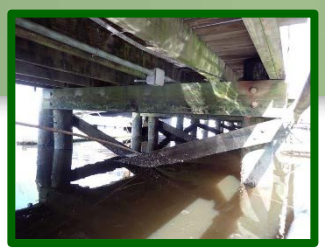


Structural Condition Assessment Report

Harborwalk Timber Boardwalk and Floating Docks

September 28, 2023

Prepared for:
City of Georgetown, SC

Prepared by:

COLLINS ENGINEERS INC.

5995 Core Road, Suite 522

N. Charleston, SC 29406

843.884.2027 • www.collinsengr.com

Contents

EXECUTIVE SUMMARY

Project: City of Georgetown –Structural Condition Assessment of the Harborwalk Timber Boardwalk and Floating Docks

Purpose of Project: To perform an above and underwater condition assessment of the Harborwalk Timber Boardwalk and Floating Docks in accordance with the ASCE Manual No. 130 *Waterfront Facilities Inspection and Assessment*.

Inspection Team: Team Leader – Jonathan Chapman, P.E. – Collins Engineers, Inc.
Team Member – Eric Beach, E.I.T. – Collins Engineers, Inc.
Team Member – Charlie Stephens – Collins Engineers, Inc.

Inspection Date: August 21-22, 2023

Summary of Significant Findings:

Deteriorated elements were observed at a number of locations along the Harborwalk and adjacent floating docks. The following is a summary of the significant deterioration observed:

- Less than 5 percent of the pile caps along the Harborwalk exhibited significant deterioration and should be replaced in-kind. The remaining pile caps exhibited rot and/or fungal decay with negligible section loss.
- Approximately 10 percent of the piles along the Harborwalk exhibited marine borer activity near/below the low-water line. Moderate Condition marine borer activity was typically localized to a quadrant of the pile and estimated maximum section loss of approximately 15 percent. The remaining piles exhibited rot and/or fungal decay with less than 5 percent section loss.
- Approximately 20 percent of the cross bracing along the Harborwalk exhibited marine borer activity near/below the low-water line with section loss up to 25-to-50 percent of the cross section. The remaining cross bracing exhibited moderate rot and/or fungal decay primarily within the tidal/splash zone.

1.0 INTRODUCTION

1.1 Purpose and Scope

Collins Engineers Inc. (Collins) was engaged by the City of Georgetown (the City) to perform a structural condition assessment of the above-water and underwater components of the approximately 1,480-foot-long Harborwalk and two floating docks located along the Sampit River in Georgetown, South Carolina. The Harborwalk is composed of a fixed timber walkway with numerous floating finger-piers which are used for berthing. Collins was also engaged to provide repair recommendations cost estimates for observed deficiencies. See Figure 1.1-1 for an overall view of the site.

Figure 1.1-1. Aerial View of the Harborwalk from Google Earth 2023 with Annotation from Collins

1.2 Site Description

The Harborwalk, which was reportedly constructed in the 1980's along the northeastern bank of the Sampit River in the 1980's, extends approximately 1,480 feet in the northwest-southeast direction parallel to the river, from Station 0+00 at the Screven Street entrance to Station 14+80 at the King Street entrance. According to the City, no original construction drawings exist, but a set of renovation plans generated by Collins Engineers, Inc. dated January 2010 were available for review (Appendix B). The dock is composed of a 12-foot-wide walkway (Appendix B, Fig No.2, Section B-B) between Stations 0+00 and 10+40 and an 8-foot-wide walkway (Appendix B, Fig No. 6, Section H-H) between Stations 10+40 and 14+80. Landings were constructed at various locations along the Harborwalk. The structural elements typically consist of treated southern yellow pine timber, with untreated Brazilian ipe timber for decking and handrails. Refer to Appendix B, Figure 1.1-1 for stationing and Figure 1.2-1 through 1.2-2 for inspection nomenclature.

The east floating dock is located at Station 0+00 and the west floating dock is located at Station 5+12. Both are constructed with untreated Brazilian ipe timber decking supported by treated yellow pine timber frames on top of plastic floats and secured to timber piles. The east floating dock was approximately 60 feet long and 8 feet wide. It was composed of two 44-foot-long fingers to the east and two 22-foot-long fingers to the west. The west floating dock was approximately 54 feet long and 8 feet wide. It was comprised of two 22-foot-long fingers to the east and two 44-foot-long fingers to the west. Refer to Appendix B, Figure 1.1-1 for stationing and Figure 1.2-3 for inspection nomenclature.

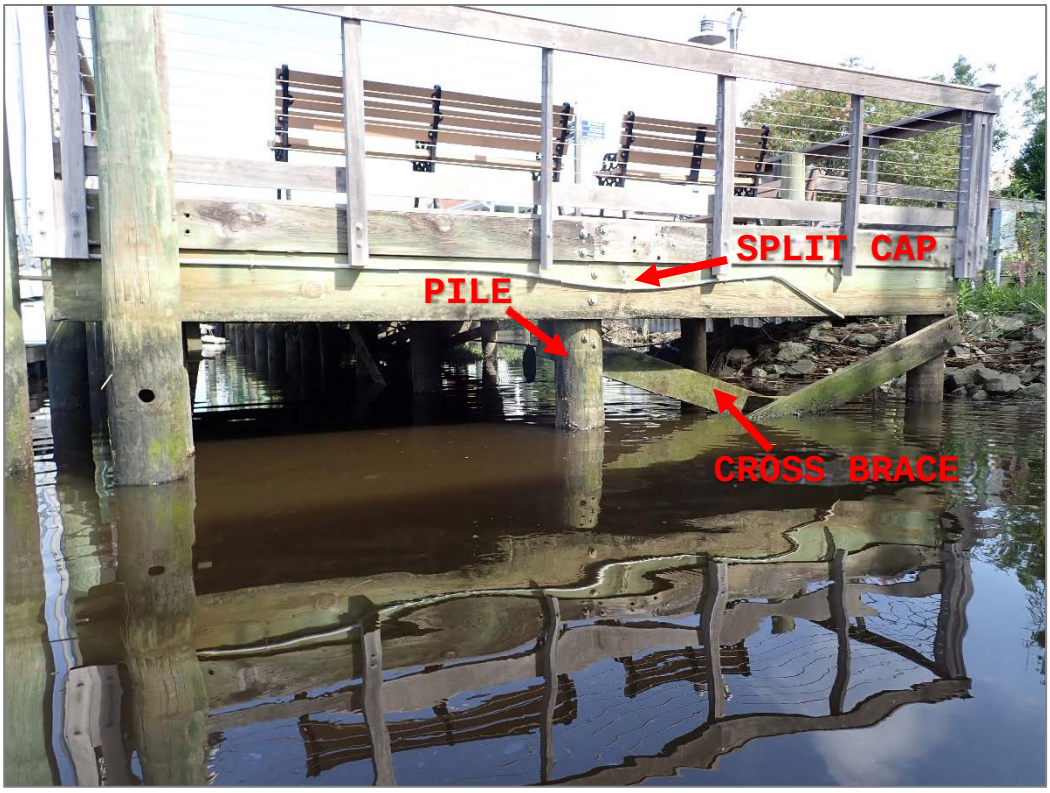


Figure 1.2-1: Typical Bent – Southeastern section, 12 foot wide (Sta. 0+00)

Figure 1.2-2: Typical Bent – Northwestern section, 8 foot wide (Sta. 13+50)

Figure 1.2-3: Typical Floating Dock – East Floating Dock (Sta. 0+00)

1.3 Inspection Team

The assessment was performed on August 21, 2023 and August 22,2023 by a three-person team, one of whom is Professional Engineer licensed in the State of South Carolina. The assessment was purely visual and tactile in nature; no destructive testing or material sampling was performed.

2.0 OBSERVATIONS

2.1 Procedure

The assessment was conducted from the waterway via a kayak and commercial scuba equipment. The Level-I inspection was performed on 100 percent of the piles using visual and tactile methods in accordance with the ASCE Manual No. 130 *Waterfront Facilities Inspection and Assessment*. A Level-II inspection was performed on up to 10 percent of the piles where marine growth was removed at suspect locations to better assess the underlying substrate. Prior established stationing was followed along the Harborwalk starting from the southeastern end (Sta. 0+00) and moving to the northwestern end (Sta. 14+80). Refer to Appendix B for a plan view of the Harborwalk with stationing.

2.2 Condition Assessment at Harborwalk

Overall, the boardwalk was in *Fair Condition*: most primary structural elements are in sound condition, but minor to moderate defects/deterioration were observed. The typical structural deficiencies observed included minor-to-moderate marine borer activity in the piles and cross bracing, minor-to-major splitting of the split-cap and cross bracing, and minor-to-major deterioration of the connection hardware. General defects are defined below in Section 2.2.1 and significant defects are described in Section 2.2.2. Defect ratings (Minor, Moderate, Major, Severe Condition) are defined below and in Appendix C.

2.2.1 Typical Conditions

Defects and conditions that were observed throughout the Harborwalk are documented below based on general size of defect, location on the structural element, and condition rating. Specific defects are documented in Section 2.2.2. Percentages and estimates are based on engineering experience and are approximate.

1. Timber Piles- approximately 90 percent of piles exhibited rot and/or fungal decay with less than 5 percent section loss in Minor Condition (Photograph 1). Approximately 10 percent of the piles exhibited marine borer activity near/below the low-water line. Moderate Condition

marine borer activity was typically localized to a quadrant of the pile and estimated maximum section loss of approximately 15 percent (Photo 2). With the exception of the piles with observed marine borer activity, the wood treatment appears to be functioning.

2. Split Cap/Pile Cap- Approximately 95 percent of the caps were in Minor Condition: all exhibited rot and/or fungal decay with negligible section loss (Photograph 3). Approximately 50 percent of the caps also exhibited minor checking less than 1/8 in. wide that had not penetrated through the entire member cross section. The remaining 5 percent were in Major Condition with splits that penetrated the full width of the member and extended up to its full length. The caps rated in Major Condition are outlined in Section 2.2.2.
3. Connection Hardware- Approximately 75 percent of the connection hardware was in Minor Condition with surface rust and oxidation of the galvanized coating (Photograph 4). Approximately 20 percent of the connection hardware was in Moderate Condition with pitting and flaking corrosion that was typically localized to the washer and bolt (Photograph 5). The remaining 5 percent was in Major Condition with 25-to-50 percent section loss (Photograph 6); the significantly corroded hardware was typically located within the tidal/splash zone and was connecting cross bracing to piles (not a primary structural connection).
4. Cross Bracing- Approximately 20 percent of the braces were observed to have marine borer activity with section loss up to 25-to-50 percent of the cross section in Major Condition (Photograph Photo 7). The remaining 80 percent exhibited rot and/or fungal decay primarily within the tidal/splash zone; approximately 5-to-10 percent section loss in Moderate Condition was typically observed in this zone (Photograph 8).

2.2.2 Inspection Records

Defects and conditions that were atypical or significant enough to potentially reduce the load-carrying capacity of the structure are described in the below table. Photographs of defects follow the table.

Table 1: Inspection Record

ELEMENT	DEFECT	DIMENSION	STATION	RATING
Cap	Shake with Associated Area of Section Loss	4 in wide by 6 in long by full member width	0+90	Major (Photograph 9)
Cross Bracing	Split	1/8 in wide by 10 in long by full member width	2+50	Major (Photograph 10)
Cap	Split	1/2 in wide by full length of member by full member width	2+66	Major (Photograph 11)
Cap	Split	1/8 in wide by 24 in long by full member width	6+52	Major (Photograph 12)
Cap	Split	1/8-in wide by 16-in long by full member width	9+26	Major (Photograph 13)
Cross Bracing	Decay at Connection	100 percent loss of section	12+40	Severe (Photograph 14)

2.3 Condition Assessment at Floating Docks

Overall, the floating docks were in *Fair Condition*: most primary structural elements are in sound condition, but minor to moderate defects/deterioration were observed. The typical structural deficiencies observed included minor-to-moderate checking in the piles and timber frame, and minor-to-major deterioration of the connection hardware. General defects are defined below in Section 2.3.1 and significant defects are described in Section 2.3.2. Defect ratings (Minor, Moderate, Major, Severe Condition) are defined below and in Appendix C.

2.3.1 Typical Conditions

Defects and conditions that were observed throughout the two floating docks are documented below based on general size of defect, location on the structural element, and condition rating. Specific defects

are documented in Section 2.3.2. Percentages and estimates are based on engineering experience and are approximate.

1. Timber Piles- 100 percent of the piles exhibited minor checking less than 1/8 inch wide. The wood treatment appears to be functioning. Steel cable retainers were missing at four piles along the northeast finger of the East floating dock.
2. Timber Frame - 100 percent of the timber frames exhibited minor checking less than 1/8 inch wide (Photograph 15). Less than 1 percent of the timber frame exhibited isolated connection failure at the lower frame of both floating docks (Photographs 15 through 17).
3. Plastic Floats –100 percent of the plastic floats were in Satisfactory Condition.
4. Timber Decking –100 percent of the timber decking was in Satisfactory Condition with minor checking, weathering, and warping observed.
5. Connection Hardware- 100 percent of the connection hardware exhibited minor surface rust and oxidation of the galvanized coating.

2.3.2 Inspection Records

No defects or conditions that were atypical or significant enough to potentially reduce the load-carrying capacity of the structure were observed.

3.0 RECOMMENDATIONS

Following are Collins' recommendations for the Georgetown Harborwalk.

- Pile Caps – Repair the deficient split caps listed in Table 1. Splitting in the caps with minor and moderate ratings should be monitored on a two-year above-water inspection cycle.
- Cross Bracing – Repair deficient cross bracing and cross bracing connections at Station 12+40.

Following are Collins' recommendations for the adjacent floating docks.

- Timber Piles – The missing steel cable retainers should be replaced at the East floating dock.
- Timber Frames – the isolated timber frame connection failures on the underside of both floating docks should be repaired.

4.0 CONCLUSION

Collins Engineers, Inc. (Collins) performed an above and underwater structural condition assessment of the Harborwalk and adjacent floating docks in Georgetown, South Carolina. The assessment was performed on August 21, 2023 and August 22, 2023 to determine the condition of the Harborwalk and adjacent floating docks and to determine any necessary recommendations of repair. Deteriorated elements should be monitored and repaired as necessary to ensure continuous operation of both the Harborwalk and adjacent floating docks.

No warranty, expressed or implied, is provided by Collins Engineers, Inc. for this assessment or report.

Collins appreciates the opportunity to work with the City of Georgetown on this project and looks forward to working with you in the future. We would be happy to discuss any aspect of this report with you in person or via phone or email.

Respectfully submitted,
COLLINS ENGINEERS, INC.

Timothy Weeks, P.E.

Originated by:
Eric Beach, E.I.T.

Appendix A: Photographs

Photo 1: Pile – Minor Rot or Fungal Decay

Photo 2: Pile – Moderate Marine Borer Activity

Photo 3: Cap – Minor Rot or Fungal Decay

Photo 4: Hardware – Minor Surface Corrosion

Photo 5: Hardware – Moderate Flaking Corrosion

Photo 6: Hardware – Major Corrosion with Section Loss

Photo 7: Cross Bracing – Major Marine Borer Activity

Photo 8: Cross Brace – Moderate Decay or Fungal Rot

Photo 9: Cap – Major Full Width Split/Shake with Area of Associated Section Loss, Station 0+90

Photo 10: Cross Bracing – Major Full Width Split, Station 2+50

Photo 11: Cap – Major Full Width Split, Station 2+66

Photo 12: Cap – Major Full Width Split, Station 6+52

Photo13: Cap – Major Full Width Split, Station 9+26

Photo 14: Cross Bracing – Severe Decay with 100 Percent Loss of Section, Station 12+40

Photo 15: Floating Dock Frame – Minor Checking and Connection Hardware Failure, Screven St. Floating Dock

Photo 16: Floating Dock Frame – Connection Failure, Screven St. Floating Dock

Photo 17: Floating Dock Frame – Connection Failure, Broad St. Floating Dock

Appendix B: 2010 Historic Renovation Plans

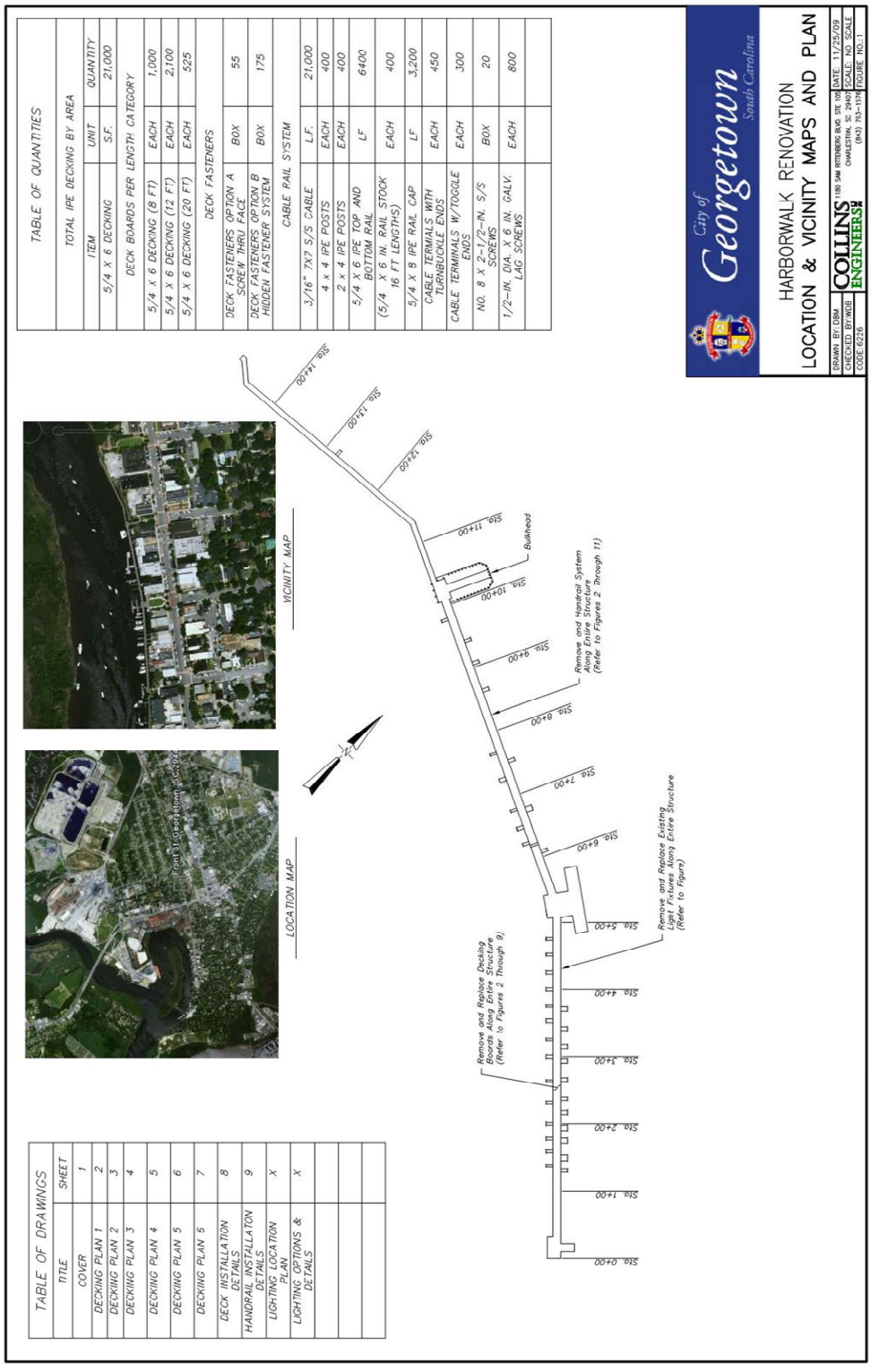
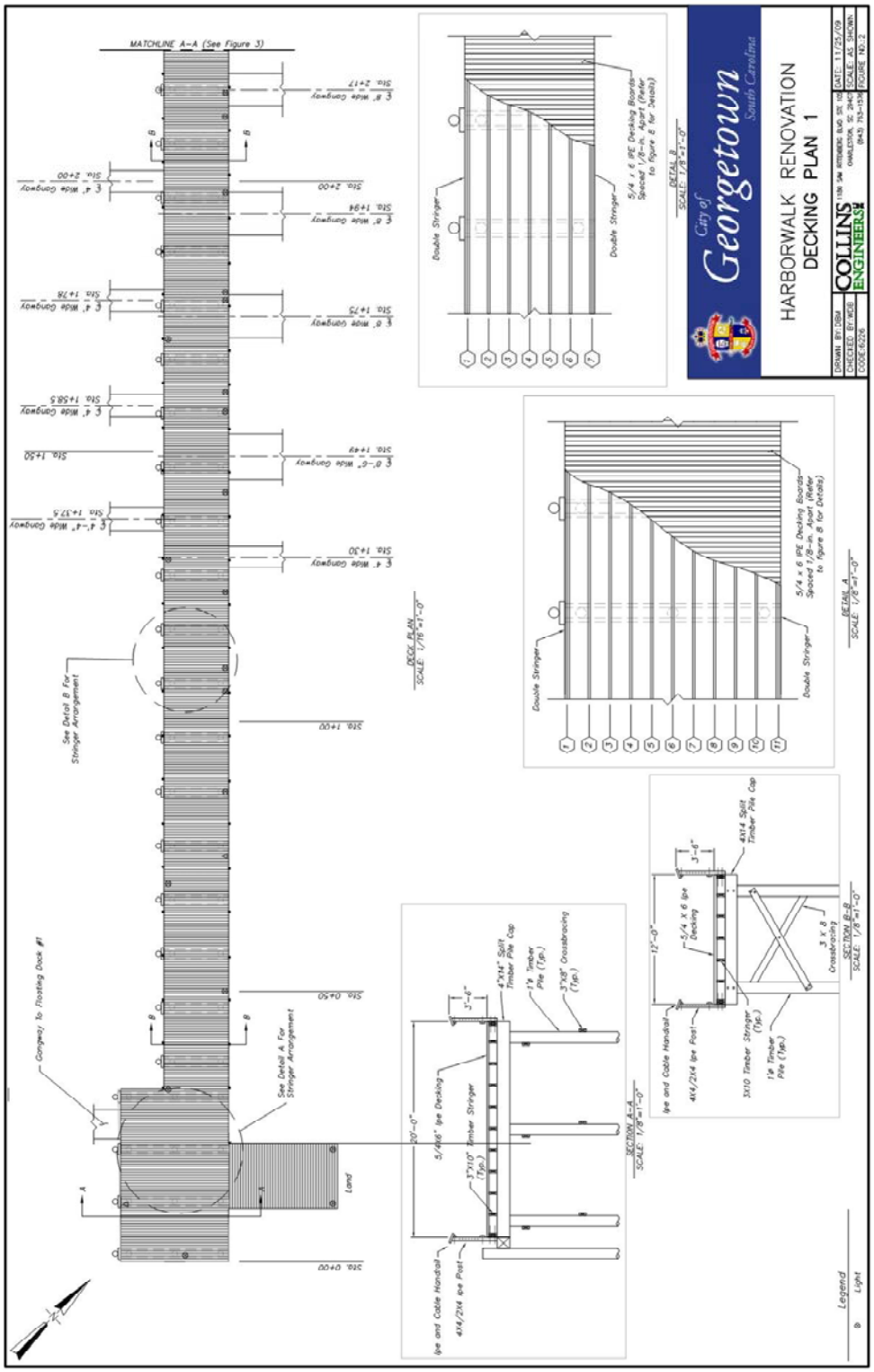
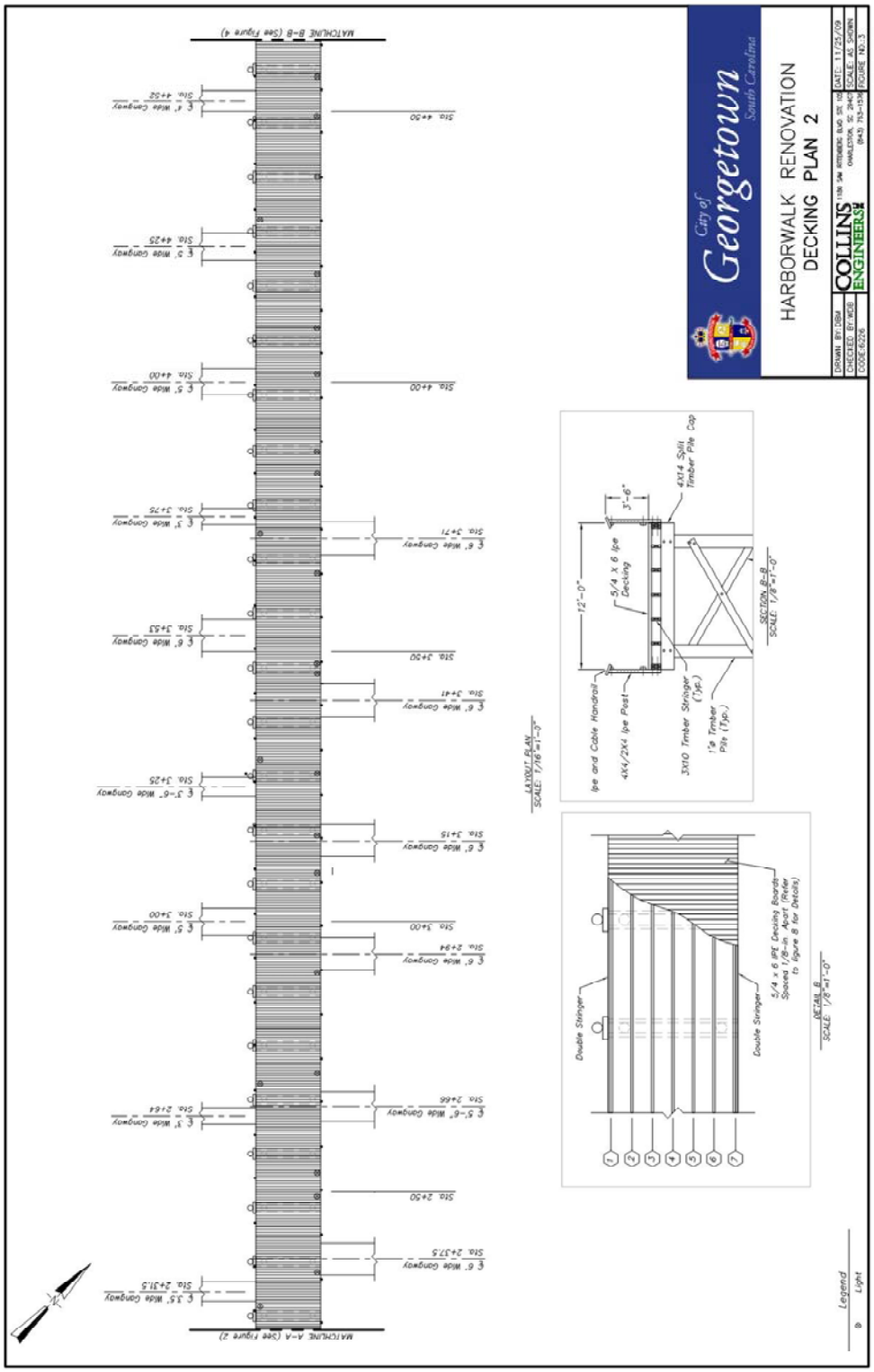
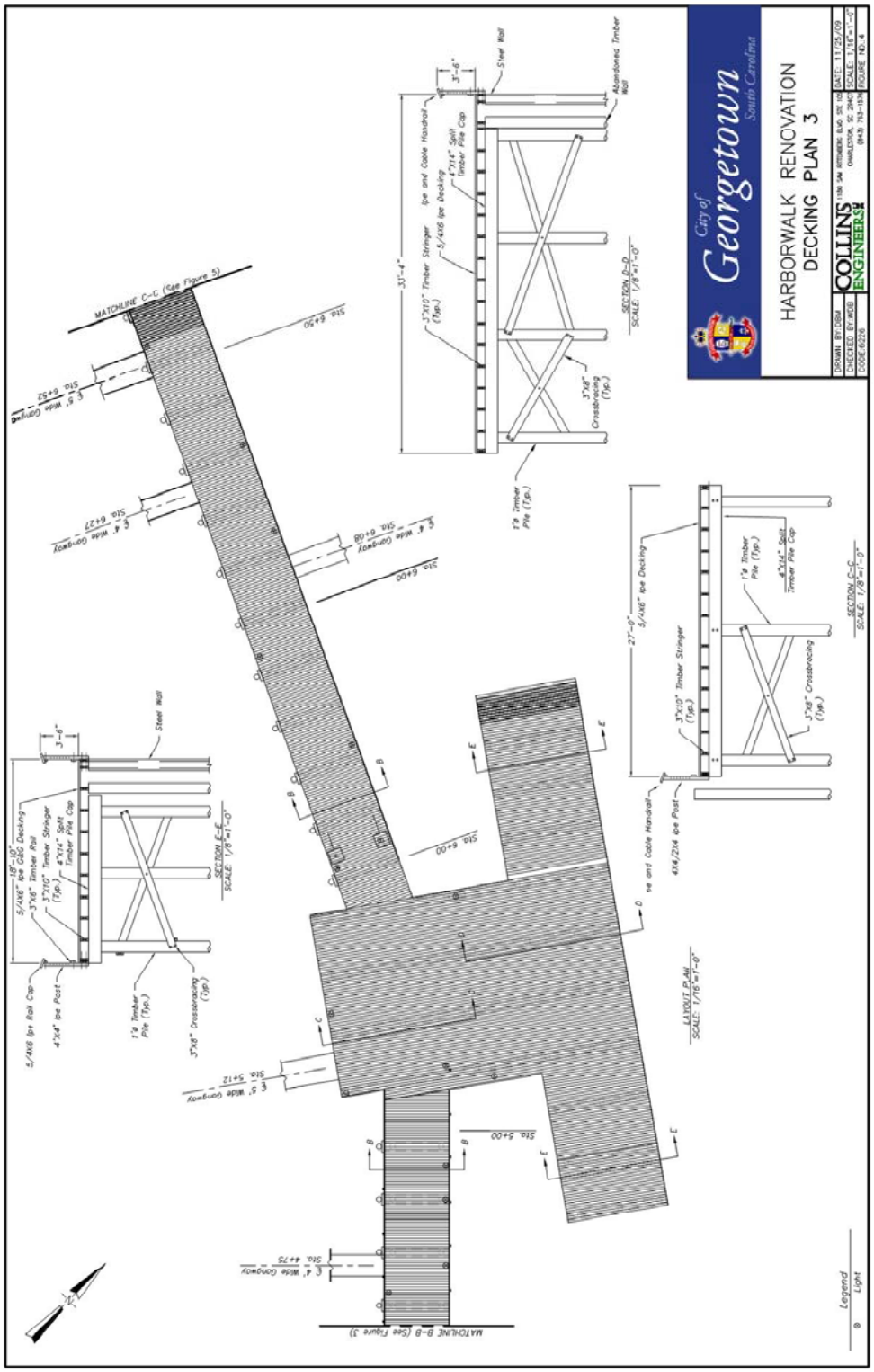
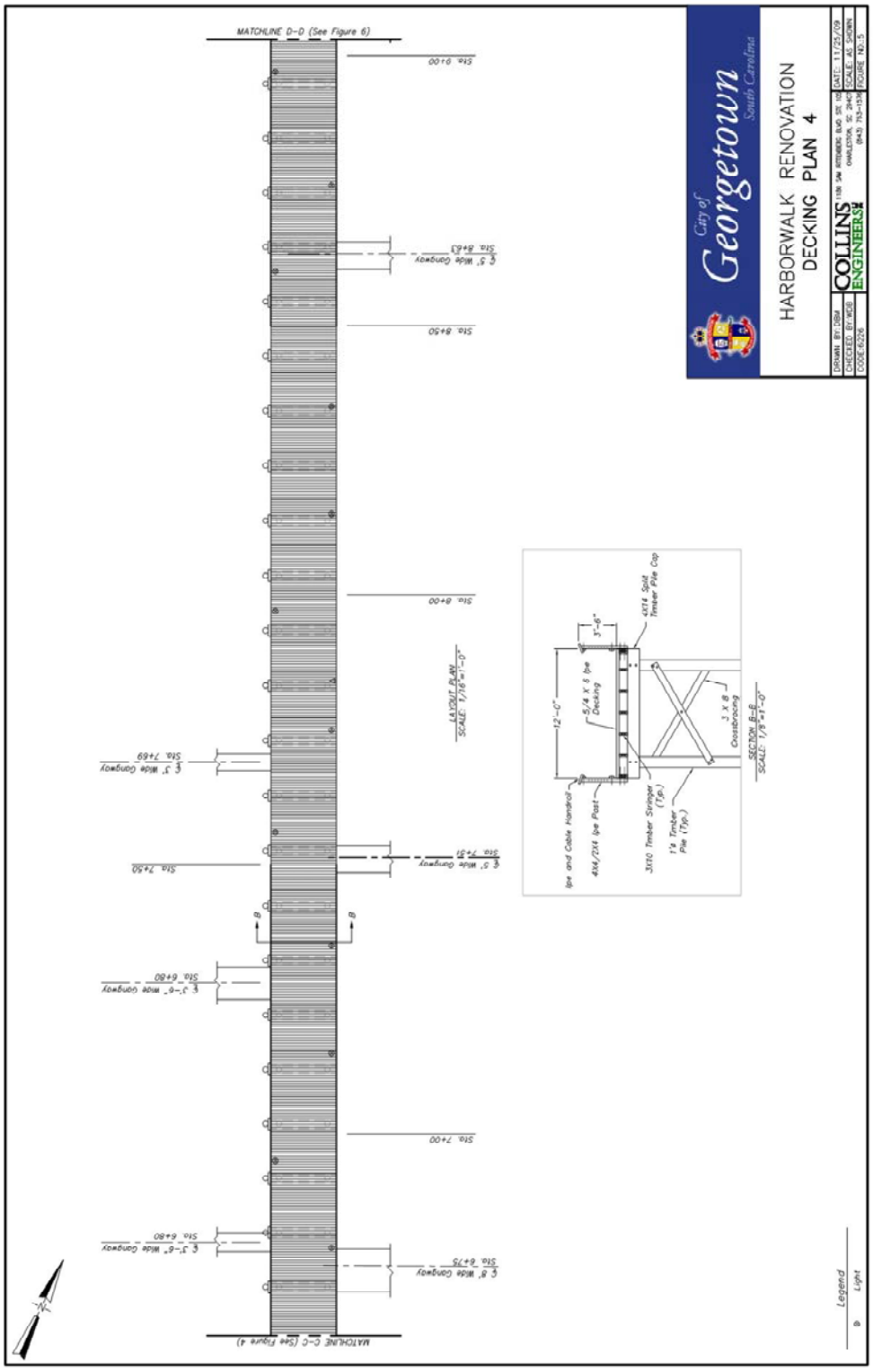


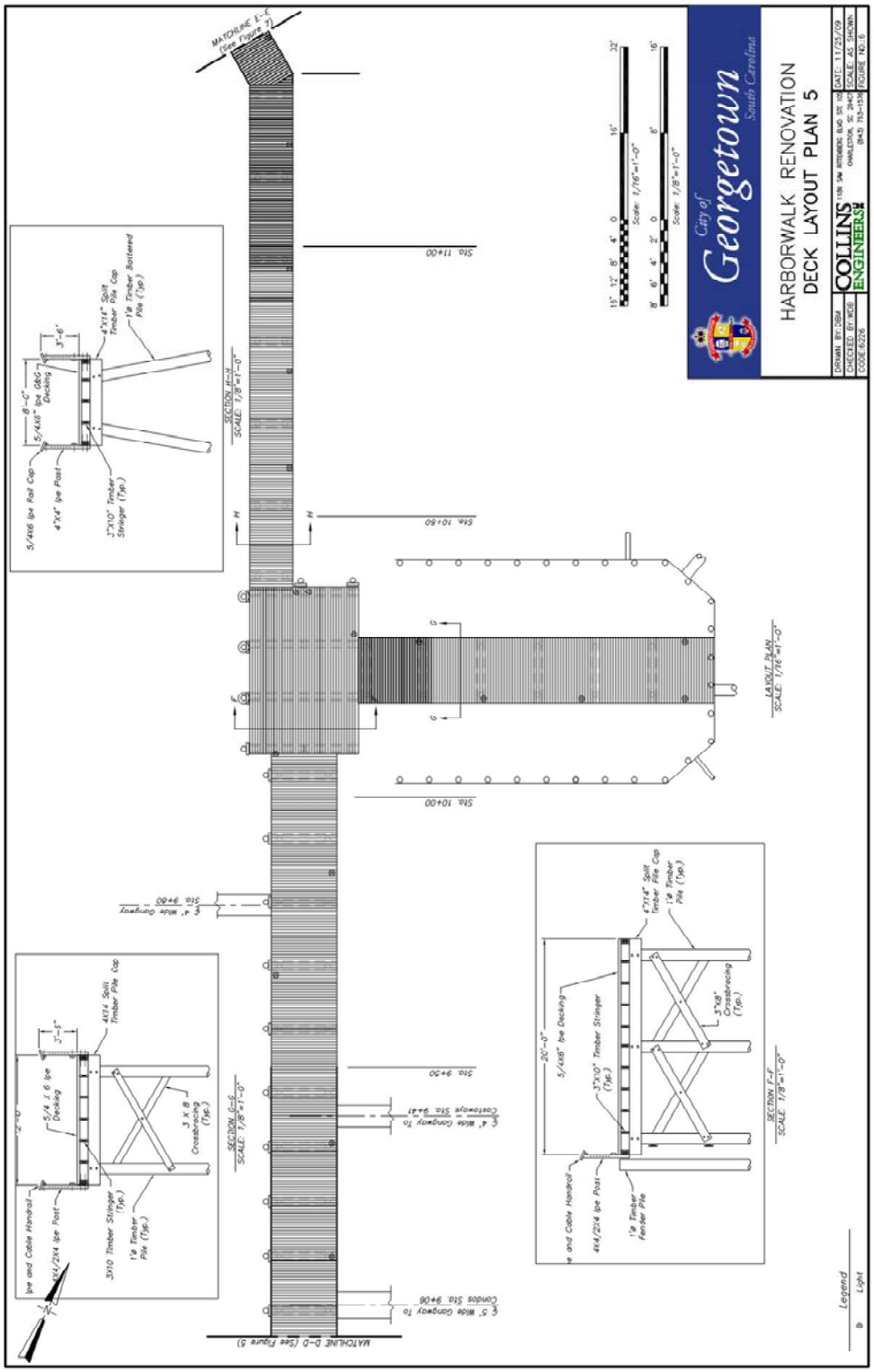
TABLE OF QUANTITIES
TOTAL IPE DECKING BY AREA
ITEM | UNIT | QUANTITY
5/4 X 6 DECKING | S.F. | 21,000
DECK BOARDS PER LENGTH CATEGORY
5/4 x 6 DECKING (8 FT) | EACH | 1,000
5/4 x 6 DECKING (12 FT) | EACH | 2,100
5/4 x 6 DECKING (20 FT) | EACH | 525
DECK FASTENERS
DECK FASTENERS OPTION A SCREW THRU FACE | BOX | 55
DECK FASTENERS OPTION B HIDDEN FASTENER SYSTEM | BOX | 175
CABLE RAIL SYSTEM
3/16" 7X7 S/S CABLE | L.F. | 21,000
4 x 4 IPE POSTS | EACH | 400
2 x 4 IPE POSTS | EACH | 400
5/4 X 6 IPE TOP AND BOTTOM RAIL | LF | 6400
(5/4 X 6 IN. RAIL STOCK 16 FT LENGTHS) | EACH | 400
5/4 X 8 IPE RAIL CAP | LF | 3,200
CABLE TERMIALS WITH TURNBUCKLE ENDS | EACH | 450
CABLE TERMINALS W/TOGGLE ENDS | EACH | 300
NO. 8 X 2-1/2-IN. S/S SCREWS | BOX | 20
1/2-IN. DIA. X 6 IN. GALV. LAG SCREWS | EACH | 800
City of Georgetown South Carolina
HARBORWALK RENOVATION
LOCATION & VICINITY MAPS AND PLAN
DRAWN BY: DBM
CHECKED BY: WDB
CODE: 6226
COLLINS ENGINEERS INC
1180 SAM RITTENBERG BLVD, STE 105
CHARLESTON, SC 29407
(843) 763-1074
DATE: 11/25/09
SCALE: NO SCALE
FIGURE NO.: 1
VICINITY MAP
LOCATION MAP
Sta. 14+00
Sta. 12+00
Sta. 11+00
Bulkhead
Sta. 10+00
Sta. 9+00
Remove and Handrail System Along Entire Structure (Refer to Figures 2 Through 11)
Sta. 8+00
Sta. 7+00
Sta. 6+00
Remove and Replace Existing Light Fixtures Along Entire Structure (Refer to Figure)
Sta. 5+00
Remove and Replace Decking Boards Along Entire Structure (Refer to Figures 2 Through 9)
Sta. 4+00
Sta. 3+00
Sta. 2+00
Sta. 1+00
Sta. 0+00
TABLE OF DRAWINGS
TITLE | SHEET
COVER | 1
DECKING PLAN 1 | 2
DECKING PLAN 2 | 3
DECKING PLAN 3 | 4
DECKING PLAN 4 | 5
DECKING PLAN 5 | 6
DECKING PLAN 6 | 7
DECK INSTALLATION DETAILS | 8
HANDRAIL INSTALLATION DETAILS | 9
LIGHTING LOCATION PLAN | X
LIGHTING OPTIONS & DETAILS | X

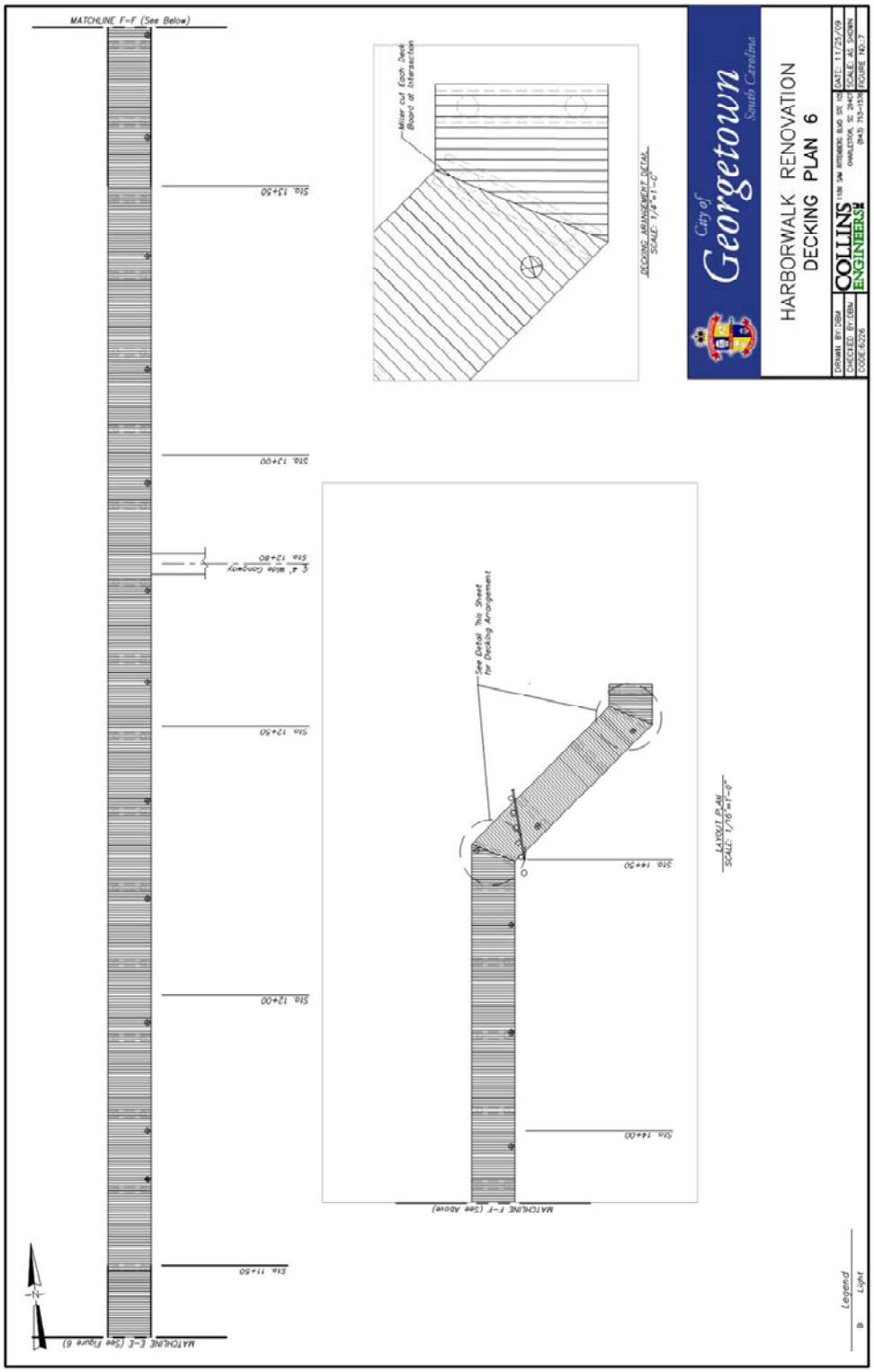

HARBORWALK RENOVATION
DECKING PLAN 1
City of Georgetown South Carolina
COLLINS ENGINEERS
MATCHLINE A-A (See Figure 3)
DECK PLAN
SCALE: 1/16"=1'-0"
DETAIL A
SCALE: 1/8"=1'-0"
SECTION A-A
SCALE: 1/8"=1'-0"
SECTION B-B
SCALE: 1/8"=1'-0"
Gangway To Floating Dock #1
See Detail A For Stringer Arrangement
See Detail B For Stringer Arrangement
Land
Double Stringer
5/4 x 6 IPE Decking Boards Spaced 1/8-in. Apart (Refer to Figure 8 for Details)
5/4 x 6 IPE Decking
5/8x8" Ipe Decking
17"x10" Timber Stringer (Typ.)
4"X14" Split Timber Pile Cap
1'± Timber Pile (Typ.)
3"x8" Crossbracing (Typ.)
Ipe and Cable Handrail
4X4/2X4 Ipe Post
3'-0"
12'-0"
3 x 8 Crossbracing
5X10 Timber Stringer (Typ.)
Legend
Light

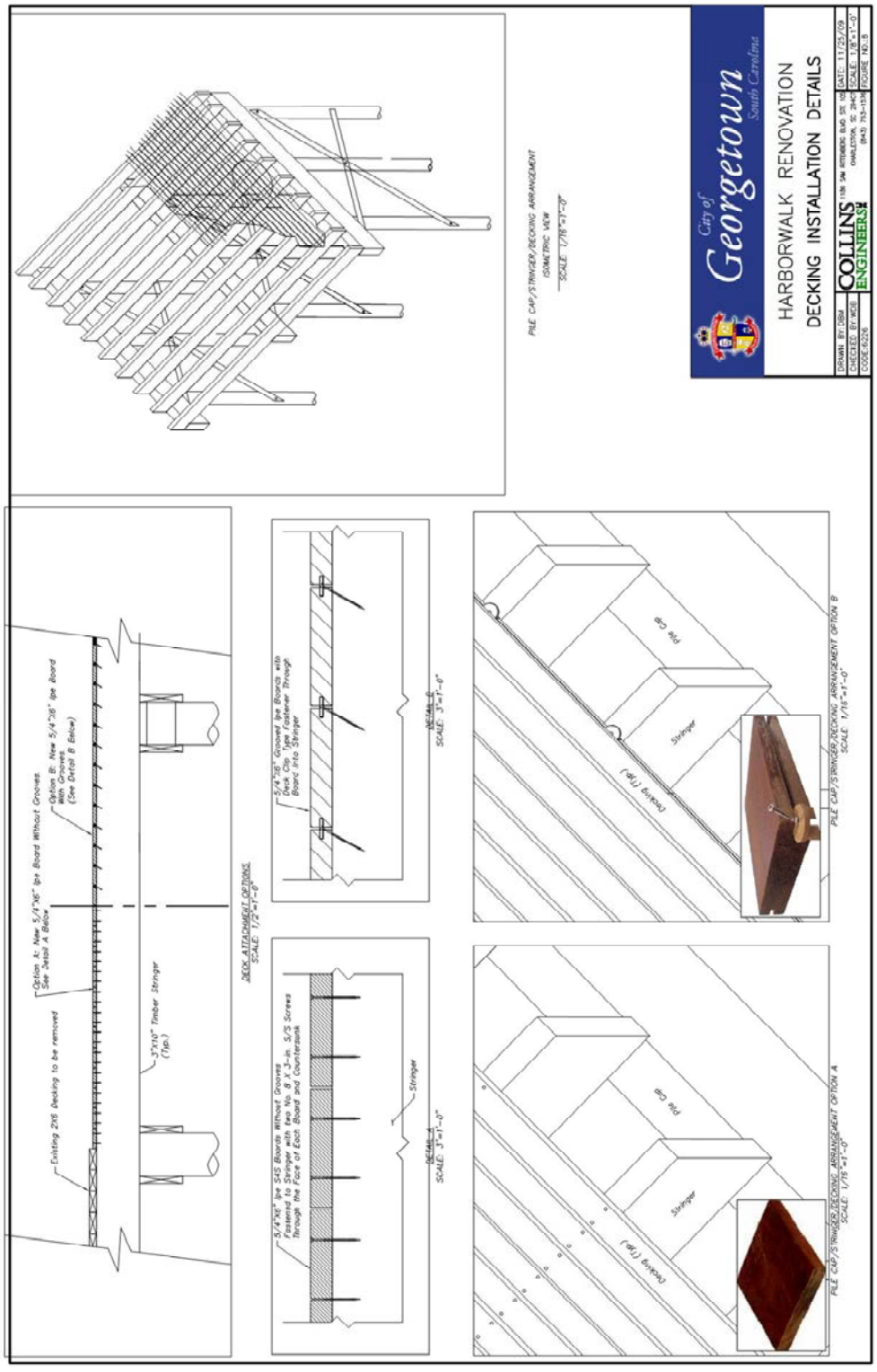

City of Georgetown
South Carolina
HARBORWALK RENOVATION
DECKING PLAN 2
COLLINS ENGINEERS
DRAWN BY: DBM
CHECKED BY: WDB
CODE: 6026
DATE: 11/25/09
SCALE: AS SHOWN
FIGURE NO: 3
MATCHLINE B-B (See Figure 4)
MATCHLINE A-A (See Figure 2)
LAYOUT PLAN
SCALE: 1/16"=1'-0"
SECTION B-B
SCALE: 1/8"=1'-0"
DETAIL B
SCALE: 1/8"=1'-0"
4X14 Split Timber Pile Cap
5/4 X 6 Ipe Decking
Ipe and Cable Handrail
4X4/2X4 Ipe Post
3X10 Timber Stringer (Typ.)
9" Timber Pile (Typ.)
Double Stringer
5/4 x 6 IPE Decking Boards Spaced 1/8-in Apart (Refer to figure 6 for Details)
Legend

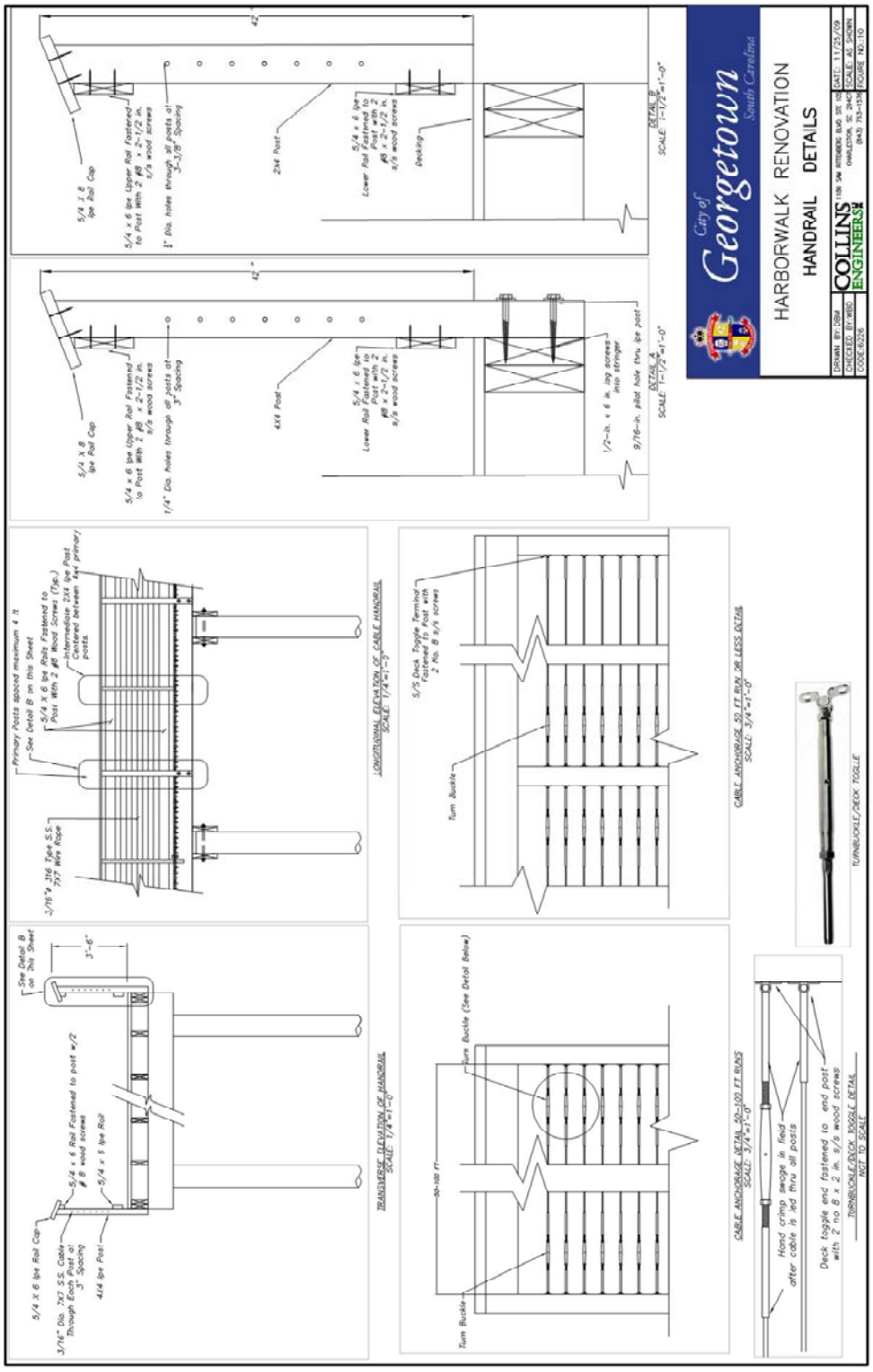

City of Georgetown
South Carolina
HARBORWALK RENOVATION
DECKING PLAN 3
COLLINS ENGINEERS
DRAWN BY: DBM
CHECKED BY: WDB
CODE: 6026
DATE: 11/25/09
SCALE: 1/16"=1'-0"
FIGURE NO: 4
MATCHLINE C-C (See Figure 5)
MATCHLINE B-B (See Figure 3)
Sta. 6+30
Sta. 6+53
Sta. 6+27
Sta. 6+08
Sta. 6+00
Sta. 5+12
Sta. 5+00
Sta. 4+75
5' wide Gangway
4' wide Gangway
Steel Wall
Abandoned Timber Wall
3'-6"
3'X10" Timber Stringer (Typ.)
5/4X6 Ipe Decking
4"X14" Split Timber Pile Cap
3'X8" Crossbracing (Typ.)
1'ø Timber Pile (Typ.)
SECTION B-B
SCALE: 1/8"=1'-0"
SECTION C-C
SCALE: 1/8"=1'-0"
SECTION E-E
SCALE: 1/8"=1'-0"
LAYOUT PLAN
SCALE: 1/16"=1'-0"
21'-0"
5/4X6" Ipe Decking
3'X10" Timber Stringer (Typ.)
1'ø Timber Pile (Typ.)
4"X14" Split Timber Pile Cap
1'ø" Crossbracing (Typ.)
15'-10"
5/4X6" Ipe G&G Decking
3'X8" Timber Rail
3'X10" Timber Stringer (Typ.)
4"X14" Split Timber Pile Cap
5/4X6 Ipe Rail Cap
4"X4" Ipe Post
1'ø Timber Pile (Typ.)
3'X8" Crossbracing (Typ.)
Ipe and Cable Handrail
4X4/2X4 Ipe Post
Legend
Light


MATCHLINE D-D (See Figure 6)
Sta. 8+00
Sta. 7+00
Sta. 6+00
Sta. 7+50
Sta. 6+80
Sta. 6+75
LAYOUT PLAN
SCALE: 1/16"=1'-0"
SECTION B-B
SCALE: 1/8"=1'-0"
4X14 Split Timber Pile Cap
5/4 X 6 Ipe Decking
3 X 8 Ipe Cross Bracing
3X10 Timber Stringer (Typ.)
Ipe and Cable Handrail
4X4/2X4 Ipe Post
City of Georgetown
South Carolina
HARBORWALK RENOVATION
DECKING PLAN 4
COLLINS ENGINEERS
DRAWN BY: DBM
CHECKED BY: WDB
CODE: 6026
DATE: 11/25/09
SCALE: AS SHOWN
FIGURE NO: 5
Legend
Light


City of Georgetown
South Carolina
HARBORWALK RENOVATION
DECK LAYOUT PLAN 5
COLLINS ENGINEERS
DRAWN BY: DBM
CHECKED BY: WDB
CODE: 6026
DATE: 11/25/09
SCALE: AS SHOWN
FIGURE NO: 6
Sta. 11+00
Sta. 10+50
Sta. 10+00
Sta. 9+80
Sta. 9+50
LAYOUT PLAN
SCALE: 1/16"=1'-0"
SECTION E-E
SCALE: 1/8"=1'-0"
SECTION F-F
SCALE: 1/8"=1'-0"
SECTION G-G
SCALE: 1/8"=1'-0"
5/4X6" Ipe Rail Cap
4"X4" Ipe Post
3"X10" Timber Stringer (Typ.)
8'-0" Ipe 5/4X6 Decking
3'-6"
4"X14" Split Timber Pile Cap
1'ø Timber Battered Pile (Typ.)
20'-0"
5/4X6" Ipe Decking
3"X10" Timber Stringer (Typ.)
3"X8" Crossbracing (Typ.)
Ipe and Cable Handrail
4X4/2X4 Ipe Post
1'ø Timber Fender Pile
2'-0"
5/4 X 6 Ipe Decking
3 X 8 Crossbracing (Typ.)
3X10 Timber Stringer (Typ.)
1'ø Timber Pile (Typ.)
4" Wide Gangway
5' Wide Gangway To Catamaran
5' Wide Gangway To Condos
MATCHLINE E-E (See Figure 7)
MATCHLINE D-D (See Figure 5)
Legend
Light


MATCHLINE F-F (See Below)
Miter cut Each Deck Board at Intersection
DECKING ARRANGEMENT DETAIL
SCALE: 1/4"=1'-0"
City of Georgetown South Carolina
HARBORWALK RENOVATION
DECKING PLAN 6
COLLINS ENGINEERS
DRAWN BY: DBM
CHECKED BY: JBM
CODE: 6026
DATE: 11/25/09
SCALE: AS SHOWN
FIGURE NO: 7
See Detail This Sheet for Decking Arrangement
LAYOUT PLAN
SCALE: 1/16"=1'-0"
MATCHLINE F-F (See Above)
MATCHLINE E-E (See Figure 6)
Legend


City of Georgetown
South Carolina
HARBORWALK RENOVATION
DECKING INSTALLATION DETAILS
COLLINS ENGINEERS
PILE CAP/STRINGER/DECKING ARRANGEMENT
ISOMETRIC VIEW
SCALE: 1/16"=1'-0"
DECK ATTACHMENT OPTIONS
SCALE: 1/2"=1'-0"
Option A: New 5/4"x6" Ipe Board Without Grooves
See Detail A Below
Option B: New 5/4"x6" Ipe Board
With Grooves
(See Detail B Below)
Existing 2x6 Decking to be removed
3"x10" Timber Stringer
(Typ.)
5/4"x6" Ipe S4S Boards Without Grooves
Fastened to Stringer with two No. 8 X 3-in. S/S Screws
Through the Face of Each Board and Countersink
Stringer
DETAIL A
SCALE: 3"=1'-0"
5/4"x6" Grooved Ipe Boards with
Deck Clip Type Fastener Through
Board Into Stringer
DETAIL B
SCALE: 3"=1'-0"
PILE CAP/STRINGER/DECKING ARRANGEMENT OPTION A
SCALE: 1/16"=1'-0"
PILE CAP/STRINGER/DECKING ARRANGEMENT OPTION B
SCALE: 1/16"=1'-0"
Pile Cap
Stringer
Decking (Typ.)


City of Georgetown South Carolina
HARBORWALK RENOVATION
HANDRAIL DETAILS
COLLINS ENGINEERS
DRAWN BY: DBM
CHECKED BY: WBC
CODE: 6026
DATE: 11/25/09
SCALE: AS SHOWN
FIGURE NO: 10
DETAIL B
SCALE: 1-1/2"=1'-0"
DETAIL A
SCALE: 1-1/2"=1'-0"
LONGITUDINAL ELEVATION OF CABLE HANDRAIL
SCALE: 1/4"=1'-0"
TRANSVERSE ELEVATION OF HANDRAIL
SCALE: 1/4"=1'-0"
CABLE ANCHORAGE DETAIL 50-100 FT RUNS
SCALE: 3/4"=1'-0"
CABLE ANCHORAGE 50 FT RUN OR LESS DETAIL
SCALE: 3/4"=1'-0"
TURNBUCKLE/DECK TOGGLE
TURNBUCKLE/DECK TOGGLE DETAIL
NOT TO SCALE
5/4 x 6 Ipe Upper Rail Fastened to Post With 2 #8 x 2-1/2 in. s/s wood screws
5/4 x 6 Ipe Lower Rail Fastened to Post with 2 #8 x 2-1/2 in. s/s wood screws
Decking
2x4 Post
4X4 Post
1" Dia. holes through all posts at 3" Spacing
1/4" Dia. holes through all posts at 3" Spacing
5/4 X 8 Ipe Rail Cap
1/2-in. x 6 in. lag screws into stringer
9/16-in. pilot hole thru Ipe post
Primary Posts spaced maximum 4 ft
See Detail B on this Sheet
5/4 X 6 Ipe Rails Fastened to Post With 2 #8 Wood Screws (Typ.)
Intermediate 2x4 Ipe Post centered between two primary posts
3/16" ϕ 316 Type S.S. 7x7 Wire Rope
5/8 Deck Toggle Terminal Fastened to Post with 2 No. 8 s/s screws
Turn Buckle
50-100 ft
Turn Buckle (See Detail Below)
See Detail B on this Sheet
3'-6"
5/4 x 6 Rail Fastened to post w/2 #8 wood screws
5/4 x 6 Ipe Rail Cap
3/16" Dia. 7x7 S.S. Cable Through Each Post at 3" Spacing
4/4 Ipe Post
Hand crimp swage in field after cable is led thru all posts
Deck toggle end fastened to end post with 2 no 8 x 2 in. s/s wood screws

Appendix C: ASCE Waterfront Inspection Manual Excerpts

The following tables and graphics are taken from the ASCE Manuals and Reports on Engineering Practice No. 130, "Waterfront Facilities Inspection and Assessment."

Table 2-14. Condition Assessment Ratings

Rating		Description
6	Good	No visible damage or only minor damage noted. Structural elements may show very minor deterioration, but no overstressing observed. No repairs are required.
5	Satisfactory	Limited minor to moderate defects or deterioration observed, but no overstressing observed. No repairs are required.
4	Fair	All primary structural elements are sound, but minor to moderate defects or deterioration observed. Localized areas of moderate to advanced deterioration may be present, but do not significantly reduce the load-bearing capacity of the structure. Repairs are recommended, but the priority of the recommended repairs is low.
3	Poor	Advanced deterioration or overstressing observed on widespread portions of the structure, but does not significantly reduce the load-bearing capacity of the structure. Repairs may need to be carried out with moderate urgency.
2	Serious	Advanced deterioration, overstressing, or breakage may have significantly affected the load-bearing capacity of primary structural components. Local failures are possible, and loading restrictions may be necessary. Repairs may need to be carried out on a high-priority basis with urgency.
1	Critical	Very advanced deterioration, overstressing, or breakage has resulted in localized failure(s) of primary structural components. More widespread failures are possible or likely to occur, and load restrictions should be implemented as necessary. Repairs may need to be carried out on a very high-priority basis with strong urgency.

Table 2-4. Damage Ratings for Timber Elements

Damage Rating		Existing Damage[a]	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
NI	Not Inspected	• Not inspected, inaccessible, or passed by[b]	
ND	No Defects	• Sound surface material	
MN	Minor	• Checks, splits, and gouges less than 0.5 in. wide • Evidence of marine borers or fungal decay	Minor damage not appropriate if • Loss of cross section • Marine borer infestation • Displacements, loss of bearing, or connections
MD	Moderate	• Remaining diameter loss up to 15% • Checks and splits wider than 0.5 in. • Cross section area loss up to 25% • Corroded hardware • Evidence of marine borers or fungal decay, with loss of section	Moderate damage not appropriate if • Displacements, loss of bearing or connections

(Continued)

Table 2-4. Damage Ratings for Timber Elements *(Continued)*

Damage Rating		Existing Damage[a]	Exclusions [Defects Requiring Elevation to the Next Higher Damage Rating(s)]
MJ	Major	• Remaining diameter loss 15 to 30% • Checks and splits through full depth of cross section • Cross-section area loss 25 to 50%; heavily corroded hardware • Displacement and misalignments at connections	Major damage not appropriate if • Partial or complete breakage
SV	Severe	• Remaining diameter loss more than 30% • Cross section area loss more than 50% • Loss of connections and/or fully nonbearing condition • Partial or complete breakage	

[a]Any defect listed below is sufficient to identify relevant damage grade.
[b]If not inspected due to inaccessibility or passed by, note as such.

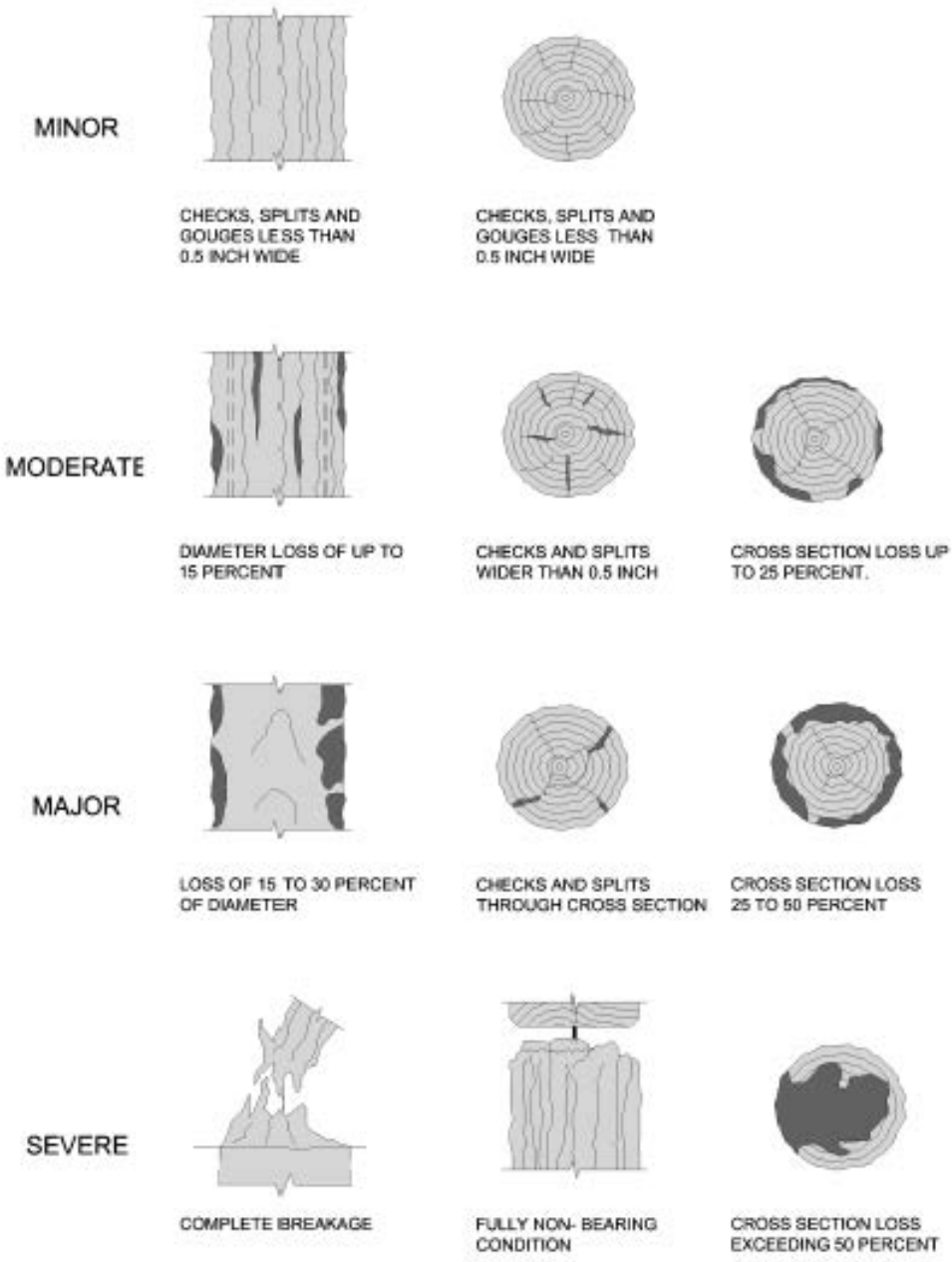


Fig. 2-2. Condition ratings for timber elements
Source: Courtesy of CH2M HILL, Inc. and COWI, Inc., reproduced with permission.

Appendix D: Repair Cost Estimate

Table 1: Harborwalk Boardwalk Repairs

ENGINEERS' ESTIMATE OF PROBABLE CONSTRUCTION COST							
CITY OF GEORGETOWN	COLLINS ENGINEERS, INC.						
	5955 CORE RD, STE 522						
HARBORWALK & FLOATING DOCK REPAIRS	NORTH CHARLESTON, 29406				ENGINEER'S ESTIMATE		
ESTIMATE BY: JEB	(843) 790-8998				COLLINS Project No. 40-14787		
MOBILIZATION AND DEMOBILIZATION	QTY	UNIT	$/UNIT	Cost			
Mob/demob				$5,280			
Subtotal				$5,280			
REPAIR EXISTING BENTS & DOCKS	QTY	UNIT	$/UNIT	Cost			
Replace 4 Caps & 2 Braces (labor+material)				$13,980			
Install 4 Pile Guides (labor+materials)				$3,840			
Subtotal				$17,820			
GRAND TOTAL				$23,100			
					Class 4 Estimate +/- 40%		