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ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: STANDARD DETAILS FOR HIGHWAY BRIDGE
:ATE OWNED BRIDGES SPANNING THE N.Y.S. CANAL
SYSTEM.
Subject Code: 735.4

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APPROVED:

M. J. Cuddy, Offide of Engineering

This Engineering Instruction establishes minimum standards and guidelines to be followed in designing new or replacement bridges over the canal. These guidelines should be considered binding. Minor variances to the stated criteria may be granted on a case by case basis through the process of negotiation between the Waterways Maintenance Division and the Structures Division with input from the Regional Waterways Maintenance Engineer. Final decisions on variance requests will rest with the Director of the Waterways Maintenance Division.

1. Full consideration should be given to hydraulic/hydrologic factors, canal curvature and local navigation conditions. Adverse site conditions which may merit an increase in horizontal clearance standards should be identified in the initiation document and all subsequent design reports. Adequate documentation must be provided (accident records, groundings, etc.) for considerations that will increase project cost due to required increases in the minimum stated criteria.

2. Defined Channel: The edge of channel is defined as the outside edge of the theoretical bottom angle. Therefore, in a typical earth section of 75', the channel is 75' wide. Drawings indicating typical channel sections and required minimum pier location/protection criteria are attached. Please note that typical sections are subject to transition areas which will vary from the stated widths.

3. Substructure Locations - Channel Requirements

   a. All substructures, including cofferdams and fender systems, shall be placed a minimum of five feet outside of channel limits. Encroachment upon earth or rock section channel limits will not be allowed. River sections of less than 200' may be permitted to facilitate significant project cost savings as long as the reasonable needs of navigation are met.

b. Required Minimum Channel Sections for the Champlain, Cayuga-Seneca, Erie Canal West of Three Rivers

Earth Section = 75' Vert. Clear. = 15'6", Channel Depth = 12'
Rock Section = 94' Vert. Clear. = 15'6", Channel Depth = 12'
River Section = 200' Vert. Clear. = 15'6", Channel Depth = 12'

c. Required Minimum Channel Sections For the Oswego Canal, Erie Canal From Waterford to Three Rivers

Earth Section = 104' Vert. Clear. = 20', Channel Depth = 14'
Rock Section = 120' Vert. Clear. = 20', Channel Depth = 14'
River Section = 200' Vert. Clear. = 20', Channel Depth = 14'

Note: Variances will not be granted for channel depth or vertical clearance standards. Vertical clearance minimum is measured from maximum navigable pool elevation. Channel depth minimum is measured from normal pool elevation.

4. Pier Protection: Barge traffic, capable of seriously damaging bridge substructures presently exists on the Champlain, Oswego and Erie Canal (Waterford to Lyons). All new or replacement structures constructed in these areas with piers located in water depths of 2' or more will require an impact attenuator system around the pier to minimize or prevent damage to the structure. The system will consist of a permanent steel sheeting cofferdam filled with screened gravel. The minimum gravel fill requirement is 5' from the face of pier to the inside edge of sheeting. The steel sheeting will extend to 3' above maximum navigable pool elevation. A rubber dock fender system will be installed on the channel sides of the sheeting and wrap around the face of the pier so that a passing barge cannot "peel" the fender. Installation height shall be 18" (centerline of fender to pool elevation) above normal pool. A second rubber fender will be installed a minimum of 18" above the initial installation. This dimension may vary according to the difference between normal pool and maximum navigable pool elevations. The minimum design requirement for horizontal clearance is 16' from centerline of pier to edge of channel in all Canal areas.

The Cayuga-Seneca Canal and the Erie Canal west of Lyons do not presently contain substantial barge traffic. However, there are no physical constraints in either Canal which would preclude barges from using these waterways. Therefore, proposed bridge projects in these areas will be designed so that an impact attenuator system can be installed at a future date and not encroach on channel limits. The minimum horizontal clearance of 16' from centerline of pier to

edge of channel will still be required. Column type piers should not be utilized. A solid pier is required in the absence of an impact attenuator system. While an impact attenuator system is not required at this time, a rubber dock fender system is necessary to protect both vessel and structure from damage. Therefore, all substructures located in water depths exceeding 2' of depth (from normal pool) will have a rubber dock fender system installed. Installation requirements are the same here as they are for the impact attenuator system.

5. Navigation Lights. These aids to navigation are mandated by Federal Law. The U.S. Coast Guard is the sole authority in these matters. The Structures Division is responsible for securing Coast Guard approval. Once approval of a lighting system is obtained, modifications cannot be made without Coast Guard Approval.

   a. Fixed Bridges - Each fascia of the superstructure shall indicate the edge of channel passage through the structure for nighttime traffic. The edge of the channel will be marked by a red channel margin light which shall show through a horizontal arc of 180 degrees and be mounted just below the edge of superstructure. The center of the channel will be marked by a green navigation light showing through a horizontal arc of 360 degrees and mounted just below the superstructure. Navigation lights are not considered an encroachment on vertical clearances and should be placed over the actual channel limits whenever possible. Channel maintenance is the responsibility of the Regional Waterways Maintenance Engineer and the Waterways Maintenance Division.

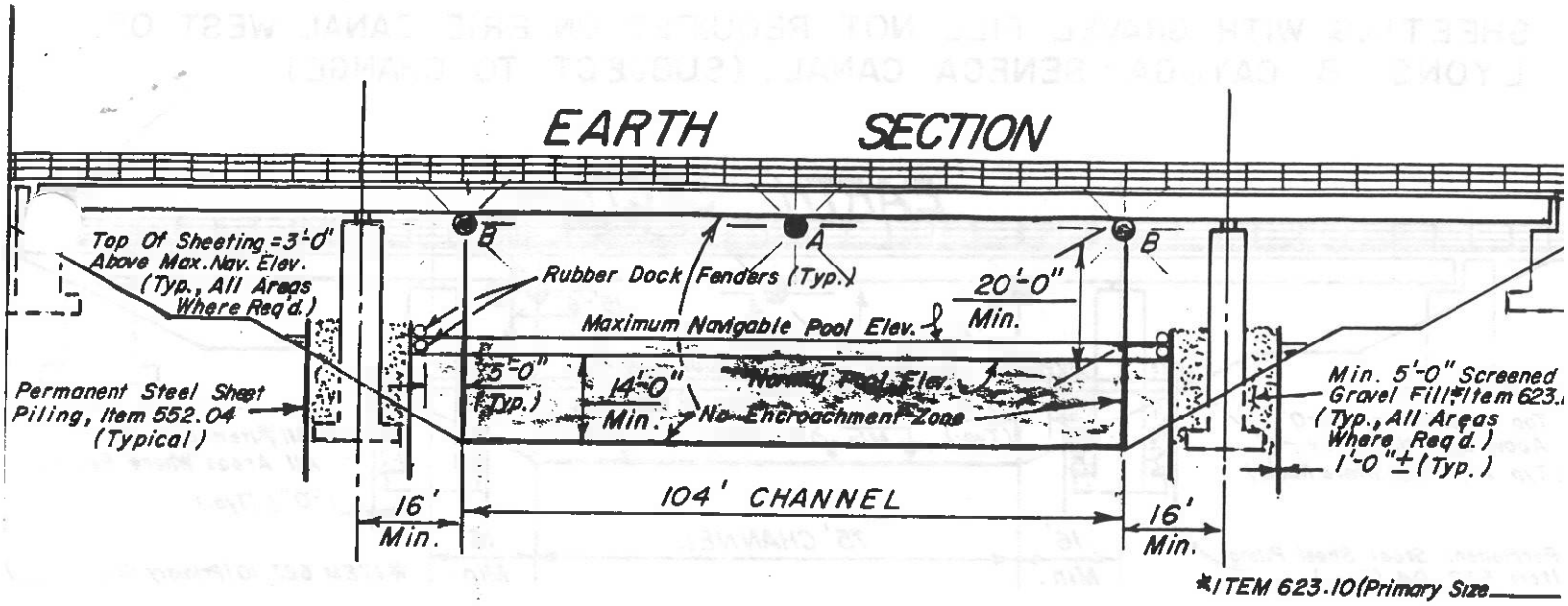
   b. Lighting Exceptions: Because of the variety of structure types and navigable conditions, it is impossible to apply the same rule in all circumstances. The Structures Division will coordinate with the U. S. Coast Guard and Waterways Maintenance Division for proper lighting requirements.

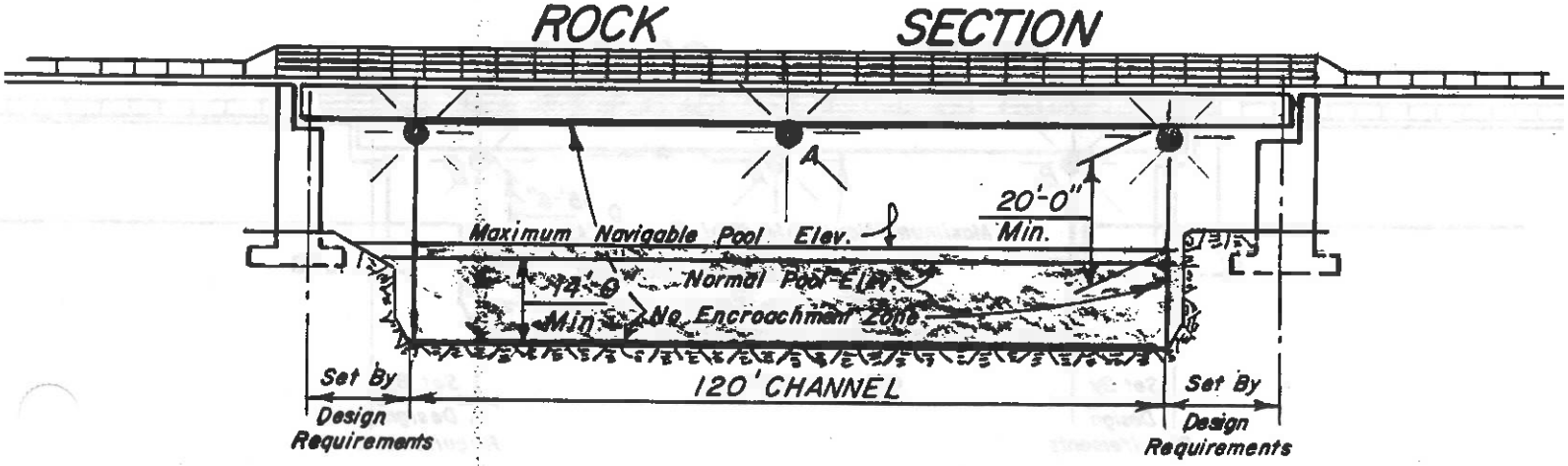
6. Miscellaneous Items: There are numerous other aids to navigation which the Coast Guard could order installed. Such items as retroreflective panels, pier lights, daymarks, radar reflectors, racons and painting piers are all possible. Ordinarily, the Coast Guard will not mandate such items but the possibility does exist. The Structures Division is responsible for coordination with the Coast Guard.

7. Permits: All bridges constructed over the canal (permanent or temporary) require a U. S. Coast Guard Bridge Permit before construction may commence. The Structures Division is the responsible agency. Corps Nationwide Permit 330.5 (a) (15) is in effect when the Coast Guard issues a bridge permit. A section 401 Water Quality Certificate from the N.Y.S.D.E.C. is also required.

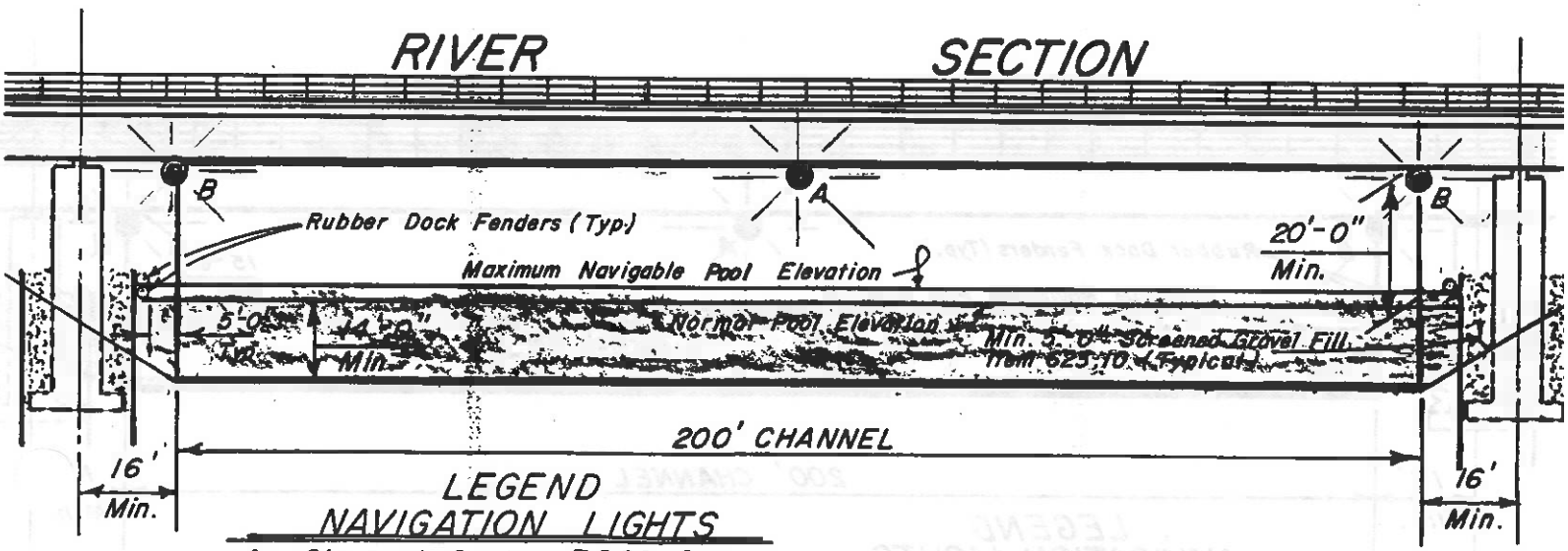
8. Rehabilitation Projects: It is the intention of this Department to have all State owned bridges over the Barge Canal conform to Federal lighting requirements and to provide pier protection where required. As a general rule, major rehabilitation of a bridge (complete deck or superstructure replacement) should include the addition of navigation lights. Rubber dock fenders and/or an impact attenuator system for substructures located in the navigable portion of the canal should be considered on an individual basis and the practicality of such an installation. Coordination between Regional Waterways, Regional Design, Waterways Maintenance and the Structures Division will be required. It is also important to note that any rehab which will change the width of the superstructure or alter the existing horizontal and/or vertical clearances over the canal will require a U. S. Coast Guard bridge permit before construction may commence. When this occurs, navigation lights and fenders are mandatory. Questions should be directed to the Structures Division.

jjm 9/89 ej





"TYPICAL CHANNEL SECTIONS"
ERIE CANAL - WATERFORD TO THREE RIVERS
OSWEGO CANAL - THREE RIVERS TO OSWEGO



LEGEND

NAVIGATION LIGHTS

A: Channel Center 360° Green
B: Channel Margin 180° Red

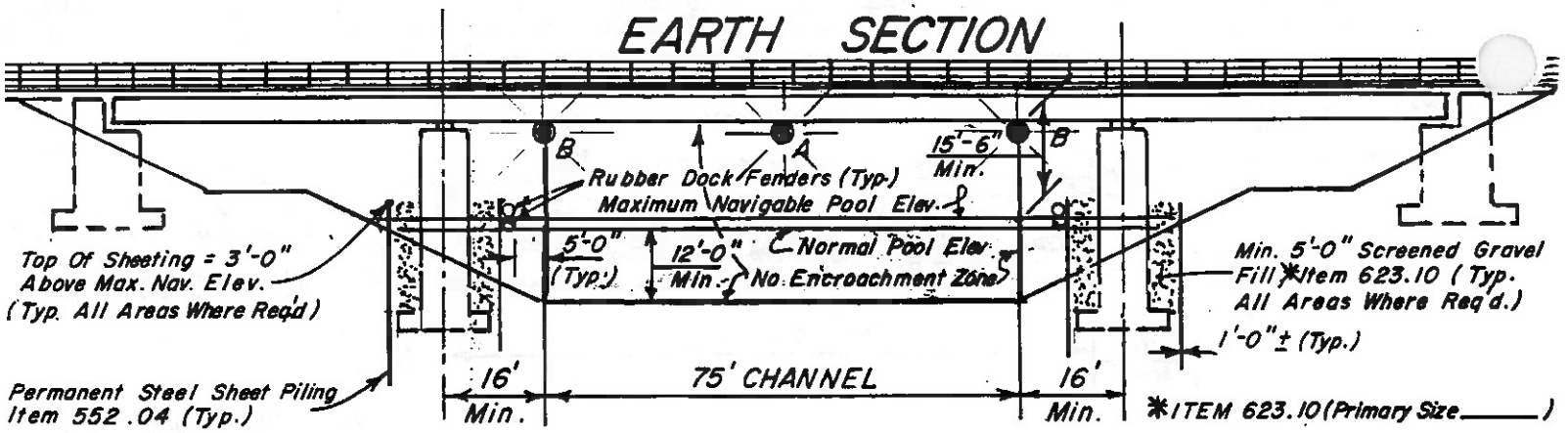
Item 16665.9987

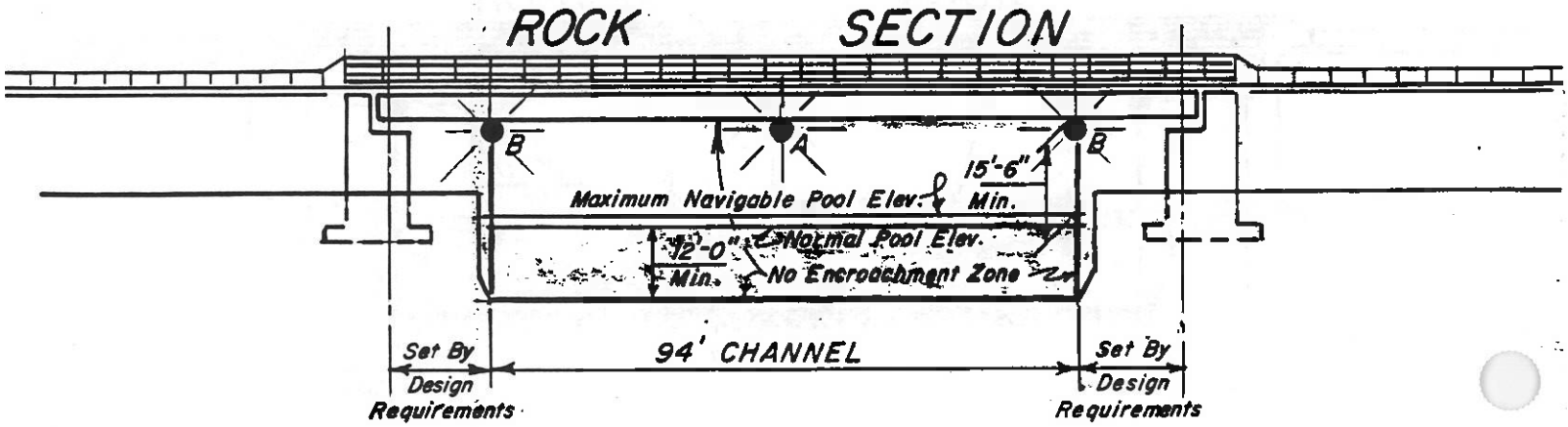
RUBBER DOCK FENDERS - Item 665.04

SHEET 1 of 2

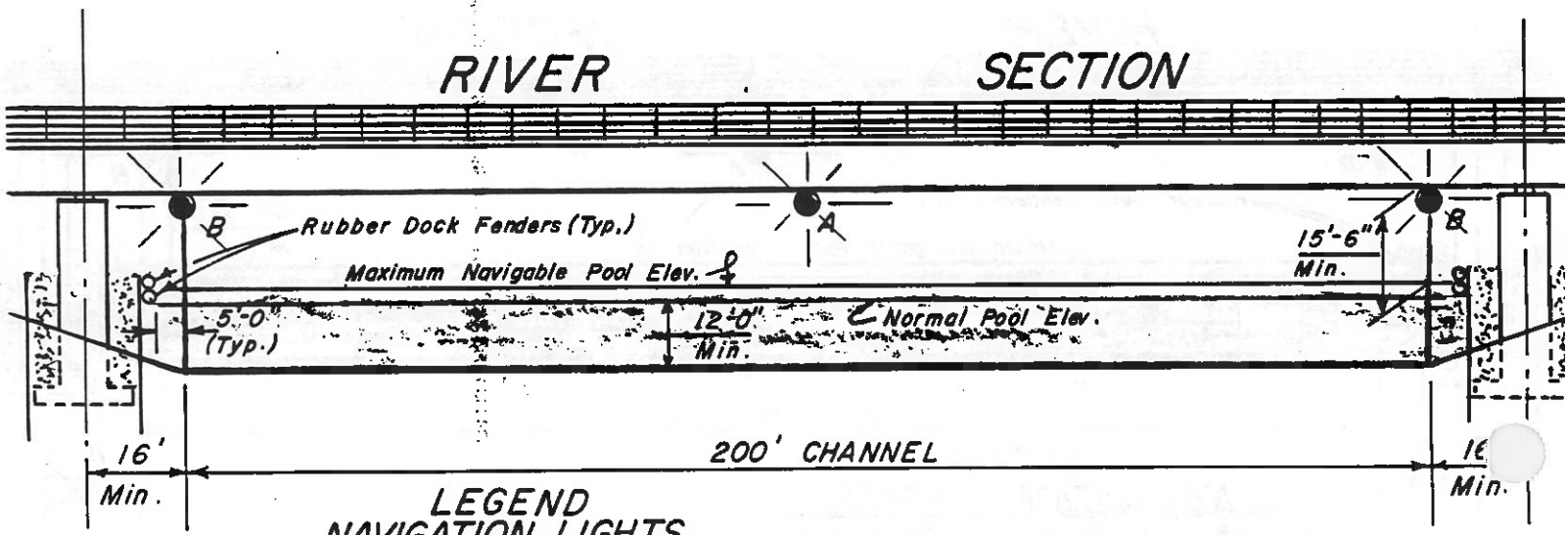
Detailed By: J. J. McGaughan

SHEETING WITH GRAVEL FILL NOT REQUIRED ON ERIE CANAL WEST OF LYONS & CAYUGA - SENECA CANAL. (SUBJECT TO CHANGE)





"TYPICAL CHANNEL SECTIONS"
CHAMPLAIN CANAL, CAYUGA-SENECA CANAL & ERIE CANAL-THREE RIVERS TO TONAWANDA



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