall consider and investigate the cost of raising the mainline or ramp profile in the vicinity of the bridge to improve the vertical clearance as much as possible. Where a minor rehabilitation is being done on a mainline or ramp structure over a railroad, vertical underclearances less than 22'-0" must be raised to a minimum of 22'-0". Under no circumstances shall a design be progressed with a vertical underclearance of less than 22'-0".

1.9.2 - HORIZONTAL CLEARANCES

New piers and abutments shall be placed as far away from the railroad tracks as practical. The minimum horizontal clearance of a substructure unit offset from the tracks will be governed by the

size of the construction zone required to build the unit. The location of temporary sheeting, formwork, construction equipment or any other fixed obstruction needs to be considered during the preliminary design stages such that a minimum horizontal clearance of 14.0 feet from the centerline of the tracks is maintained. Refer to Subsection 4.2.3 – Sheeting and Cofferdams for loading and deflection requirements at railroads. Existing substructure units may remain in place regardless of their horizontal clearance but must be protected if required as described below.

1.9.3 - CRASH WALLS

The provisions of this section are not intended to create a structure that will resist the full impact of a direct collision by a loaded train at high speed. Rather, the intent is to reduce the damage caused by shifted loads or derailed equipment. This is accomplished by: deflecting or redirecting the force from the substructure; providing a smooth face; providing resisting mass; and distributing the collision force over a larger area of the substructure. In general, crash wall requirements shall be as follows:

A. Solid piers and abutment stems that are parallel to the tracks and have a minimum thickness of 2’-6” do not require crash wall protection.

B. All multi-column piers as well as solid piers and abutments with stem thickness less than 2’-6” must be protected from rail traffic with crash walls as follows:

    1. Substructure faces from 12.0 feet to 25.0 feet from the centerline of the track shall be protected by a crash wall with a minimum height of 6.0 feet above the top of rail.

    2. Substructure faces less than 12.0 feet from the centerline of the track shall be protected by a crash wall with a minimum height of 12.0 feet above the top of rail.

C. For multi-column piers, the crash wall shall be anchored to and connect the columns and extend at least 1.0 foot in front of the outermost column face parallel to the track.

D. Crash walls shall be at least 2'-6" thick and shall extend at least 10.0 feet beyond the leading and trailing edge of the substructure unit.

E. Crash walls shall be anchored to the footings as applicable or shall extend to at least 4.0 feet below the lowest surrounding grade.

F. Where substructure units are not parallel to the tracks, the minimum horizontal clearance shall be the criterion used to determine the need and size of a crash wall.

G. Consideration should be given to providing protection for bridge substructures located more than 25.0 feet from the center line of the track as conditions warrant. In making this determination, account for such factors as horizontal and vertical alignment of the track, embankment height, and conduct an assessment of the consequences of serious damage in the case of a collision.

For additional design requirements of substructures see Section 4 - Substructures.