

# CHAPTER 7 UNDERWATER OPERATIONS TEAM

## 7.1 INTRODUCTION

This chapter introduces MassDOT's Underwater Operations Team (UOT). The primary function of the Underwater Operations Team is to conduct underwater inspections of all state, city and town bridges where required in accordance with the National Bridge Inspection Standards (NBIS). The Team conducts underwater inspections on a year round basis for structures throughout the Commonwealth of Massachusetts. Additional duties of the Underwater Operations Team includes assistance to state and municipal departments in repairing bridge substructure elements and installing scour countermeasures, assisting in search and recovery efforts, debris removal and other related underwater work associated with bridges.

Underwater inspections and other underwater tasks will be conducted by the Underwater Operations Team for all divisions of the Department of Transportation. Upon written request and when approved by the Chief Engineer, these activities will be conducted for other government agencies. Also, in times of flooding or other emergencies and with the approval of the Chief Engineer, part-time members of the Underwater Operations Team may be temporarily activated to assist in situations on a full time basis.

#### 7.2 ORGANIZATIONAL STRUCTURE

The Underwater Operations Team (UOT) is a self-contained unit within MassDOT's Bridge Inspection Section and the Team reports to the Bridge Inspection Engineer. The UOT is headed by the Underwater Operations Engineer who is responsible in overseeing the operation of the unit on a statewide basis.

The Underwater Operations Engineer oversees two Area Dive Coordinators, an Eastern and a Western Area Dive Coordinator. The Area Dive Coordinators are responsible to schedule and coordinate diving activities in their respective areas.

The UOT also consists of full time divers and part time divers. Full Time Dive Team Members dedicate 100% of their time to the Underwater Operations Team. MassDOT also maintains a roster of part-time divers that are able to participate in a minimum of 20 dives per calendar year. The part time divers are DOT engineers from other departments statewide. They collectively supplement the full time divers on a daily basis. Dive teams shall operate on a statewide basis that shall not be restricted by District Boundaries.

# 7.3 DIVER CLASSIFICATIONS

MassDOT's Underwater Operations Personnel shall be assigned a diver classification and must maintain certain individual diver requirements. A dive is defined as participation by an individual in one day's diving operation, including participation as a safety diver. The divers shall be classified in one of three groupings. The classifications are as follows:

• Class I Diver - Full time diver



- Class II Diver 20 dives/year (minimum)
- Class III Diver Inactive/Reserve

A Class III diver must make a check-out dive with the Underwater Operations Engineer or his designee in order to be upgraded from inactive/reserve status. The check-out dive may be held at a bridge site.

#### 7.4 UNDERWATER INSPECTION DIVER QUALIFICATIONS

All members of the Underwater Operations Team receive various training. Such training includes initial scuba training, NBIS bridge inspection training and various training that is conducted annually. This section outlines these requirements.

## 7.4.1 Initial Eligibility Requirements for Divers

In order to be initially eligible to participate in the Underwater Operation Team, an individual must meet the following requirements:

- 1. Candidates must receive approval from their current supervisor to participate in the dive program (minimum 20 dives/year)
- 2. Be employed by the Department in an engineering title
- 3. Pass a physical examination
- 4. Pass the following swim test:
  - A. Complete 1 mile non-stop swim in a pool
  - B. Swim 20 yards underwater
  - C. Survival swim, 10 minutes
  - D. Recover weight from 10 feet of water
  - E. Swim a short distance with a blacked out mask
- 5. Complete and pass the MassDOT sponsored Scuba Diver Training program. The program is approximately 100 hours in duration and includes classroom, pool and a minimum of 20 open water dives. It is designed to be very physical and expose the candidate to the wide range of diving environments.
- 6. Complete an FHWA approved comprehensive bridge inspection training course such as the NHI Safety Inspection of In-Service bridges training

#### 7.4.2 Annual Requirements for Divers

All members of the Underwater Operations Team are also required to receive various training/certification/examinations on a yearly basis as follows:

- 1. Participate and pass an annual Skill Review Session. The session will include reviewing of basic scuba skills, stressful diving situations and other related training
- 2. Complete an annual 440 yard non-stop swim (pool)
- 3. Pass and have a current certification for First Aid, CPR, AED, and Oxygen Management
- 4. Pass an annual physical examination



#### 7.4.3 Additional NBIS Requirements for Divers

As outlined in Section 7.4.1 above, all underwater bridge inspectors must complete an FHWA approved comprehensive bridge inspection training course. MassDOT also requires that all inspectors receive bridge inspection refresher training at a minimum of five year intervals.

#### 7.5 DIVER SAFETY PRACTICES

Divers may be exposed to hazards that include circulatory risk, respiratory risk, low visibility, hypothermia, and possible injury from falls or submerged debris. Safety of all Dive Team members is paramount in daily activities. As such, Dive Team members must adhere to the following diver safety practices:

- 1. If a diver does not feel well, has sinus congestion, or ear problems, he or she shall refrain from diving. Under no circumstances should a diver forcibly clear his ears in order to participate in a diving operation.
- 2. A diver shall terminate the dive if he or she becomes ill, experiences equipment malfunction, or for any reason becomes uncomfortable with the surroundings.
- 3. Dive flags shall be used on all diving operations where boat traffic is possible.
- 4. Water entries should be made carefully to avoid being impaled on any object protruding from the bottom.
- 5. Divers should visually scan each other prior to entering the water.
- 6. Surface personnel should be aware of the position of the divers in the water at all times.
- 7. When using a boat, do not operate the motor unless the precise location of all divers is known, and then only when the divers are well clear of the boat.
- 8. Dives requiring decompression stops are not authorized.
- 9. Dives in excess of 100 feet **are not** authorized.
- 10. Ascent rates should be slow and never exceed 30'/minute, unless the diver is making an emergency ascent.
- 11. All scuba dives will be terminated to allow 500 PSI in the tank when the diver surfaces.
- 12. The "Buddy System" will be used on all scuba diving operations. However, there are times, when working in heavy current, or with limited visibility, that two divers in the water are more of a hazard to each other than a safety factor. Under these conditions it is acceptable for one diver to work at a time, but extreme vigilance should be exercised by surface personnel. The Buddy must be suited with equipment at the ready and be prepared to assist without delay. A specific dive plan should be prepared and carried out so that the safety diver can monitor diver progress.



- 13. Divers will wash their scuba equipment after each dive and maintain it in good repair.
- 14. Divers are responsible to deliver their regulator to the Underwater Operations Engineer for yearly maintenance. Visual and hydro scuba tank inspections will be kept current.
- 15. Divers are responsible to deliver any faulty scuba equipment to the Underwater Operations Engineer for repair or replacement.
- 16. A qualified diver will remain on the surface during all diving operations.
- 17. In the event of a thunder and lightning storm, diving operations shall be halted until the storm passes.
- 18. All dives into submerged structures when a direct ascent to the surface is not possible shall be made with surface supply diving equipment.
- 19. During surface supply operations, the dive may be terminated when requested by the diver, or the diver fails to correctly respond to communication or signals from a surface team member, or the diver begins to use the reserve air supply.

## 7.5.1 Compressed Air Injuries

Due to the nature of the work that the Underwater Operation Team performs, an accident involving the compressed air that the divers must breathe involves a different set of emergency procedures that must be followed.

- A. If an accident occurs while a diver is breathing compressed air and an air embolism or decompression sickness is suspected, the diver must be taken to a hyperbaric chamber for treatment as soon as possible.
- B. The primary source of information for diving accidents and the national coordinating agency for hyperbaric chamber treatment is the National Divers Alert Network (DAN), located at the Duke University Medical Center in Durham, North Carolina. Their emergency number is 919-684-9111, 24 hours/day (office number for non-emergencies is 1-866-446-2641, 8:30AM to 6:30PM, M-F).
- C. The procedure for contacting DAN is:
  - 1. Out at sea, call the Coast Guard not DAN
  - 2. If inland, transport diver to the nearest hospital or contact rescue personnel first, then call DAN.
  - 3. The DAN emergency telephone number is the switchboard for Duke University Medical Center. The operators are not trained in diving medicine. Tell the operator:
    - You are calling DAN
    - You have an emergency, or an urgent problem related to a dive
    - That you must talk to the DAN physician on call
    - Coordinating chamber treatment may take 5-15 minutes or longer



- Give your area code and telephone number and stay on the line
- Do not transport a patient to a hyperbaric chamber unless the staff has been alerted and they are willing and able to accept a patient for treatment
- D. Transportation to a hyperbaric chamber or hospital
  - Local ambulance service/fire department
  - United States Coast Guard Search and Rescue 427 Commercial St. Boston, MA 617-223-5757 (24 hours)
- E. Communication
  - 1. Call 911 for emergency operator assistance
  - 2. Call Mass. Dept. of Transportation (HOC) (if unable to reach 911) 1-800-227-0608, 617-310-4700 or 617-946-3150
  - 3. Local medical facilities may not be familiar with diving related accidents
    - One diver from the Dive Team should accompany the patient
    - If the emergency room doctor does not voluntarily call DAN, insist that it be done. If necessary, make the call yourself
    - A diver with a compressed air injury would be stabilized with oxygen and intravenous drugs in an emergency room before transport to a hyperbaric chamber. The DAN physician must be informed of the patient's dive profile so he can select the proper treatment and drug regimen

#### 7.6 UNDERWATER BRIDGE INSPECTION

There are three methods used to evaluate underwater elements during bridge inspections:

- Wading inspections
- Self-contained diving (SCUBA)
- Surface supplied air diving

Wading inspections can generally be used when waterways are less than 3 feet in depth and have low velocity water flow. The substructure units and stream bed is typically evaluated using waders and a sounding rod or probe. Above water inspection teams generally perform wading inspections as part of the regular inspections.

The Underwater Operations Team is responsible for all SCUBA and Surface Supply inspections. When underwater inspections are required Item 92 (B) on the SI&A sheet is coded "Y".

#### 7.6.1 Waterway Characteristics That Warrant Dive Inspections

As outlined above, a bridge will be assigned to the Underwater Operations Team for an underwater inspection if the water depth is three feet or greater, or at a lesser depth if site conditions require that a diver be used for a complete inspection of all underwater elements.



Those bridges requiring underwater inspection will be inspected on a regular basis in accordance with National Bridge Inspection Standards.

#### 7.6.2 Inspection Frequency

The National Bridge Inspection Standards require that underwater structural elements be inspected at intervals not to exceed 5 years. That maximum frequency is appropriate for bridges with underwater elements that are in excellent conditions in waterways that are passive. In general there are not many structures that will qualify for this maximum frequency. Situations that would cause one to consider reducing the inspection frequency are structural deterioration, stream bed scour and erosion due to water flow, unknown foundations, susceptible stream bed materials, damage to structural components, etc.

Suggested underwater inspection frequencies are offered below. These are some typical situations that may dictate the frequency. The dive frequency is always at the discretion of the Underwater Operations Engineer.

- **60 Months** New bridges with substructure elements in excellent conditions and known deep foundations in a benign waterway.
- **48 months** Bridges with substructure element and stream bed in very good condition.
- **36 Months** Bridges and stream bed in average condition. The majority of MassDOT's bridges have this U/W inspection frequency.
- **24 Months** Bridges that have substructure elements that are exhibiting minor deterioration or stream beginning to exhibit scour.
- **12 Months** Bridges that have substructure elements that are exhibiting advanced deterioration or stream beds that have advanced scour. Such bridges may receive a condition rating for Item 60 of 4 (Poor).
- 6 Months Bridges that have substructure elements that are exhibiting serious deterioration or stream beds with advanced scour that may impact substructure stability. Such bridges may receive a condition rating for Item 60 of 3 (Serious).
- **3 Months or less** Bridges that have substructure elements that are exhibiting critical deterioration or stream beds with advanced scour that impacts substructure stability. Such bridges may receive a condition rating for Item 60 of 2 (Critical) or less.

The underwater inspection frequency is entered on the SI&A sheet under Item 92 (B) as a two digit number.

Special member inspections are usually interim inspections with a reduced frequency. Special member inspections may only include elements that require additional inspection. If an inspection identifies element conditions that may deteriorate prior to the next scheduled routine inspection, a special member inspection will be scheduled for those elements.

See Attachments 7-1 thru 7-3 for examples of routine underwater inspection reports and Attachment 7-4 for an example of an underwater special member inspection.



#### 7.7 CLASSIFICATION OF UNDERWATER BRIDGE INSPECTIONS

Underwater bridge inspections are defined under four different levels of inspection. The levels are defined as follows:

Level I:	A general, visual or tactile inspection of the structure, with minimal
	cleaning, to determine overall condition and identify any problems (See
	Attachment 7-1)
Level II:	A detailed inspection with sufficient cleaning and measurements to fully
	document deficiencies (See Attachment 7-2)
Level III:	A very detailed inspection with extensive cleaning and measurements.
	Non-destructive test will be performed if necessary
Level IV:	A channel grid sounding is obtained. Level IV inspections are normally
	utilized for a new bridge to establish a river bed benchmark. Every scour
	critical bridge should have this level of inspection completed with an
	update as channel features change over time. (See Attachment 7-3)

## 7.8 UNDERWATER INSPECTION PROCEDURES

It is the diver's responsibility to provide a complete underwater inspection of the structure they have been assigned to inspect. The inspection may be visual if the water clarity permits, or tactile if the visibility is poor. For most dives, a Level II inspection is completed. A Level II inspection is essentially a site reconnaissance to determine if any problems exist and to estimate their size and scope. This will also give the diver an opportunity to acclimate to the site and learn the location of hazardous debris. If significant problems are found, the level of inspection should be upgraded.

## 7.8.1 Bridge Data Review and Dive Planning

The divers will review all previous underwater inspection reports and all substructure plans available on the bridge to be inspected. The divers will develop a dive plan for each underwater inspection that will determine the number of divers needed, assign duties to each of the divers participating in the dive, state the access means (boat or shore entry) to accomplish the inspection, review dive procedures and determine entry and exit points for the inspection. If conditions do not allow an inspection at the primary bridge, the dive team will proceed to the secondary preplanned inspection.

A dive plan should include the following:

- 1. Review previous underwater inspection reports and check for:
  - Dive conditions
  - Traffic setup/police detail required
  - Penetration/low clearance requiring surface supply or other specific equipment
  - Boat or inflatable
  - Tidal conditions requiring an inspection at low tide, high tide, or slack tide
  - Notify State Police Marine Unit or local police, if necessary
  - The Underwater Operations Engineer will notify the BIE prior to an inspection, by any team, at a critical or high profile structure



- 2. Review the bridge plans, if available, and look for:
  - Footing type, depth, dimensions, etc.
  - Sheeting type and location
  - Scour countermeasures
- 3. Make visual above water inspection of piers and abutments, before beginning diving operations to:
  - Note any misalignment, settlement, cracks, displacement, etc.
  - Note best location for diver entrance and exit
  - Note boat traffic requiring dive flag(s)
  - Coordinate with bridge operator for bridge openings

# 7.8.2 Dive Equipment

MassDOT possesses and maintains an extensive amount of general and personal use dive equipment to allow for safe and thorough underwater inspections. Safety of employees and the traveling public is MassDOT's primary concern. Divers are required to ensure that all equipment is maintained in good working order. A partial list of equipment typically used by the Dive Team is as follows:

Unit Equipment:

- Dive Vans
- 19' Boston Whaler
- 24' Privateer
- Surface supply gear
- Communication gear
- Underwater camera
- Underwater video
- Probing rods
- Hammers
- Scrapers
- Rulers & measuring tapes
- Clipboards
- Rope
- Ladder (s)
- Dive flags

## Personal Equipment:

- Wet suit
- Dry suit
- Face mask
- Swim fins
- Air tank
- Regulator



- Buoyancy compensator
- Weight belt
- Depth gauge
- Pressure gauge
- Knife

Upon completion of dives and return to the office, all divers must clean and store personal equipment and work together to clean unit equipment. If any equipment should show wear or require replacement, notify the Underwater Operations Engineer.

#### 7.8.3 Dive Inspection Process

#### 7.8.3.1 Dive Master

As mentioned previously, multiple divers are always used. The number of divers will depend on the size and type of inspection required. One diver serves as the Dive Master. The Dive Master directs other team members during the inspection, assigning specific duties. The Dive Master is responsible for the report preparation.

#### 7.8.3.2 References

The typical underwater inspection process is well documented in industry reference materials as noted below. As such it will not be detailed in this manual. For a step by step description of the suggested method of inspecting underwater elements and features please refer to the following documents. Copies are available at the Underwater Operations Office (Dive Shack) and at Bridge Inspection Headquarters.

- FHWA Bridge Inspector's Reference Manual (BIRM) Publication No.FHWA-NHI-03-002
- NHI Couse No 130091 Underwater Bridge Inspection class reference manual. Publication No.FHWA-NHI-10-027

#### 7.8.3.3 Established Water Elevation

During an inspection, divers will establish a location for a "water control shot". A water shot is a measurement from a fixed location on the structure to the top of water at the time of the inspection. Sounding depths can then be converted to stream bed elevations relative to the water shot. This allows relevant comparison of soundings from different inspection cycles. Divers should always utilize the water shot location that has been used for previous dives.

- a) Height of water level to a constant and fixed location on the bridge (use judgment) (i.e. bottom of beam, bottom of deck, arch intrados, bottom of bent cap)
- b) Soundings taken to waterline are adjusted to the initial water level with a correction factor.



#### 7.8.3.4 Stationing

Consistent stationing shall be used when documenting inspections. Stationing established on previous reports or on bridge plans will be used. Abutments and or piers are labeled left and right when looking downstream. If a flow cannot be determined a compass direction will be used.

#### 7.8.3.5 Sounding Location Determination

Soundings are frequently obtained during underwater inspections. Each dive bridge should have at least a stream bed profile obtained along the upstream and downstream ends of the bridge across the channel. They will be useful in documenting future stream bed changes that may affect the structure. The profiles should be re-taken whenever stream bed changes are suspected, such as after high water events.

Scour Critical Bridges should have soundings taken at each inspection. At a minimum they should be taken along the upstream and downstream ends of the bridge across the channel. For new bridges soundings are frequently obtained in a grid pattern within limits as described below.

When soundings are taken during an inspection the following sounding locations should be considered. The objective is to identify any riverbed scour. Divers should use good judgment for sounding locations based on stream bed features and historic inspection data.

- 10' intervals along face of exposed footing
- 10'-20' grid beneath bridge, when practical (initial Level IV inspection)
- Continue upstream and downstream 20' +/- (use judgment)
- 10' (or convenient measurement) across channel at upstream or downstream end, or a location of greatest scour or highest footing exposure (Level II inspection)

#### 7.8.3.6 Defect Documentation

Divers will note any defects during an underwater inspection that should include the following:

- Scour
- Exposed footings
- Voids in substructure
- Undermining
- Decay/Section Loss
- Cracks

## 7.9 **REPORT PREPARATION**

At the completion of an underwater inspection, a dive report will be prepared by the Dive Master or his designee to detail the results of the inspection. If deficiencies are found, sufficient measurements shall be recorded to fully document the condition. Sketches, including plan, elevation, and sectional views shall be drawn when necessary to fully illustrate any deficiency. Reports will be submitted to the Underwater Operations Engineer in a timely manner.

The following reports are used during underwater inspections.



- Created within 4D
  - Routine Underwater Inspection Report
  - Underwater Special Inspection Report
- Not created in 4D
  - Element Level Inspection Report (formerly Pontis & included in Routine Inspection Reports)
  - Diver Activity Report (See Attachment 7-5)
  - Flood Inspection Report

## 7.10 CRITICAL DEFECT NOTIFICATION

The Bridge Inspection Engineer should be contacted from the bridge site prior to the report being written when critical defects that may affect the structural integrity of the bridge, or the public's safety, are initially observed (refer to Section 4.7).

# 7.11 FLOOD INSPECTIONS

- Scour Critical bridges should be a priority
- Part time divers may be activated to full time status
- Use Diver Activity Report for reporting
- Underwater Operations Engineer maintains a daily log of structures inspected, with status
- Submit inspection status report to Bridge Inspection Engineer weekly

## 7.12 INSPECTION REPORT REVIEW AND DISTRIBUTION

Upon completion of a dive inspection, the following steps shall be done in the underwater report writing and distribution:

- 1. Dive Master prepares the report and marks it complete in 4D when it is ready for review
- 2. The report is reviewed electronically within 4D by Underwater Operations Engineer. When acceptable the report is approved with a check mark in 4D
- 3. The report is then signed by the Dive Master and the Underwater Operations Engineer
- 4. Copies of the report are made and distributed as follows:

A. Internal Distribution

- One Copy to the Bridge Inspection Engineer for the NBIS file
- Original report in the Dive Files located in Boston
- Two Copies are filed in Westwood
- B. Distribution of Municipally Owned structures
  - One copy to Municipality via letter of transmittal signed by the State Bridge Engineer (see Attachment 7-6)
  - A copy of the letter of transmittal is filed in the NBIS file



- C. Distribution of MassDOT owned structures
  - Reports are periodically forwarded to the district DHD's with a letter of transmittal signed by the State Bridge Engineer (see Attachment 7-7)
  - A copy of the transmittal is filed in the Dive report file in the respective district correspondence folder

# 7.13 UNDERWATER ELEMENTS

The following are guidelines for areas of concern during underwater inspections.

## 7.13.1 Footing or Foundations

- Type
  - Spread
  - Pile supported
- Material
  - Concrete
  - Timber cribbing
  - Stone masonry
- Condition
  - o Timber
    - Decay
    - Marine borer attack
  - o Concrete
    - DeteriorationCracking (local
      - Cracking (location and size)
  - o Stone Masonry
    - Check for missing stones
    - Measure depth of penetration between stones if mortar is missing
    - Check for significant cracks
    - Check for misalignment or displacement
    - Check for signs of settlement
- Exposed dimensions
  - Location (stations)
  - Exposed length
  - Exposed height
  - Offset from abutment or pier stem (toe)
- Covered footing
  - Probe, dig, etc. to determine the bottom of footing

## 7.13.2 Scour

- Indicate location and depth
- Define limits with soundings
- Soil deposition
  - Location
  - o Height
- Elevation of water during flooding noted by:



- Discoloration of concrete
- o Debris deposited on bridge seats

#### 7.13.3 Undermining

- Dimensions (L x H x Pen.)
- Location

## 7.13.4 Sheeting

- Type
  - o Steel
  - o Timber
- Condition
- Height of exposure above footing or mudline
- Thickness
- Measure one section of sheeting to determine size and shape
- Measure offset from abutment or pierwall
- Measure any separation from footing

## 7.13.5 Piles

- Type
  - o Vertical
  - o Battered
- Material
  - o Timber
  - Concrete
  - Steel (concrete filled)
- Condition
  - o Timber piles
    - Inspect for marine borer activity
    - Inspect bolt connections for corrosion
    - Probe wood to detect decay
    - Take caliper measurement to document section loss
    - Inspect for other deterioration, delamination
    - Locate and measure size of any splits or checks
    - Core a sample of wood pile (if necessary)
  - Concrete piles
    - Determine condition of concrete
    - Measure cross-sectional loss
    - Check for erosion of concrete and spalls
    - Check condition of any protective jackets
    - Check for exposed reinforcement
    - Check for cracks
    - Inspect for abrasion or delamination



- Steel piles
  - Check for collision damage
  - Measure cross-section loss
  - Inspect for deterioration
  - Inspect the condition of any protective jackets
- Collision Damage
  - Inspect for broken piles
  - Inspect for missing piles
  - Inspect for cracks and splits
  - Inspect channel bottom for indication of movement
- Spacing (center to center)

# 7.13.6 Pile Bents

- Condition
  - o Piles
  - $\circ$  Bracing
    - Horizontal bracing
    - Diagonal bracing
  - $\circ$  Fasteners
  - o Impact damage
  - o Missing piles

#### 7.13.7 Fender System

Inspect for material defects and collision damage on the following elements (see inspection procedures for bents):

- Piles
- Diagonal bracing
- Horizontal bracing
- Fasteners
- Wales
- Ladders

#### 7.13.8 Scour Countermeasures

- Type
  - o Riprap
  - o Dumped stone
  - o Cement/grout bags, sand bags
  - o Other
- Location
- Condition
- Size (dimensions)

# 7.13.9 Previous Underwater Repairs

• Type



- Location
- Condition

# 7.13.10 Soil – Bottom Material

- Visual classification
- Location
- Depth
  - $\circ$  Probe with steel bar or rod

# 7.13.11 Marine Growth

- Type
- Location
- Thickness

## 7.13.12 Debris

- Determine amount, type and location
- Estimate reduction of waterway opening
- Note hazards to divers

## 7.13.13 Photographs

• Visibility, camera availability, and dive conditions permitting (if helpful)

# 7.13.14 Sketches

- Plan view
- Elevation (if helpful)
- Section (if helpful)



# 7.14 CHAPTER 7 ATTACHMENTS

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-DIST B.I.N.	UNDERV	WATER OF	PERATIONS TEAM	BR. DEPT. NO.	5.
5 45G		IT LID ACTIV	L JEWEL OH INSP.	INSPECTION DATE	
	B17017-	-45G-DOT-NBI		11/6/12	
7-FACILITY CARRIED	ACCESS TO	BRIDGE	UNDERWATER OPERATIONS EN	Rand E. Rain	
6-FEATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	REPORT SUBMITTED BY :	
COHASSET NARROWS	10'	15 <sup>1</sup>	CARRIE LAVALLEE	Same Joualle	2
CONC. DEBRIS & GRAVEL	TIDAL	R. BONICA,	W. COLLERAN, G. BROZ	& B. FITZGERALD	
		REMAI	RKS		
General		, ,	,		
At the request of Kevin	Morrissey,	District 5 I	Resident Engineer, the	MassDOT Underwater	•
Operations Dive Team cor	nducted a 1	bottom searc	ch to locate any debr	ris remaining from the	1211
removed sections of Pier #1	l, Pier #2, F	Pier #3, and	Pier #4. Piers are num	Dered feir to right when	
facing downstream.				κ.	5
Observations: The divers noted only sma	iller pieces	of concrete	at the mudline at Pier	#1. The smaller pieces	
Observations: The divers noted only sma were 1' to 2' diameter. The Pier #2, Pier #3, and Pier # 3' to 4' diameter.	iller pieces divers note 4. The smal	of concrete d many large ller pieces we	at the mudline at Pier e and small pieces of co ere 1' to 2' diameter an	#1. The smaller pieces increte at the mudline at id the larger pieces were	т. 
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Observations: The divers noted only sma were 1' to 2' diameter. The Pier #2, Pier #3, and Pier # 3' to 4' diameter. Pier #2: At 30' downstream from downstream from the remaining a width of 1,5' and a length	aller pieces divers note 4. The small the remain aning pier s pier section of 6' were r	of concrete d many large ller pieces we ning pier sec section and 3 n and 5' to t noted.	at the mudline at Pier e and small pieces of co ere 1' to 2' diameter an ction a 4' diameter st 30' to the right, a 3' di he left, two granite bla	#1. The smaller pieces increte at the mudiline at ad the larger pieces were tone was noted. At 20' ameter stone was noted. ocks with a height of 2',	а 
Observations: The divers noted only sma were 1' to 2' diameter. The Pier #2, Pier #3, and Pier # 3' to 4' diameter. Pier #2: At 30' downstream from downstream from the remaining a width of 1.5' and a length	aller pieces divers note 4. The smal the remain aning pier s pier section of 6' were r	of concrete d many large ller pleces we sing pler sec section and 3 n and 5' to the noted.	at the mudline at Pier e and small pieces of co ere 1' to 2' diameter an otton a 4' diameter st 30' to the right, a 3' di he left, two granite bla	#1. The smaller pieces increte at the mudline at ad the larger pieces were tone was noted. At 20' ameter stone was noted. ocks with a height of 2',	
Observations: The divers noted only sma were 1' to 2' diameter. The Pler #2, Pler #3, and Pier # 3' to 4' diameter. Pler #2: At 30' downstream from downstream from the remaining a width of 1.5' and a length Pier #3: At 45' downstream from the line with the remaining p width of 1.5' and a length of 6 concrete pieces with 2.	aller pieces divers note 4. The small the remain aning pier s pier section of 6' were r he remainin ier section of 4' was no 5' diameters	of concrete d many large lier pieces we section and 3 n and 5' to th noted. and 5' to th oted, At 3' up s were noted.	at the mudline at Pier e and small pieces of co ere 1' to 2' diameter an ction a 4' diameter at 30' to the right, a 3' di he left, two granite bloc n a 3' diameter piece o te right, a granite bloc ostream from the remain	#1. The smaller pieces increte at the mudiline at ad the larger pieces were tone was noted. At 20' ameter stone was noted. ocks with a height of 2', of concrete was noted. In k with a height of 2', a ning pier section a group	
Observations: The divers noted only sma were 1' to 2' diameter. The Pier #2, Pier #3, and Pier # 3' to 4' diameter. Pier #2: At 30' downstream from the remaining a width of 1.5' and a length Pier #3: At 45' downstream from til line with the remaining p width of 1.5' and a length of 6 concrete pieces with 2. Pier #4:	aller pieces divers note 4. The small the remain aning pier s pier section of 6' were r he remainin ier section of 4' was no 5' diameters	of concrete d many large ller pieces we section and 3 n and 5' to th noted. and 5' to th oted. At 3' up s were noted.	at the mudline at Pier e and small pieces of co ere 1' to 2' diameter an ction a 4' diameter st 30' to the right, a 3' di he left, two granite blo n a 3' diameter piece o the right, a granite bloc ostream from the remain	#1. The smaller pieces increte at the mutiline at ad the larger pieces were tone was noted. At 20' ameter stone was noted. ocks with a height of 2', of concrete was noted. In k with a height of 2', a ning pier section a group	
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Observations: The divers noted only sma were 1' to 2' diameter. The Pier #2, Pier #3, and Pier # 3' to 4' diameter. Pier #2: At 30' downstream from downstream from the remaining a width of 1.5' and a length Pier #3: At 45' downstream from til line with the remaining p width of 1.5' and a length of 6 concrete pieces with 2. Pier #4: In line with the remaining noted. In line with the re- height of 4' was noted. T sheeting.	aller pieces divers note 4. The small the remain aning pier s pler section of 6' were r he remainin ier section of 4' was no 5' diameters g pier section maining piec his mound	of concrete d many large ller pieces we section and 3 n and 5' to th noted. and 5' to th bted. At 3' up s were noted. on, two piece er section, a was between	at the mudline at Pier e and small pieces of co ere 1' to 2' diameter an otton a 4' diameter st 30' to the right, a 3' di he left, two granite bloc n a 3' diameter piece of the right, a granite bloc ostream from the remain es of timber sheeting to 10' diameter mound on the remaining pier se	#1. The smaller pieces increte at the multiline at ad the larger pieces were tone was noted. At 20' ameter stone was noted. ocks with a height of 2', of concrete was noted. In k with a height of 2', a ning pier section a group with a height of 5' were of concrete debris with a ection and the new steel	
Observations: The divers noted only sma were 1' to 2' diameter. The Pier #2, Pier #3, and Pier # 3' to 4' diameter. Pier #2: At 30' downstream from downstream from the remaining a width of 1.5' and a length Pier #3: At 45' downstream from the line with the remaining pi width of 1.5' and a length of 6 concrete pieces with 2. Pier #4: In line with the remaining noted. In line with the remaining noted. In line with the remaining sheeting.	aller pieces divers note 4, The small the remain aning pier s pier section of 6' were r he remainin ier section of 4' was no 5' diameters g pier section maining pie his mound	of concrete d many large ller pieces we section and 3 n and 5' to th noted. and 5' to th oted. At 3' up s were noted. on, two piece er section, a was between	at the mudline at Pier e and small pieces of co ere 1' to 2' diameter an otton a 4' diameter st 30' to the right, a 3' di he left, two granite blo n a 3' diameter piece of the right, a granite bloc ostream from the remain ess of timber sheeting to 10' diameter mound of the remaining pier se	#1. The smaller pieces increte at the mudiline at ad the larger pieces were tone was noted. At 20' ameter stone was noted. ocks with a height of 2', of concrete was noted. In k with a height of 2', a ning pier section a group with a height of 5' were of concrete debris with a ection and the new steel	
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Attachment 7-1: Level I Divers Activity Report, Page 1 of 2





Attachment 7-1: Level I Divers Activity Report, Page 2 of 2



2-DIST B.I.N. 05 45K RC	UN	IDE] INE]	RWATE JNDERW	R OPERA ATER INS	ATI SPE		IS T	EAM REPORT	BR. W	DEPT.	NO. 16	
		8	WOGO1	0. 6-45K-DOT-N	BI	ľ	BYBLU	II .	DEC	11.2	012	
7-FACILITY CARRIED			ACCESS TO BRI	DGE	UNI	DERWA	TER OP	ERATIONS ENGINEER	°	ò	-	
US 6 MARION RD			EMBANK	AENT	R	AND	IE.E	BONICA Ra	- A C	. Bo	an and	
6-FEATURES INTERSECTED			DEPTH	VISIBILITY	TEAM	LEAD	ER (DIV)	EMASTER)	eport submitted of	by:	:	
WATER WEWEANTIC F	RIVEF	CIMP	9 m	- 0.5 m	RAN		E, BC	IGA	N. 00	~	ea.	
GRAVEL. BOULDERS		TIDA	L/SWIFT	W. J. COLL	ERA	N, E	3. FIT	ZGERALD, E	P. TERN	IOSK	Y	
ITEM 60			ITEM 61	CHANN	EL d	F -	4	ITEM 62	and a definition of the		N	
SUBSTRUCTURE		DEF	CHANNI	EL PROTECTIO	DN .		DEF	CULVERTS			DEF	
1. Abutments	N		1. Channel	Scour	4		S-P	1. Roof		N		I
a. Pedestals	N	-	2. Embankı	nent Erosion	7	_	-	2. Floor		N		i la
b. Bridge Seats	N	-	3. Dobris		7		-	3. Walls		N N		••
c. Backwalls	N		4. Vegetatio	on .	y y	1	-	4. Headwall		N		
a. Breastwalls	N	-	6. Utilities	Clana Drotflar	7		-	5. wingwall		'N	-	
f. Slope Baying/Din Ban	N	-	7 Aggrada	Siope Protection	7		2	7 Protective Cd		N		
a. Pointina	N	-	8. Fender S	vstem	N		- :	8. Embankment		N	-	
h. Footinas	N	-	a, plias		.N		- 1	9. Wearing Surfa	ice	N	• .	
I. Piles	N	-	b. Diago	al Bracing	N		-	10. Railing		N	-	
J. Scour	N	-	c. Horizo	ntal Bracing	N		·•*	11. Sidewalks		N	•	
k. Settlement	N	· •	d. Wales		N		-	12. Utilities		N	-	
	N	-	e. Faster	18/5	N		-	13, Member Allg	ņment	N	-	l.
2. Piers or Bents	.4		f. Ladde	18	N			14. Deformation	•	N.	-	
a. Pedestals	N	-	9.		N			15. Scour		N		
h. Caps	N	<u> </u>	TTEM 59	SUPERSTR	UCTU	RE	DEF	16. Settlement	· ·	N		•
c. Columns	5	M-P			N		•	17.		N	-	
e. Pointing	5	M-P	-		N		-	10,		1	N	8
f. Footing	5	M-P			N			UNDERMINING (YIN		1		
g. Piles	H	-		1016	STCI	UN	JYK	BPORTING	GOIDE	12		
h. Scottr	4	S-P	DEFICIEN	RIES OF DEFICIE	VC/FS	hatreq	uires conv	ective action.				
i. Settlement	7	-	M= Minor	Deficiency Deficien	des.which	are min Exernel	or in naturo,	generally do not impact the str ut are not limited to: Spalled co	uctural integrity of the norete, Minor scouri	e bridge and ng, etc.	d could	
۶	N	-	S= Severe	Major Deficiency-	Deficient	cles which	h are more	extensive in nature and nated n	the brue grinning and	ort to repair	, Examples	
<i>k.</i>	N	-			include b rebars, E	out are n Detedora	ed timber p	Moderale lo major deterioratio iles, Considerable settlement, (	n in concrete, Expos Considerable scourin	d ou nugeur og ang cou	nining, etc.	
3. File sents	N		C-S= Criti	cal Structural Defi	ciency-	A de duo	idency in a o the failure	structural element of a bridge t or imminant failure of the elem	hat poses an extrem ant which will affect (	o unsafa co lho structuri	ndition at integrity	
a. Pile Caps	N	<u> </u>	C-H=Crit	ical Hazard Deficie	ncy-	of the	ncy in a con	nponent or element of a bridge	that poses an extran	ne hazard o	ç unsafe	2
D. Piles	N				•	condition Include I and may	to the public terms of	no, cut does not impair the slaw imited to: Any part of piles or fe safely hazard for the navigation	ader system which a nder system which a ist traffic, etc.	re projecting	outward	
c. Diagonal Bracing	N	<u> </u>	URGENC	Y OF REPAIR!	1.5							
a. Horizontal Bracing	N		I=Immediat	e- [Inspector(s) Immediat further Instruction from	ely conlact him/her.1	District	3ridge Inspe	edion Engineer (DBiE) lo repor	t the Deficiency and I	lo receive		
e. Fasteners			A=ASAP-	(Action/Repair should bridge) upon raceipt of	be initiated	by Distri sion Rep	ct Maintena off.]	nce Engineer or the responsibl	e party (if not a State	owned		
UNDERMINING (Y/N)	2	Y	P=Prioritiz	- [Shall be prioritized by	District Ma	intesand	e Engineer	or the Responsible Party (If no	a Slate owned bridg	re) and repa	airs	ε.

Attachment 7-2: Level II Underwater Inspection Report, Page 1 of 7



	100 10		* 2 * 3	PAGE 2 OF 6	
	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	DEC 11, 2012	
	451	10-00-010			
1		KIDIVIA	IKAO	(a) 	
This structure is a three spa the downstream end of the e between them. The new an pier have a common concre the tidal zone. Both abutme 1) Orientation - Abutments a 2) Sta 1+00 is at the upstrea Note: Tides are approximate lock tide	n bridge da existing pie d the old so te pier cap nts are in t and piers an am face of ely 1/2 hou	ted 1956. When rs. The footings f ections of each pie See attached sk he dry at low tide e labeled left and the new section of r after tides at Ma	the bridge was widened new p or the two sections of pier do or are both founded on piles. tetch on Page 5. Both piers ha and were not inspected for this right when facing downstream f the pier. See sketch on Page rion, Sippican Harbor. Bridge	piers were added at not have any space The two sections of ave granite facing in s report. 1. 5.	
slack lide.					
TEM 60 - SUBSTRUCTUR	<u>E</u>			15	
tem 60.2 - Piers or Bents					
Item 60.2.d - Stems/Webs/ Left Pier: There are random areas of I The largest area measures: There are random cracked I	Pierwalls minor conc 1.0' L x 0.1 plocks in th	rete deterioration 7' H x 1.7' P. The e upper tidal zone	on the right side of the pier, ju deterioration is into an area o e.	st above the footing. f concrete laitance.	
The old pier has minor conc the tremie. The pier from th <b>Right Side</b> - Deterioration i additional 5' from the angle p There are minor remnants c <b>Left Side</b> - There is deterior maximum penetration is 0.3'	rete deterio e nose to t s from the point. Maxi of timber for ation from	pration with laitand he angle points is upstream nose, to mum height is 1.0 mwork against th the upstream nos	the at the bottom of the concret approximately 4 <sup>4</sup> . If the angle point, and continue and maximum penetration is e right face of the old section to the angle point. Maximum	e pierwall, just above es downstream an 0.4'. of the pier. n height is 1.0' and	
Item 60.2.e - Pointing	а 1				
Left Pier: There is minor pointing loss right side is 3'+ and maximu	in the tidal m penetrat	zone but the joint ion in the left side	s are generally tight. Maximur is 2.0'.	n penetration in the	
<b>Right Pier:</b> There is minor pointing loss the right side is 1.7', left sid	in the tidal e is 1.3', ar	zone but the joint nd 3.0'+ at the ups	s are generally tight. Maximur stream and downstream noses	n joint penetration in	15
Item 60.2.f - Footing			S		
Left Pier: The left face of the old secti maximum height of exposur There is steel sheeting whic exposed height along the do	on has stee e of 4.0'. h is cut off ownstream	el sheeting intermi at the top of the fo nose is 16.9'.	ittently exposed 2.0' to 2.6' off poting at the new section of pic	the pier with a er. The maximum	×
Undermining: At the downstream end of the at the mudline. For measur The void extends approximately 11' u the void is 1.2' and the maxiundermining goes complete Void Monitoring Chart on Part	ne right fac ing purpos ately 3.0' d upstream o imum pene ly under the age 6.	e of the old sectio es Sta 1+00 is at ownstream of Sta f Sta 1+00 where tration is 12.7'. The e footing and bene	n and continuing into the new the upstream face of the new 1+00 where it meets steel she it is covered by boulders. The he width of the footing is appro- eath the mudline on the left sid	section there is a void section of the pier. Seting. The void a maximum height of oximately 9', so the e of the pier. See	

Attachment 7-2: Level II Underwater Inspection Report, Page 2 of 7



TTY/IOWN	B.I.N	BR. DEPT. NO.	8STRUCTURE NO.	INSPECTION DATE	1.
WAREHAM	45K	W-06-016	W06016-45K-DOT-NBI	DEC 11, 2012	
		REMA	ARKS		
Item 60.2.f - Footing (0	Cont'd)		· · ·		
This undermining may ha bottom materials.	ave been caus	ed by a washout	of concrete laitance in additio	n to a scouring out of	
<b>Right Pier:</b> The sheeting at the new :	section of the	pier is cut off at th	e top of the footing. The exp	osed height along the	- 52
downstream nose is 14.2		he mudline starti	ag 10.0' unstream of the dowr	astream pose of the old	
pier (10' L x 1.0' H x 1.3'	P)		ig 10.0 upstream of the down	he downotroom noso	
Left Side - There is dete of the old pier (4.0' L x.0.	rioration at the 6' H x.0.6' P).	e mudline from the	a downstream angle point to u	ne downstream nose	
Item 60.2.h - Scour					- 7
The left face of the old se	ection has stee	el sheeting interm	ittently exposed 2.0' to 2.6' off	the pier with a	
There is steel sheeting w exposed height along the	hich is cut off downstream	at the top of the f nose is 16.9'.	ooting at the new section of p	ier. The maximum	
Undermining:	6 <sup>17</sup> 1970 - S. 2010 - S.				· •
At the downstream end o at the mudline. For mea	of the right fac suring purpos	e of the old sections at 2 of the old sections at 2 of the old section	n and continuing into the new the upstream face of the new	section of the pier.	
The void extends approx	timately 3.0' d	ownstream of Sta f Sta 1+00 where	1+00 where it meets steel sh it is covered by boulders. The	eeting. The void e maximum height of	
the void is 1.2' and the m	aximum pene	tration is 12.7'. T	he width of the footing is appr	oximately 9', so the	
Void Monitoring Chart on	Page 6.		of concrete leitenes in additio	to a coouring out of	
This undermining may ha bottom materials.	ave been caus	sed by a washout	or concrete lattance in additio	in to a scouring out of	
Right Pier:					
The sheeting at the new downstream nose is 14.2	section of the 2'.	pier is cut off at t	he top of the footing. The exp	oosed height at the	
ITEM 61 - CHANNEL A	ND CHANNE	L PROTECTION			
Item 61.1 - Channel Sc	our		4. 	82 - 20 20	
Left Pier: The left face of the old se	ection has ste	el.sheeting interm	ittently exposed 2.0' to 2.6' of	f the pier with a	
There is steel sheeting w exposed height along the	which is cut off e downstream	at the top of the t nose is 16.9'.	ooting at the new section of p	ier. The maximum	5
Undermining:	af the visht for	o of the old costin	n and continuing into the new	v section there is a void	
at the mudline. For mea	suring purpos	es Sta 1+00 is at	the upstream face of the new	section of the pier.	1.
The void extends approx extends approximately 1	dmately 3.0' d 1' upstream o	ownstream of Sta f Sta 1+00 where	it is covered by boulders. Th	e maximum height of	
the void is 1.2' and the m undermining goes compl Void Monitoring Chart or	etely under th	tration is 12.7'. T e footing and ben	he width of the footing is appr eath the mudline on the left sid	oximately 9', so the de of the pier. See	
void monitoring onalt of	ave been cau	sed by a washout	of concrete laitance in addition	on to a scouring out of	
This undermining may h	ave bean baa		21 B		

Attachment 7-2: Level II Underwater Inspection Report, Page 3 of 7



					P/	AGE 4 OF 6	
CITY/TOWN WAREHAM	B.I.N. 45K	BR. DEPT. NO. W-06-016	8STRUCTU W06016-4	JRENO. 5K-DOT-	NBI	DEC 11, 20	атв 12
	. [	REMA	RKS				
Item 61.1 - Channel Scour (C	Cont'd)	_					
		-					
Right Pier:				ether Th	A avroad	hoight at the	
The sheeting at the new section downstream nose is 14.2'.	n of the	pier is cut off at the	e top of the 10	oung. m	e exposed	neight at the	26
Item 61 6 - Rin-Ran/Slope Pro	otection	<b>1</b> . ~			· ·		
Right Abutment:			room ond				2
Riprap along the right abutmen	t is sium	iped at the downst	leam end.				
There are boulders across the mudline	upstrea	m nose extending	down along ti	he right fa	ce to the u	indermining at the	a
				1	36, 139 <b>K</b> o		3
Sketch 7 Chart Log Sketch 1: LEFT PIER (PLAN	VIEW	& RIGHT SIDE EL	EVATION) (N	NTS)			
Chart 1: UNDERMINING C	HART	- LEFT PIER (RIG	HT SIDE)		1		
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Attachment 7-2: Level II Underwater Inspection Report, Page 4 of 7



# **Bridge Inspection Handbook Underwater Operations Team**



Attachment 7-2: Level II Underwater Inspection Report, Page 5 of 7



# Bridge Inspection Handbook Underwater Operations Team

AREHAM	•		45K	5	-06-016		×	W06016-4	15K-DOT-	NBI		D	C 11, 2012
A.						CHART	S		a.				2 8 1
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,		*		a.					×	•			
	2.00					<u>^</u>							
141							•						
NDERMINING	CHART	(LEFT PIL	ER - RIGH	T SIDE)				<u>(</u> *)			a		
		1/12/99	20/12/11	10/22/03	11/2/04	12/8/05	11/9/06	11/29/07	12/16/08	12/11/09	1/JOUL	12/6/11	JENTINE.
HEIBH													
A' - 3.0' DS OF S	STA 1+00	20	101	14	50		1.0	12.0	20	10.0°	80	-8-0 -	1.2
	DUT N TI	14.10		12	2 P	0.84	n R <sup>b</sup>		18.7 <sup>4</sup>	10.04	19.6	19.61	1.9"
0' - 6.6' US OF S	11 T-DO	0:74	10.7 <sup>1</sup>	12-0	12 July 1	0°.7"	0.74	7.01	101	0.4 <sup>0</sup>	0.51	T.S.	0.4
	-Pillet												
	AND P YOUR	600	99.0	- 1114-	10 0	1 10 0	ЧЧ р	10 D.	10 D	1 50	19.6	12 5	
R' - STA 1-DD		*U'£	202	4.14	19 L.	2.00	11.0.11	19.6	13.11	11.11	19.04	.13.61	12.71
C' - 4.0' US OF S	TA 1+00.	59	2.07	7.8.2	12.3"	6.5	<u>و</u> کړ	7.01	7.8'	5.5	6.7"	7.07	K.
0' - 6.6' US OF S	51A.1+00	តែ	44	5.9%		1.6 <sup>1</sup>	5.0'	8:21	523	4.94	5.0 <sup>4</sup>	5.3	7.0"
PENETRATION T. EE PLAN VIEW FI	WKEW THRO DR LOCATIO	INS OF A, B	MATERIAL.	3				•			i.		
				•.5		4375		•		• .			÷
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		Chart'	11N	DERMINI	VG CHAR'	- 1 FFT I	DIFR (RIG	HT SIDE)					
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. 32-20		8	i.e				¥ 2				2		

Attachment 7-2: Level II Underwater Inspection Report, Page 6 of 7



	<u>Ele</u>	ment UNDE	t Dat RWAT	<u>ta Coll</u> er oper	ection ATIONS I	Form		Month 12	Day 11	Year 2012	
	Bridge Numbe	rw-oe	-016				Town	WAREHA	M		
	. · <u>BI</u>	45K		1			District	5	]		
	Bridge Key Numbe	r W060	1645	KDOTNBI			э.				
	Inspector	BONIC Leader	A		COLLERAN Member	I, FITZGER	ALD, TER	NOSKY		] .	
Elem.	Element		Env-	Total	Condi	tion State	s (Quanti	ty or Perc	ent) *	Q or	
#	Name	Units	iron.	Quantity	· 1	2	. 3	· 4	5	P *	
220	SUBMERGED FOOTING	FA	3	127	1	127					
361	SCOUR	EA	3	· · 1		. 1				Q	
							15				
	· · · · · · · · · · · ·										
·						а. 1		· ·			8
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-	<u> </u>		2							<u> </u>	
i.				~ .		•	. <u></u>				
3								1.0			
lt is oka	ay to switch between Quanti	ty and Po	ercent f	or different	Elements.						

Attachment 7-2: Level II Underwater Inspection Report, Page 7 of 7



TYTTOPN     BSTRUCTURE NO.     LEVEL OF INSPECTION     OBLAGE 31, 2012       DOVER=NEEDHAM     ACCESS TO BEIDOB     INCLEMATER OFERATIONS ENCINNER:     AUG 31, 2012       ACCESS TO BEIDOB     EMBANKILENT     EMBANKILENT     EMBANKILENT     CANDERVATER OFERATIONS ENCINNER:     AUG 31, 2012       NATER CHARLES RIVER     INTERNOSTICITUS     OLIDERVATER OFERATIONS ENCINNER:     AUG 31, 2012     AUG 31, 2012       NATER CHARLES RIVER     INTERNOSTICITUS     DUPTH     INTERNOSTICITUS     Aug 31, 2012       DOULDERS; GRAVEL     SLIGHT     TRAM MANDERS     Aug 31, 2012     INTERNOSKY, B. FITZGERALD       SUBULT TRAM MANDERS     S. BUGHT     G. BROCZ, R. E. BONICA, E. P. TERNOSKY, B. FITZGERALD     Northold States and States an	-DIST B.I.N. 06 B26 R	SACI UN OUT	IDE IDE INE I	TTS DEPA RWATE JNDERW	R OPERA	OF T ATIO SPEC	DNS T	EAM TEPORT D-10	1 OF BR. DEPT. 0-004=N	NO. -04-007
DOVERSING     DIVUGUA-B22-INUN-DES     IV     ACCESS TO       AVECHTY CARLED     ACCESS TO BERORS     UNDERWARD OFFANTOR OFFANTORS DIVUNDER     ACCESS TO BERORS       AVECHTY CARLED     ACCESS TO BERORS     UNDERWARD OFFANTORS DIVUNDER     ACCESS TO BERORS       AVATER CHARAELES RIVER     A m     0.3 m     MORAMMERS       AVATER CHARAELES RIVER     A m     0.3 m     MORAMMERS       BOULDERS; GRAVEL     SLIGHT     TRAM MEMBERS     B       SUBSTRUCTURE     B     CHARANZE & B     CULVERTS     N       SUBSTRUCTURE     B     CHARANZE & B     CULVERTS     N       SUBSTRUCTURE     B     CLARAMER & B     - <t< td=""><td>TY/TOWN</td><td></td><td></td><td>8-STRUCTURE N</td><td></td><td></td><td>LEVEL O</td><td>FINSPECTION 93B-DATE</td><td>INSPECTED</td><td>042</td></t<>	TY/TOWN			8-STRUCTURE N			LEVEL O	FINSPECTION 93B-DATE	INSPECTED	042
And Li Johnson     And Li J				D10004	-BZ6-WUN-L	UND	RWATER OF	PERATIONS ENGINEER	JG 31, 4	
ATTALESTORES   PARTORES   PATTORES   PA				EMBANK		RA	NDI E. I	BONICA Razz	8.6	onica
NATER CHARLES RIVER     4 m     0.3 m     MOHAMMED ALI JALINOUS       DTOM CONSTITION     CURRENT     TEAM MAINBES       DOULDERS; GRAVEL     SLIGHT     S. BROCZ, R. E. BONICA, E. P. TERNOSKY, B. FITZGERALD       DOULDERS; GRAVEL     B     TEAM MAINBES       TAM MAINBES     B     TEAM MAINBES       NURSTRUCTURE     B     TEAM MAINBES       A. Bridge Staft, N     -     -       A. Bridge Staft, N     -     -       B. Bridge Staft, N     -     -       C. Backwalls     N     -       B. Bridge Staft, N     -     -       C. Backwalls     N     -       B. Bridge Staft, N     -     -       B. Bridge Staft, N     -     -       B. Bridge Staft, N     -     -       B. Silpe Faring/Tip-Rap     -     -       G. Silpe Faring/Tip-Rap     -     -       B. Feeder System     N     -       B. Feeder System     N     -       B. Academic N     -     -       B. Feeder System     -     -       B. Academic N     -     -       B. Feeder System     -     -       B. Academic N     -     -       B. Academic N     -     -       B. Ac	FEATURES INTERSECTED			DEPTH	VISIBILITY	TRAM 1	EADER (DIV	EMASTER) Report subm	ined by	
CURRENT       CURRENT       TRAM MAMBERS         SOULDERS; GRAVEL       SLIGHT       TRAM MAMBERS         SOULDERS; GRAVEL       SLIGHT       CLANCEL       SLIGHT       Restaurant         SOULDERS; GRAVEL       SLIGHT       CHANNEL de CHANNEL DE CHANNEL DE CHANNE	NATER CHARLES RIV	/ER		4 m	0.3 m	MOHA	MMED ALI	JALINOUS	XX	
BULDERS; GRAVEL     SLIGHT     District, net is bulked, it is the status of the	OTTOM CONDITION		CURRI	TNT	TEAM MEMBERS	FF		E P TERNOSKY P	EITZG	FRALD
MAN CO     B     Hawked CHANNEL Ac     B     Hawked CHANNEL Ac     B       ABUBSTRUCTURE     Deer     CHANNEL ACTECTION     B     Deer       1. Abutments     B     Deer     CHANNEL AC     B     Deer       1. Abutments     B     Deer     I. Channel Scour     B     Deer     I. Roof     N       2. Abutments     N     -     B. Debris     7     -     B     Headwall     N       4. Broastwalls     B     -     6. Bub-Radiolsope Protection     X     -     B <t< td=""><td>BOULDERS; GRAVEL</td><td></td><td>SLI</td><td>GHT</td><td>G. BROZ, N</td><td></td><td></td><td></td><td></td><td></td></t<>	BOULDERS; GRAVEL		SLI	GHT	G. BROZ, N					
1. Abutments       8       1. Channel Scour       8        1. Roof       N          a. Pardestins       N        2. Embankment Erosion       X        3. Walls       N          b. Birdge Seads       N        3. Debris       7        3. Walls       N          c. Backwalls       6        6. Wingwall       N         6. Wingwall       N          a. Broastwalls       6        6. Reparation        6. Wingwall       N          a. Broastwalls       6        6. Wingwall       N        6. Wingwall       N          a. Broastwalls       6        7. Agaradation       8        6. Wingwall       N          b. Footing       N        6. Adapta and Brachag       N        6. Wingwall       N          b. Footing       N        6. Adapta and Brachag       N        11. Bidewalls       N          b. Capas       N        6. Adapta and Brachag        11. Membera Allamment	IVENI GU SUBSTRUCTURE		8 DEF	CHANNE	CHANN CL PROTECTIO	EL & DN	8 DEF	CULVERTS		N DEF
a.       Padestals       N       -       2.       Embankment Erosion       X       -       3.       Volis       N       -         b.       Bridge Seats       N       -       3.       Debris       7       -       3.       Walls       N       -         c.       Backwalls       N       -       4.       Vegetation       7       -       4.       Headwall       N       -         d.       Breastwalls       8       -       5.       Utilities       N       -       4.       Headwall       N       -         d.       Stope Paying/Rip-Rap       X       -       6.       Fine N       N       -       7.       Anaradaton       8       -       7.       Protective Coating       N       -         d.       Stope Paying/Rip-Rap       X       -       8.       Finder System       N       -       8.       Embankment       N       -       9.       Wearing Surface       N       -         d.       Stout       8       Fender System       N       -       14.       Stowaring Surface       N       -         d.       Social       N       -       4.       Aut	1. Abutments	8		1. Channel	Scour	8	-	1. Roof	N	-
b. Bridge Seats       N       -       3. Debris       7       -       3. Weils       N       -         c. Backwalls       N       -       4. Vogetation       7       -       4. Hoadvail       N       -         d. Brasstvalls       8       -       5. Ultitles       N       -       6. Wingwall       N       -         d. Brasstvalls       8       -       5. Ultitles       N       -       6. Wingwall       N       -         d. Mingwalls       8       -       5. Ultitles       N       -       6. Protective Coating       N       -         n. Pointing       N       -       8. Fender System       N       -       8. Embankment       N       -         h. Footings       N       -       a Splae       N       -       10. Realing       N       -         f. Pilas       N       -       a Splae       N       -       10. Realing       N       -         l. Scour       8       -       a Splae       N       -       10. Realing       N       -         l. Scour       8       -       a Splae       N       -       11. Sidewalks       N       -	a. Pedestals	N	-	2. Embankr	nent Eroslon	x		2. Floor	N	•
c. Backwalls       N       -       4. Vegetation       7       -       4. Headwall       N       -         d. Breastwalls       8       -       5. Ultilities       N       -       6. Wingwall       N       -         e. Mingwalls       8       -       6. Ultilities       N       -       6. Pipe       N       -         e. Mingwalls       8       -       6. Rig-PapiSlopP Protection X       -       6. Pipe       N       -         f. Slope Paving/Rip-Rap       X       -       7. Agaradation       8       -       7. Agaradation       1. Agaradation       -       1. Agaradation       -       1. Agaradation       -       1. Bidewalls       N       -       1. Agaradation       -       -       1. Agaradation       -       -	b. Bridge Seats	N		3. Debris		7	-	3, Walls	N	-
d. Breastwalls       8       -       5. Utilities       N       -       6. Wingwall       N       -         e. Wingwalls       8       -       6. Rin-RapiSlope Protection       X       -       6. Pipe       N       -         I. Slope Paving/Rip-Rap       X       -       7. Agaradation       8       -       7. Protective Coating       N       -         R. Pointing       X       -       8. Fendor System       N       -       8. Embankment       N       -         A. Police       N       -       8. Embankment       N       - <td< td=""><td>c. Backwalls</td><td>N</td><td>-</td><td>4. Vegetatio</td><td>in</td><td>7</td><td>-</td><td>4. Headwall</td><td>N</td><td></td></td<>	c. Backwalls	N	-	4. Vegetatio	in	7	-	4. Headwall	N	
a. Wingwalls       8       -       b. Rip-Rap/Slope Protection       X       -       r. Plipe       N       -         1. Stope Paving/Rip-Rap       X       -       7. Aggradation       8       -       7. Protective Coating       N       -         a. Polinting       X       -       8. Fender System       N       -       8. Embankment       N       -         h. Footings       N       -       a. Pilke       N       -       9. Wearing Surface       N       -         1. Plipes       N       -       a. Pilke       N       -       9. Wearing Surface       N       -         1. Scour       8       -       d. Machae       N       -       10. Railing       N       -         1. Scour       8       -       d. Machae       N       -       11. Sidewalks       N       -         1. A caders       N       -       a. Fastemer       N       -       13. Member Alignment       N       -         1. Capps       N       -       g. Fastemer       N       -       14. Deformation       N       -         1. Capps       N       -       g. Submers       N       -       -       16. Soc	d. Breastwalls	8		5. Utilities		N		6, Wingwall	N	
I. Slope Paving/Rip-Rep       X       -       7. Aggradation       8       -       7. Protective Coading       N       -         a. Pointing       X       -       8. Fender System       N       -       8. Embankment       N       -         b. Footings       N       -       8. Fender System       N       -       8. Embankment       N       -         b. Polings       N       -       8. Fender System       N       -       9. Wearing Surface       N       -         b. Polings       N       -       8. Anthendal Bracing       N       -       9. Wearing Surface       N       -         l. Scour       8       -       4. Anthendal Bracing       N       -       10. Realling       N       -         l. Anthenal Bracing       N       -       4. Anthenal Bracing       N       -       4. Reallow       N       -         l. Caps       N       -       4. Anthenal Bracing       N       -       4. Captor       N       -         l. Caps       N       -       4. Anthenal Bracing       N       -       4. Captor       N       -         d. Caps       N       -       -       -       - <t< td=""><td>e. Wingwalls</td><td>8</td><td>•</td><td>6. Rip-Rap/</td><td>Slope Protection</td><td>X</td><td>-</td><td>6. Pipe</td><td>N</td><td></td></t<>	e. Wingwalls	8	•	6. Rip-Rap/	Slope Protection	X	-	6. Pipe	N	
a. Pointing       N       -       B. Fender System       N       -       B. Embankment       N       -         h. Foolings       N       -       B. Fender System       N       -       B. Wearing Surface       N       -         h. Foolings       N       -       B. Mearing Surface       N       -       -       B. Wearing Surface       N       -         h. Diagonal Bracing       N       -       A. Diagonal Bracing       N       -       <	f. Slope Paving/Rip-Rap	X	-	7. Aggrada	lion	8		7. Protective Coating		<u> </u>
A. Foolings       N       -       a. plus       N       -       g. Wearing surface       N         i. Piles       N       -       a. Diagonal Brachug       N       -       g. Wearing surface       N       -         i. Scour       8       -       a. Horkental Brachug       N       -       -       g. Wearing surface       N       -         i. Scour       8       -       d. Makes       N       -	g. Pointing	A N	-	8. Fender S	ystem	N		8. Embankment	N.	
1. Piles       N       -       A. Diagonal Bracher       N       -       10. Raining       N       -         1. Scour       8       -       A. Horkenfeld Bracher       N       -       14. Sidewalks       N       -         k. Settlement       8       -       A. Horkenfeld Bracher       N       -       14. Sidewalks       N       -         1.       N       -       A. Bagonal Bracher       N       -       13. Member Alignment       N       -         1.       N       -       -       13. Member Alignment       N       -       14. Deformation       N       -         a. Pedestals       N       -       -       14. Deformation       N       -       -       16. Soour       N       -       14. Deformation       N       -       -       16. Soour       N       -       16. Soour       N       -       17. T       N       -       17. T       N       -       17. T       N       -       17. T       N       -       18. Settlemont       N       - <td< td=""><td>h. Footings</td><td>N</td><td></td><td>a. Pilos</td><td></td><td>N</td><td>-</td><td>9. Wearing Surface</td><td>N</td><td></td></td<>	h. Footings	N		a. Pilos		N	-	9. Wearing Surface	N	
J. Scour       C       A. Hortzontal Bracing       N       -       It. Biddwalks       N         k. Settlement       B       -       d. Mates       N       -       It. Utilities       N       -         J. Ladders       N       -       It. Ladders       N       -       It. Member Alignment       N       -         J. Pedestal/s       N       -       It. Ladders       N       -       It. Ladders       N       -         a. Pedestal/s       N       -       It. Ladders       N       - <th< td=""><td>i. Piles</td><td>.11</td><td>-</td><td>D. Dlagor</td><td>hal Bracing</td><td>N</td><td></td><td>10. Railing</td><td>N</td><td></td></th<>	i. Piles	.11	-	D. Dlagor	hal Bracing	N		10. Railing	N	
R. Settlement       C         I.       N         I.       A gasteners         N       I.         I.       Adders         N       I.         I.       Adders         N       I.         I.       Adders         N       I.         I.       Inders         N       Inders         I.       Inders         N       Inders         I.       Inders         N       Inders         I.       Inders         I.       Inders         I.       Inders         I.       Inders         I.       Inde	J. Scour	8		c. Horizo	ntal Bracing	N	<u> </u>	11. Sidewalks	N	
L.       Image: Construction of the second second second of the second second second of the second second of the second second of the second second second second second of the second sec	k. Settlement	N		a. Wales		N	<u> </u>	12. Otinites	N	-
a. Pedestals       N       -         a. Pedestals       N       -         b. Capps       N       -         c. Columns       N       -         d. Stems/Webs/Plerwalls       N       -         d. Pointing       N       -       -         d. Stems/Webs/Plerwalls       N       -       -         d. Stems/Webs/Plerwalls       N       -       -         d. Ples       N       -       -       -         d. Ples       N       -       -       -         d. Ples       N       -       <	2. Piers or Bents	N		t. Lorido	1075 re	N	·	14 Deformation	'N	·
b. Caps       N       -         b. Caps       N       -         c. Columns       N       -         d. Stems/Webs/Pierwalls       N       -         d. Pointing       N       -         d. Pointing       N       -         d. Piles       N       -         d. Piles       N       -         f. Scour       N       -         J. Settlement       N       -         J. N       -       DEFICIENCY: A defect in a structure that requires corrective action.         CATEGORIES OF DEFICIENCY: Structural before or place defect in a structure due to spatial conzets, Mitter conzets, mitter and one due to spatial conzets, Mitter conzets, and onud as the spatial conzets, Mitter conzets, and onud as the spatial conzets, Mitter conzets, and onud as the spatial conzets, Mitter conzets, and onud astructure due to spatial conzets, and onud as the spatia	a, Pedestals	N	-			N	-	16. Scour	N	-
C. Columns       N       -         d. Stems/Webs/Planwalts       N       -         d. Footing       N       -         g. Polies       N       -         g. Plles       N       -         g. Plles       N       -         J. Settlement       N       -         M       -       DEFICIENCY: A defact in a structure that requires corrective action.         J.       N       -         J. Settlement       N       -         J.       Settlement       N         J.       N       -	b. Caps	N	-	TUEM 59	SUPERSTR	UCTU	RE	16. Settlement	N	-
d. Stems/Webs/Plerwalls       N       -         a. Pointing       N       -       18.       N       -         a. Pointing       N       -       18.       N       -         b. Footing       N       -       DEFICIENCY:       Added to the formation of the formation	c. Columns	N			4		DEF	17.	N	-
e. Pointing       N       N       Undermining (N)       N         f. Footing       N	d. Stems/Webs/Plerwalls	N		]		N		18.	N	·
Image: Problem       N       Image: Problem       Image: Problem <td>e. Pointing</td> <td>· N</td> <td>-</td> <td></td> <td></td> <td>N</td> <td>-</td> <td>UNDERMINING (Y/N)</td> <td></td> <td>N</td>	e. Pointing	· N	-			N	-	UNDERMINING (Y/N)		N
a. Piles       N          b. Scour       N          c. Settlement       N          j.       Settlement       N         j.       N          j.       N          j.       N          j.       N          j.       N          j.       N          j.       N          j.       N          j.       N          j.       N          j.       N          j.       Settlement       N         j.       N          j.       N          j.       N          j.       N          j.       Settlements       N         a.       Pile Caps       N          j.       C-H= Critical Hazard Deficiency-       Activation table of the advise of the ad	f. Footing	N	-				NCYR	EPORTING GUID	C	
h. Scour       N       -         h. Scour       N       -         J. Settlement       N       -         J.       N       -         Setteres/Major Deficiency-       Deficiency-       Deficiency finds to induce a stands in nature admed need meet planning and effici to repair: Complete integer definition in concerning and efficiency in the provide definition in concerning which will definite in the provide definition in concerning which will definite in the provide definition in concerning which will definite in the provide definition in concerning which will definite in the provide definition in concerning which will definite in the provide definition in concerning which will definite in the provide definition in concerning which will definite in the provide definitin which will definite in the provide definiti	g. Plles	N	•	DEFICIEN	CY: A defect in a s	tructure th	at requires corr	ective action.	<u>*</u>	
Image: Settlement       N       N         Image: Settlement       N       Image: Settlement       M= Minor Deficiency - Detected within a miner on many, game my do not pread the settlement of the bridge and settlement         Image: Settlement       N       Image: Settlement       Settlement       Settlement         Image: Settlement       N       Image: Settlement       Settlement       Settlement       Settlement         Image: Settlement       N       Image: Settlement       S	h. Scour	N	-	CATEGO	RIES OF DEFICIE	NCIES:				
J.     N     -       J.     N     -       J.     N     -       J.     S= Severe/Major Deficiency- inclus to have and limited is: idealers in maker and need none planning and effort to repair. Examples inclus to have none identified is: idealers in maker definition is: controls. Exolution and inclusion.       J.     Pile Bents     N       a.     Pile Capos     N       b.     Piles     N       c.     C-H= Critical Hazard Deficiency- to bias definition is in the element of a bridge that poses an extern nurse containing, edit       b.     Piles     N       c.     Diagonal Bracing     N       d.     URGENCY OF REPIRE:       d.     URGENCY OF REPIRE:       Imagination     URgence (bias bridge) is a projecting estimated in the induction of the induced in the end of a bridge is an extern based of models       d.     URGENCY OF REPIRE:       e.     Frastenors     N	I. Settlement	N	. :	M=Minor	Deficiency Deficient easily b	cles which a e repaired. B	ra miner in nature, xamples include b	, generally do not impact the structural integrit sut are not limited to: Spalled concrete, Minor	y of the bridge an scouring, etc.	d osuld
n.         IV         IV           3. Pile Bents         N           a. Pile Caps         N           b. Piles         N           c. Diagonal Bracing         N           d. Horizontal Bracing         N           d. Horizontal Bracing         N           e. Fasteners         N	<i>J.</i>	N		S= Severe/	Major Deficiency-	Deticiend	is which are more are not limited to	extensive in nature and need more planning a Moderate to major deterioration in concrete.	and effort to repail Exposed and con	r. Examples
A. Pile Caps     N     -       b. Piles     N     -       c. Diagonal Bracing     N     -       d. Horizontal Bracing     N     -       d. Horizontal Bracing     N     -       d. Horizontal Bracing     N     -       d. Fasteners     N     -	7. 3 Pile Rents	N	-			rebars, D	larlorated timber p	ales, Considerable settlement, Considerable s	couring or under	nining, etc.
b. Piles     N     -       c. Diagonal Bracing     N     -       d. Horizontal Bracing     N     -       e. Fastenors     N     -	a Pilo Cone	N	-	C-S= Criti	cal Structural Defi	ciency-	A deficiency in a due to the failure of the bridge.	sinuctural element of a bridge that poses an e o or knowing tailure of the element which will	ndreme unsale co affect the structur	andition at integrity
Image         Image <th< td=""><td>h Dilge</td><td>N</td><td>-</td><td>C-H= Crit</td><td>ical Hazard Deficie</td><td>ncy-</td><td>deficiency in a con indition to the only</td><td>mponeni or element of a bridge that poses an lic, but does not impair the structural intentive</td><td>extreme hezerd of the bridge. Exa</td><td>or uncafe imples</td></th<>	h Dilge	N	-	C-H= Crit	ical Hazard Deficie	ncy-	deficiency in a con indition to the only	mponeni or element of a bridge that poses an lic, but does not impair the structural intentive	extreme hezerd of the bridge. Exa	or uncafe imples
d. Horizontal Bracing     N     URGENCY OF REPAIR:     URGENCY OF REPAIR:     I=Immediate     Inspectors     N     I=Immediate     Inspectors     Inspe	C Disconal Proving	N	-	-	1	b s	clude but are not i ad may become a	imited to: Any part of piles or fender system w safety hazard for the navigational traffic, etc.	hich are projection	g outward
a. Fasteners     N     Elimmediate-     Inspectors) Intractiately costact District Bridge Inspection Engineer (DBE) to report the Detectory and to receive     turther structures from himmed;     Intercent and the District Bridge Inspection Engineer (DBE) to report the Detectory and to receive     turther structures from himmed;	d Hevizental Disaling	N		URGENC	Y OF REPAIR:					
G. Fasteriers In the second state and the billion of the second state of the second st	u. Horizontal Bracing	N	+	I=Immediat	e- (Inspector(s) Immedial further Instruction from	ely contact i him/her.]	istrict Bridge Insp	ection Engineer (DBIE) to report the Deficience	y and to receive	
A=ASAF- N N Drage upon receipt of the longeride Report. N Drage Upon	e. Fasteners		, N	A=ASAP-	(Action/Repair should bridge) upon receipt o	be initiated i the inspect	y District Mainten: on Report.) Janance England	ance Engineer or the responsible party (f not a	a State owned d bridge) and rep	aits

Attachment 7-3: Level IV Underwater Inspection Report, Page 1 of 6



				PA	GE 2 OF 5	
CITY/IOWN DOVER=NEEDHAM	B.I.N. BR. B26 D-10	DEPT. NO. -004=N-04-007	8-STRUCTURE NO. D10004-B26-MU	N-DES	AUG 31, 2012	2
and a sum of a sum of The sum of a		REMAR	KS			
<u>GENERAL REMARKS</u> 1) Orientation - The abutments 2) Sta 10+00 is at the upstrear 3) Single span precast concret H-Piles (West side). Originally	are labeled lef n end, at edge te arch support constructed in	t and right whe of coping. ed on gravity a 1847, replace	en facing downstrea abutment on top of d in 1930. It is curre	im. bedrock (Eas ently under co	t side) and Steel onstruction.	10 72 •
ITEM 60 - SUBSTRUCTURE	Υ.					
ltem 60.1 - Abutments			1988 - 24 1			
Item 60.1.d - Breastwalls	e e					
There are a number of nails ar to remove prior to the end of c	nd threaded roc onstruction). Th	ls sticking out here is a concr	of the vertical face ete curtain wall loc	of the breastw ated from Sta	vall (Contractor . 10+09 to	
10+32, with a toe width of 1' ar	id max. expose	d height of 2'.				1
<u>Right Abutment:</u> There are a number of nails ar to remove prior to the end of c	nd threaded roc onstruction).	ls sticking out	of the vertical face	of the breast	vall (Contractor	
Sketch Log Sketch 1 : PLAN VIEW (N.T Sketch 2 : SOUNDINGS - (I Sketch 3 : ELEVATION VIE	.S.) N.T.S.) W - LOOKING	UPSTREAM (	N.T.S.)	ъ		
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Attachment 7-3: Level IV Underwater Inspection Report, Page 2 of 6





Attachment 7-3: Level IV Underwater Inspection Report, Page 3 of 6



# **Bridge Inspection Handbook Underwater Operations Team**



Attachment 7-3: Level IV Underwater Inspection Report, Page 4 of 6





Attachment 7-3: Level IV Underwater Inspection Report, Page 5 of 6



		Eler	nent	Dat	ta Coll	ection	Form	-	Month	Day	Year
			UNDE	RWAT	ER OPER	ATIONS	MASSDO	Ц.,	8	31	12
	Bridg	e Number	D-10	-004		9 1 1		Town	Blackston	e	]
•	Dida	BIN	B26	14 02		c	a.	District	. 6		
	DIQG	e Key Number	DIUU	J4 D21	<u>.</u>	5	1				
		Inspectors	M. Jal	inous	,	R. Bonica Member	, G. Broz,	B. Fitzger	ald, E. Tei	rnosky	
Elem.	Element			Env-	Total	Cond	ition State	s (Quanti	ty or Perc	ent) *	Q or
#	Name		Units	Iron.	Quantity	1	2	3	4	5	P *
215	ABUTMENT		LF_	2	82	82					Q
144	AKCH		<u></u>	2	39	39	1				
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	а. С						6				
						-					
* It is ok	ay to switch betw	iveen Quantit	y and P	ercent	for differen	t Elements					

Attachment 7-3: Level IV Underwater Inspection Report, Page 6 of 6



CITY/TOWN 8-STRUCTURE NO. 935-U/W ROUTINE INSP DATE UW-SPECIAL MEMBER INSP J LAWRENCE L04017-2PV-MUN-NBI Sep 30, 2009 APR 25, 2011	
	DATE .
FACILITY CARRIED ACCESS TO BRIDGE UNDERWATER OPERATIONS ENGINEER	· · · ·
WATER SPICKET RIVER MODERATE WILLIAM J. COLLERAN	
OTTOM CONDITION DEPTH VISIBILITY Report submitted by:	
SEP 30, 2011 Y24 B. FITZGERALD, R. E. BONICA, G. BROZ, J. B. DESMOI	ND
MEMBER / CONDITION Requiring Special Member Inspection	•
ITEM MEMBER REMARKS REMARKS	ncies,
60.1. Abutments	
60.1. Abutments d.Breastwalls See remarks in comments section. 3 3 3 S-	A .
60.1. Abutments k.Settlement See remarks in comments section. 3 3 3 S-	A'
	·
	· .
<u>6.59 L60 L61 L62</u>	-
(Overall Previous Condition)	
(Overall Current Condition)	2 12
CONDITION RATING GUIDE	
CODE CONDITION DEFECTS	
N NOT APPLICABLE	
G 8 VEPV COOD No problem noied.	
G 7 GOOD Some minor problems.	
F 6 SATISFACTORY Structural elements show some minor deterioration.	
F 5 FAIR All primary structural elements are sound but may have micr. section loss, cracking spalling or scour,	
P 4 POOR Advance section loss, deterioration, spelling or scour.	
P 3 SERIOUS Loss of sector, deterioration, spaling or soour have seriously affected primary structural components. Local failures are possible. Faticus cracks in steal or shear cracks in concrete may be present.	
C 2 CRITICAL Advance deterioritation of primary structural elements. Faligue creacks in steal or shear creacks in soncrole may be présent or accur may have removed substructure support. Unless closely monitored it may be necessary to close bridge . Intil concretion action to take	
C 1 "IMMINENT" FAILURE Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service,	·

Attachment 7-4: Example of an Underwater Special Member Inspection, Page 1 of 4



		• • •	PAGE 0F	
AWRENCE	2PV L-04-017	L04017-2PV-MUN-NBI	APR 25, 2011	
· · · · ·	REMA	ARKS		
GENERAL REMARKS This bridge is a single span fields 1) Orientation - Abutments are lak 2) Sta 10+00 is at the upstream e 3) Site Conditions: The bridge is Demolition Project. Access for th and down a steep slope at the up	tone arch structure. beled left and right whe nd of the granite block a adjacent to a hazardo is inspection was throu stream left side of the b	n facing downstream. arch. ous material clean-up site at the gh the hospital parking lot, arou yridge.	Óxford Mills nd a chain link fence	
ITEM 60 - SUBSTRUCTURE				
<u>Item 60.1 - Abutments</u> Item 60.1.d - Breastwalls				
There are random areas of loose breastwall. Numerous fieldstones split and missing.	and missing chinking s s below the springline a	stones and small blocks resulting and granite blocks above the spr	g in voids in the ingline are cracked,	
Sta 10+09 to 10+14.5: There is a Sta 10+32 to 10+37: There is a si parallel to the face of the abutment	void at the mudline 5.5 one just above the mu nt. This block is displac	long, 3.0' hìgh and 3.0' maximu dline with a 0.4' wide vertical spli ced toward the channel 0.5'.	m penetration. t. The split runs	3
Right Abutment: There are random areas of missi Numerous fieldstones below the	ng chinking stones and springline and granite b	small blocks resulting in voids i blocks above the springline are o	n the breastwall. cracked.	a <sup>10</sup> 100
The most significant area is between and 3.6' penetration. Stones in the previously split and displaced blo	een Sta 10+10 and 10+ le area of this void are ck appears to have onl	23. The largest void measures loose and displaced (See Partial y part of that block remaining.	7.0' long, 4.7' high Elevation). A	a x
Sta 10+03: There is a void at the Sta 10+30: There is a void at the	mudline. Void length is mudline. Void length is	3.5', height is 1.5' and penetrati 1.5', height is 0.7' and penetrati	on is 2.8'. on is 2.1'.	
Item 60.1.k - Settlement Left Abutment: There are random areas of loose breastwall. Numerous fieldstone split and missing.	and missing chinking s s below the springline a	stones and small blocks resulting and granite blocks above the spi	g in volds in the ingline are cracked,	-
Sta 10+09 to 10+14.5: There is a Sta 10+32 to 10+37: There is a s parallel to the face of the abutme	void at the mudline 5.5 tone just above the mu nt.  This block is displa	' long, 3.0' high and 3.0' maximu dline with a 0.4' wide vertical spl ced toward the channel 0.5'.	m penetration. it.  The split runs	
<b>Right Abutment:</b> There are random areas of missi Numerous fieldstones below the	ng chinking stones and springline and granite l	l small blocks resulting in voids i blocks above the springline are o	n the breastwall. cracked.	2 ··
The most significant area is betw and 3.6' penetration. Stones in th previously split and displaced blo	een Sta 10+10 and 10- ne area of this void are nck appears to have on	-23. The largest void measures loose and displaced (See Partia ly part of that block remaining.	7.0' long, 4.7' high I Elevation).  A	
Sta 10+03: There is a void at the Sta 10+30: There is a void at the	mudline. Void length is mudline. Void length is	3.5', height is 1.5' and penetrati 1.5', height is 0.7' and penetrati	on is 2.8'. on is 2.1'.	:
			· · · · ·	

Attachment 7-4: Example of an Underwater Special Member Inspection, Page 2 of 4



LAWRENCE	B.I.N. 2PV	BR. DEPT. NO. L-04-017	8-STRUCTURE NO. L04017-2PV-MUN-NBI	APR 25, 2011	
<u>Sketch Log</u> Sketch 1 : PARTIAL	ELEVATION - F	RIGHT ABUTMENT	- NOT TO SCALE		•
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Attachment 7-4: Example of an Underwater Special Member Inspection, Page 3 of 4





Attachment 7-4: Example of an Underwater Special Member Inspection, Page 4 of 4



4 1 224	UNDERV	VATER OPP	ERATIONS TEAM	PAGE 1 OF BR. DEPT. NO.	7
	8-STRUCTUR	e no.	LEVEL OF INSP.	93b- INSPECTION DATE	
BRAINTREE	B2100	5-33A-MUN-NB	1	4/7/10	
ADAMS STREET	ACCESS TO I	BANKMENT	INDERWATER OPERATIONS EN	IGINEER	
6 FHATURES INTERSECTED	DEPTH	VISIBILITY	TEAM LEADER (DIVE MASTER)	Report submitted by:	
MONATIQUOT RIVER	URRENT	5' TEAM MEMBERS	A. BONDESON	Man ganger	
BOULDERS, GRAVEL	SWIFT	BROZ, DESMO	ND, KYRIAZIDIS, PREND	ERGAST	
	STORM (HEAV	DAMAGE INS Y RAINS - SPRIM	PECTION NG 2010)		8 12
X MAJOR FLOOD DA	MAGE			a far a	3
MINOR FLOOD DAI	MAGE				
			, ·		
There is undermining abutment cap (15'L x abutment cap in the u	at the ups 2.6'H x 4'P indermined	tream end of ). Some gran 1 area are mi	f the bridge under nite blocks under c issing.	the concrete oncrete	
The upstream right co length, maximum den	oncrete reta iensions 1'	aining wall h H x 1'P (max	as undermining al imum dimensions)	ong the full	
NOTE: Plans show dril	led shafts s	supporting th	he abutment.		
		64	Τ		
a b s v s		<		NCRETE ABUTMENT	
			CO CA	NCRETE ABUTMENT	
				NCRETE ABUTMENT	
GRANITE BLOCKS (T	YP)	UNDERMINED	CO CAT	NCRETE ABUTMENT	

Attachment 7-5: Example of a Divers Activity Report – Flood Inspection



			~				
	<u></u>					_	
1 14	Deval L. Patri	ick, Governor			2) ma	scDO	7
S.	Richard A. Da Frank DePaol	avey, Secretary & CEO la, Administrator			Massachusetts Highway D	Department of Transpor	tation
			I	ecember 11 2013	-	· ·	
				, 2011, 2011	1		
	Town of Top	sfield					
	Board of Sele	ectmen					
	Topsfield M	A 01983					
	ropsneid, m	11 01905					
	Attn: Joseph	Downing, Town	Engineer				
	SUBJECT:	NATIONAL BI UNDERWATE	RIDGE INSPE R BRIDGE IN	CTION STANDA SPECTION	RDS (NBIS)		
		ROWLY BRG	ST / IPSWICH	RIVER			
		Structure No. 1-0	06001-2RM-N	IUN-NBI			
	Dear Mr. Dov	wning:	5 a 1 - 2				
	Enclosed for that carries th	your information ne ROWLY BRG	is a copy of an ST over the IPS	Underwater Inspe SWICH RIVER.	ction Report of 9/	6/13 for the bridge	•
	A copy of the the District w	e report is on file a vith any questions	at our District 4 you may have	office located in a concerning the bri	Arlington. Please dge.	feel free to contac	t
	A copy of the the District w	e report is on file a vith any questions	at our District 4 you may have	office located in a concerning the bri	Arlington. Please dge.	feel free to contac	t
	A copy of the the District w	e report is on file a vith any questions	at our District 4 you may have S	office located in a concerning the bri	Arlington. Please dge.	feel free to contac	t
	A copy of the the District w	e report is on file a vith any questions	at our District 4 you may have S	office located in a concerning the bri	Arlington. Please dge.	feel free to contac	t
	A copy of the the District w	e report is on file a vith any questions	at our District 4 you may have S	office located in a concerning the bri	Arlington. Please dge.	feel free to contac	t
	A copy of the the District w	e report is on file a vith any questions	at our District 4 you may have S	office located in a concerning the bri	Arlington. Please dge.	feel free to contac	t
	A copy of the the District w	e report is on file a vith any questions	at our District 4 you may have S	office located in a concerning the bri Sincerely, Mexander K. Bard tate Bridge Engin	Arlington. Please dge. ow, P.E. eer	feel free to contac	t
	A copy of the the District w	e report is on file a vith any questions	at our District 4 you may have S	office located in A concerning the bri bincerely, Alexander K. Bard tate Bridge Engin	Arlington. Please dge. ow, P.E. eer	feel free to contac	t
	A copy of the the District w REB/reb	e report is on file a vith any questions	at our District 4 you may have S	office located in A concerning the bri incerely, Alexander K. Bard tate Bridge Engin	Arlington. Please dge. ow, P.E. eer	feel free to contac	t
	A copy of the the District w REB/reb cc: BBC DHD, I	e report is on file a vith any questions	at our District 4 you may have S	office located in A concerning the bri incerely, Alexander K. Bard tate Bridge Engin	Arlington. Please dge. ow, P.E. eer	feel free to contac	t
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	A copy of the the District w REB/reb cc: BBC DHD, I Enclosure	e report is on file a vith any questions	at our District 4 you may have S	office located in A concerning the bri incerely, Mexander K. Bard tate Bridge Engin	Arlington. Please dge. ow, P.E. eer	feel free to contac	t
	A copy of the the District w REB/reb cc: BBC DHD, I Enclosure	e report is on file a vith any questions	at our District 4 you may have S	office located in A concerning the bri lincerely, Alexander K. Bard state Bridge Engin	Arlington. Please dge. ow, P.E. eer	feel free to contac	t
eading the	A copy of the the District w REB/reb cc: BBC DHD, I Enclosure Nation in Transportation	e report is on file a vith any questions	at our District 4 you may have S	office located in A concerning the bri bincerely, Alexander K. Bard tate Bridge Engin	Arlington. Please dge. ow, P.E. eer Ten Park Plaza, S	feel free to contac	021116
eading the	A copy of the the District w REB/reb cc: BBC DHD, I Enclosure Nation in Transportation	e report is on file a vith any questions	at our District 4 you may have	office located in A concerning the bri Sincerely, Alexander K. Bard State Bridge Engin	Arlington. Please dge. ow, P.E. eer Ten Park Plaza, S Tel: 857-3	feel free to contac Suite 4160, Boston, MA 368-4636, TTY: 857-361 www.mass.gov/m	02116 3-0655 assdot

Attachment 7-6: Example of a Municipality letter of transmittal



Withard A. Davey, Secretary & CEO         Frank DePaola, Administrator         Letter of Transmittal         Date:       December         Attention:	setts Department of Transportation     ay Division
Letter of Transmittal         Date: December Attention:	<i>r 4, 2013</i> File No.
Date: <u>December</u> Attention:	<i>r 4, 2013</i> _File No.
Re:       Dive Report         BRIDGE SECTION	the following
BRIDGE SECTION	the following
To:       Albert R. Stegemann	the following
District Two Highway Director	the following
We are sending you:          Attached         I Under separate cover via	the following
Image: Specification      Image	ns 🗆
□ Copy of letter     □ Change Order     □       Copies     Date     No     Description	
Copies     Date     No     Description	
Copies     Date     No     Description	
These are transmitted as checked below:	
$\Box$ For approval $\Box$ Approval as submitted $\Box$ Resubmit.	copies for
approval	1 · · · · · · · · · · · · · · · · · · ·
$\boxtimes$ For your use $\square$ Resolve comments $\square$ Return $\_$	corrected copies
$\Box$ As requested $\Box$ Returned for corrections $\Box$ Return our market	d-up copies
$\Box$ For review & comment $\Box$ Other	
Remarks:	
<u>Various Underwater Inspection Reports: A15020, D06002, E10001, G09008, G1</u> <u>H01012, N19021, N22004, P01005, P01015, S24030, T02013, and W35007</u>	2002, <u>G12020,</u>
Copy to: REB, BBC Signed:	
Alexand	er K. Bardow, P.E. Bridge Engineer
State	Shage Engineer

Attachment 7-7: Example of state owned letter of transmittal