APPENDIX P

APPENDIX C

Central Drainage Channel Mitigation Design Storm Water Report

July 15, 2004

CENTRAL DRAINAGE CHANNEL MIGATION DESIGN

STORMWATER REPORT

FOR

SUNQUEST PROPERTIES INC.

INDEX

Certification

INTRODUCTION

Sunquest Properties Inc. (Sunquest) is under order (# 01-041) of the Regional Water Quality Control Board to implement remedial measures to prevent leachate from discharging to waters of the State or of the United States via an open channel traversing the former Brisbane Landfill. The existing channel is commonly referred to as the Central Drainage Channel (CDC) and it conveys runoff from a significant upstream watershed including portions of the City of Brisbane, Daly City, and the former Southern Pacific Railroad Yard (railyard) owned by Sunquest. The proposed Central Drainage Channel Remediation project must not only address the Regional Board's order; it must also address the stormwater management requirements of any future development of Sunquest property and the offsite portions of the watershed. Sunquest is currently seeking approval for site development within both the railyard and the landfill portions of the watershed. Therefore, this report describes the hydrologic and hydraulic design of the proposed CDC improvements and its ability to convey "future" stormwater flows

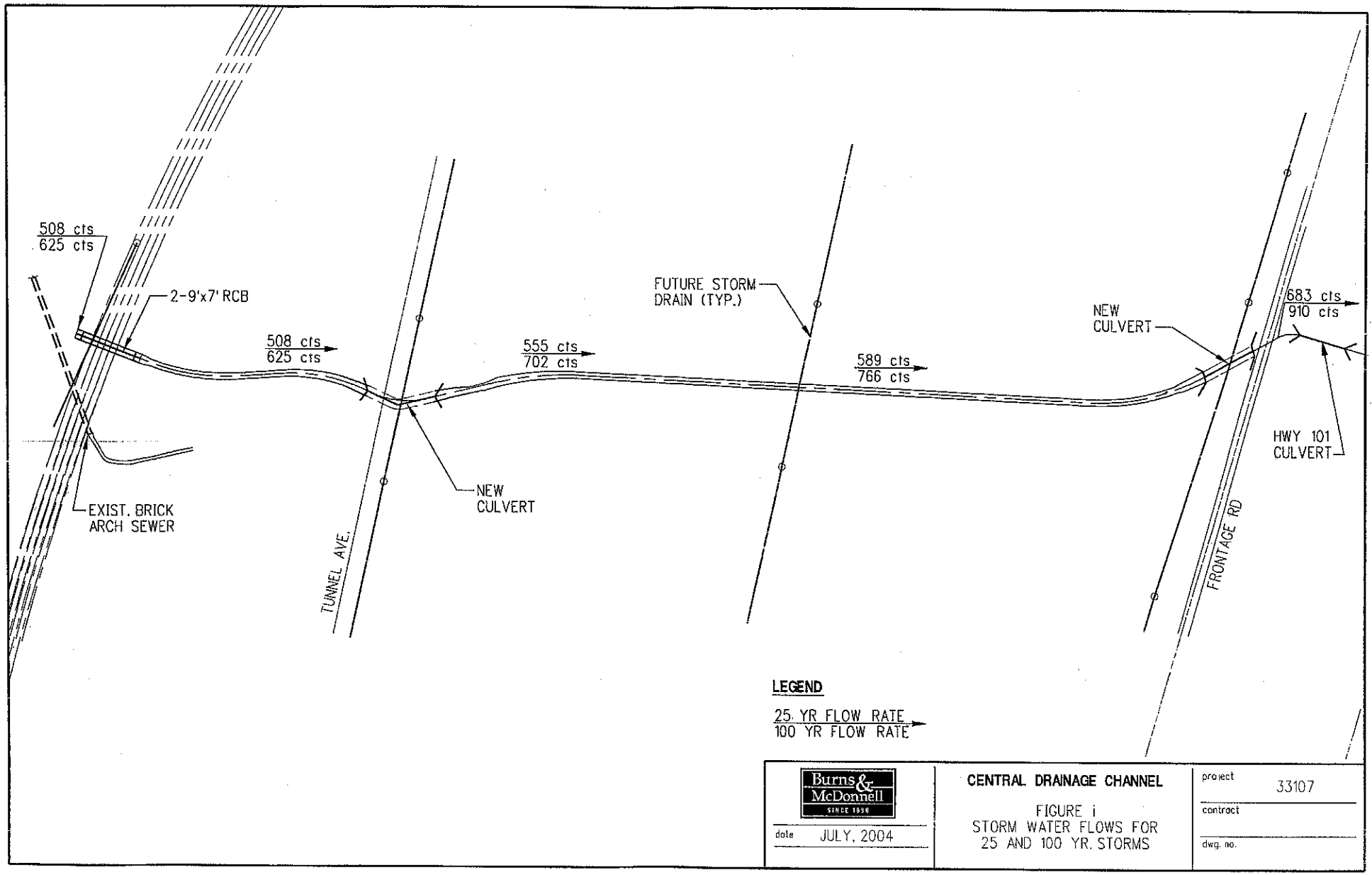
This report is intended to be a supplement to previous reports produced by Burns and McDonnell and others. Information contained in these reports will be referred to in this report, it will not be repeated in detail. Sunquest has submitted each of the reports to the City of Brisbane (City). The referenced reports are:

- *Eastern Bayshore Storm Drainage Outfall Study* by Brian Kangas Foulk (BKF) Consulting Engineers (1995)
- *Brisbane Baylands Stormwater System Report* by Burns & McDonnell (2001)
- *Interim Grading Plan Stormwater Report* by Burns & McDonnell (2004)

EXISTING CONDITIONS

The *Interim Grading Plan Stormwater Report* contains a detailed description of existing (2004) conditions within the watershed. The report describes the existing drainage system network including the CDC Hydrologic and hydraulic modeling of the watershed was performed for the 100 year storm event (combined with a high tide) utilizing the storm water management model XP – SWMM and the following results were obtained:

- The brick arch sewer extending from Bayshore Blvd. to the CDC does not have adequate capacity to convey stormwater flows



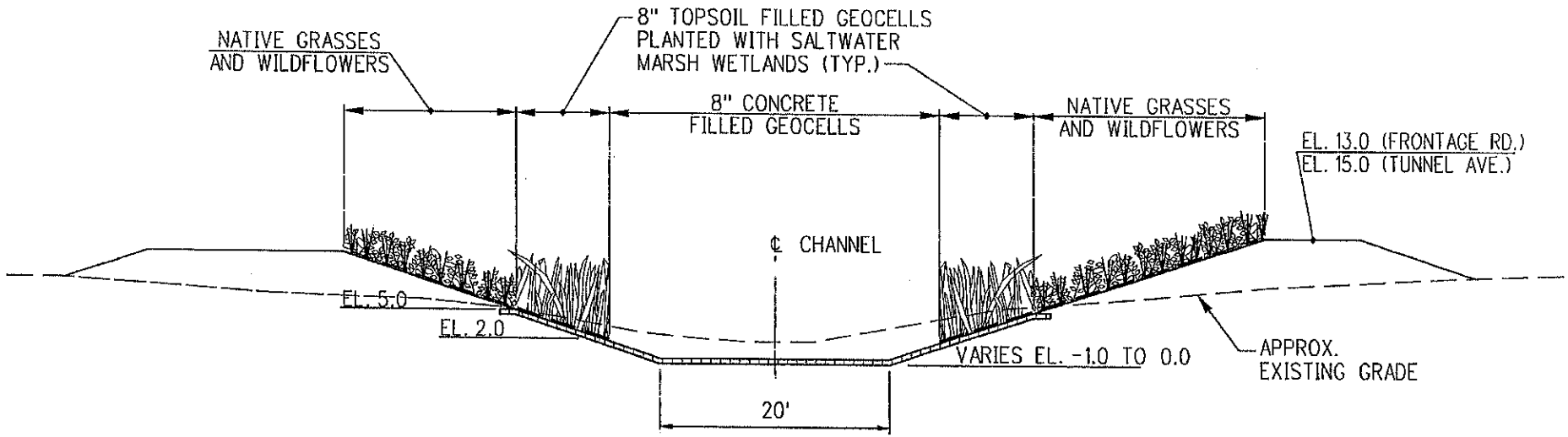
Burns & McDonnell
SINCE 1956

date JULY, 2004

CENTRAL DRAINAGE CHANNEL

FIGURE i
STORM WATER FLOWS FOR
25 AND 100 YR. STORMS

project 33107
contract
dwg. no.



TYPICAL CHANNEL SECTION BETWEEN RAILROAD R.O.W. AND FRONTAGE RD.

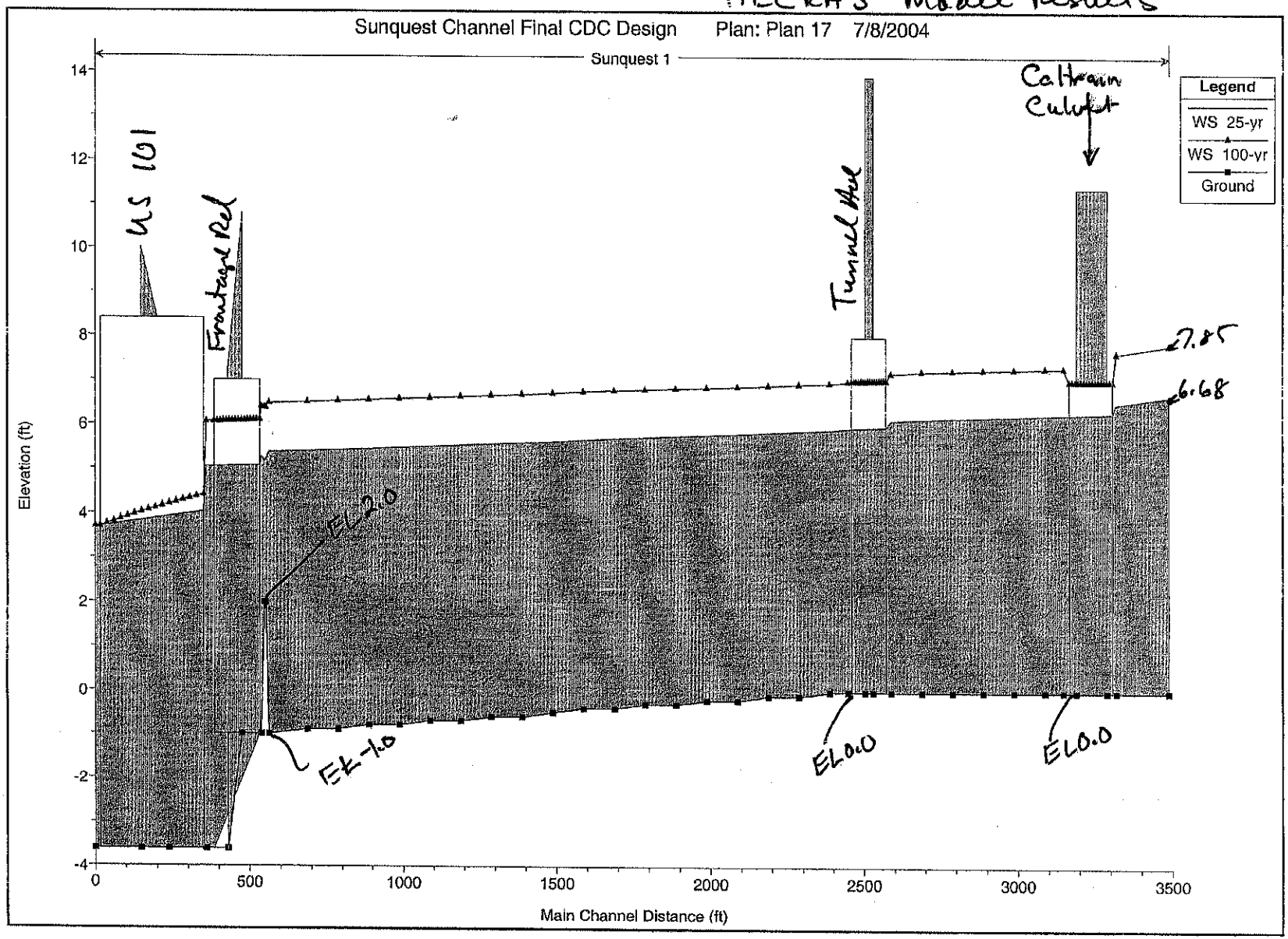
NOT TO SCALE

Burns & McDonnell SINCE 1898 date JULY, 2004	**CENTRAL DRAINAGE CHANNEL** FIGURE 2 TYPICAL SECTION	project 33107 contract dwg. no. rev. —

The final channel and culvert configuration resulted in water levels upstream of the railroad ROW of elevation 6.68' NGVD and 7.85' NGVD. The calculated levels exceeded the target levels at the upstream end of the railroad culvert; therefore additional modeling was required to determine if these stages affected flooding on Bayshore Blvd. The XP-SWMM model presented in the 2001 report was modified by reducing the size of the railroad culvert until the predicted upstream water levels approximated those obtained by the HEC-RAS modeling. The results of the revised model indicate that flooding on Bayshore does not occur during the 25 year event and flooding during the 100 year event occurs for a period of 1.5 hours with a corresponding elevation of 8.4' NGVD. This elevation is virtually identical to the level predicted for existing conditions and the duration of flooding is reduced by 4 to 5 hours

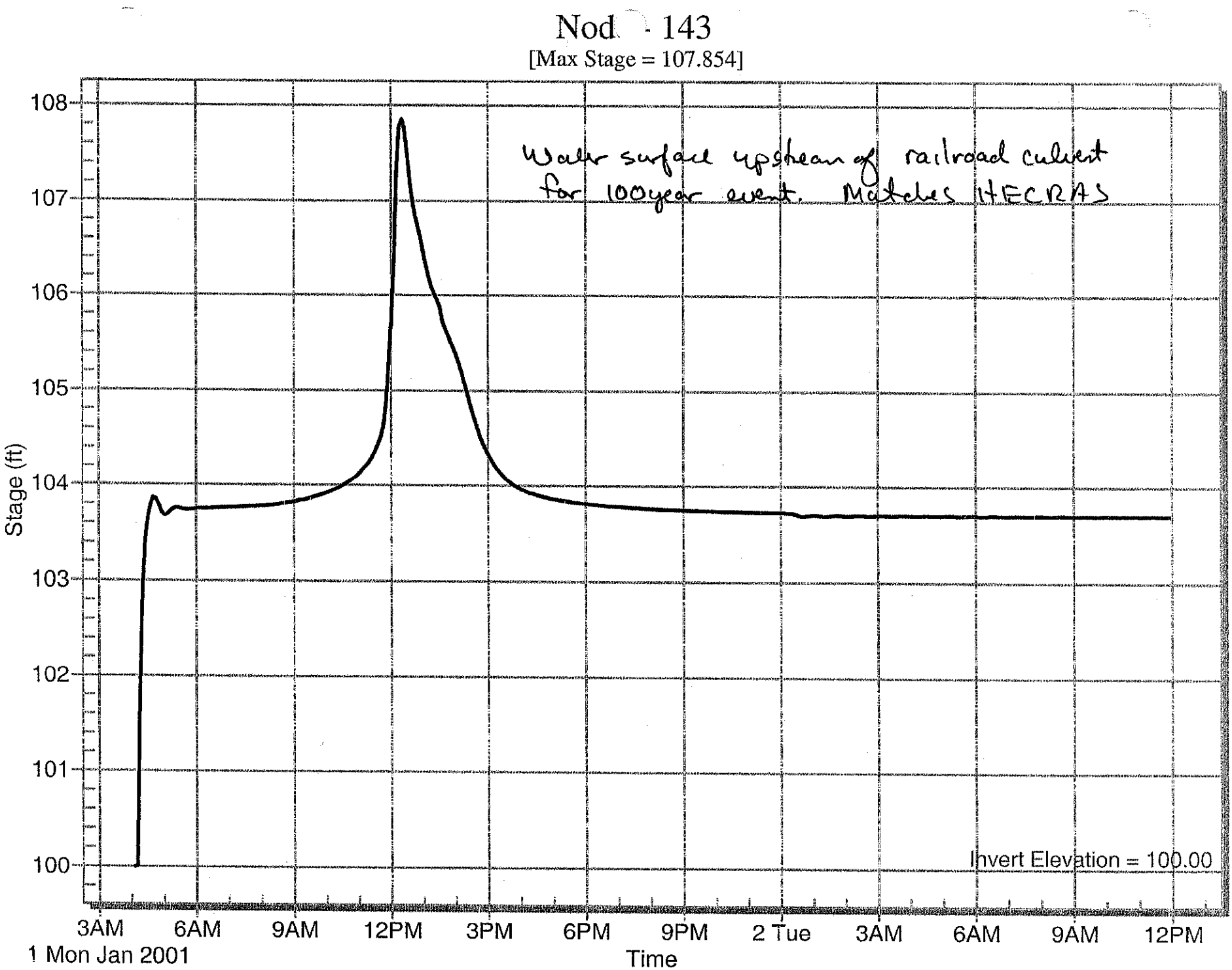
The model results demonstrate that the proposed design for the channel and culverts in conjunction with full development of the railyard and landfill will not adversely affect flooding on Bayshore Blvd. In fact, the duration of flooding is actually reduced. If the final development plan for the site includes any type of detention or if significant park areas are provided, the runoff rates will be lower than those predicted in the 2001 report and the resulting stages in the CDC and at Bayshore Blvd will be lower as well.

HECRAS Model Results



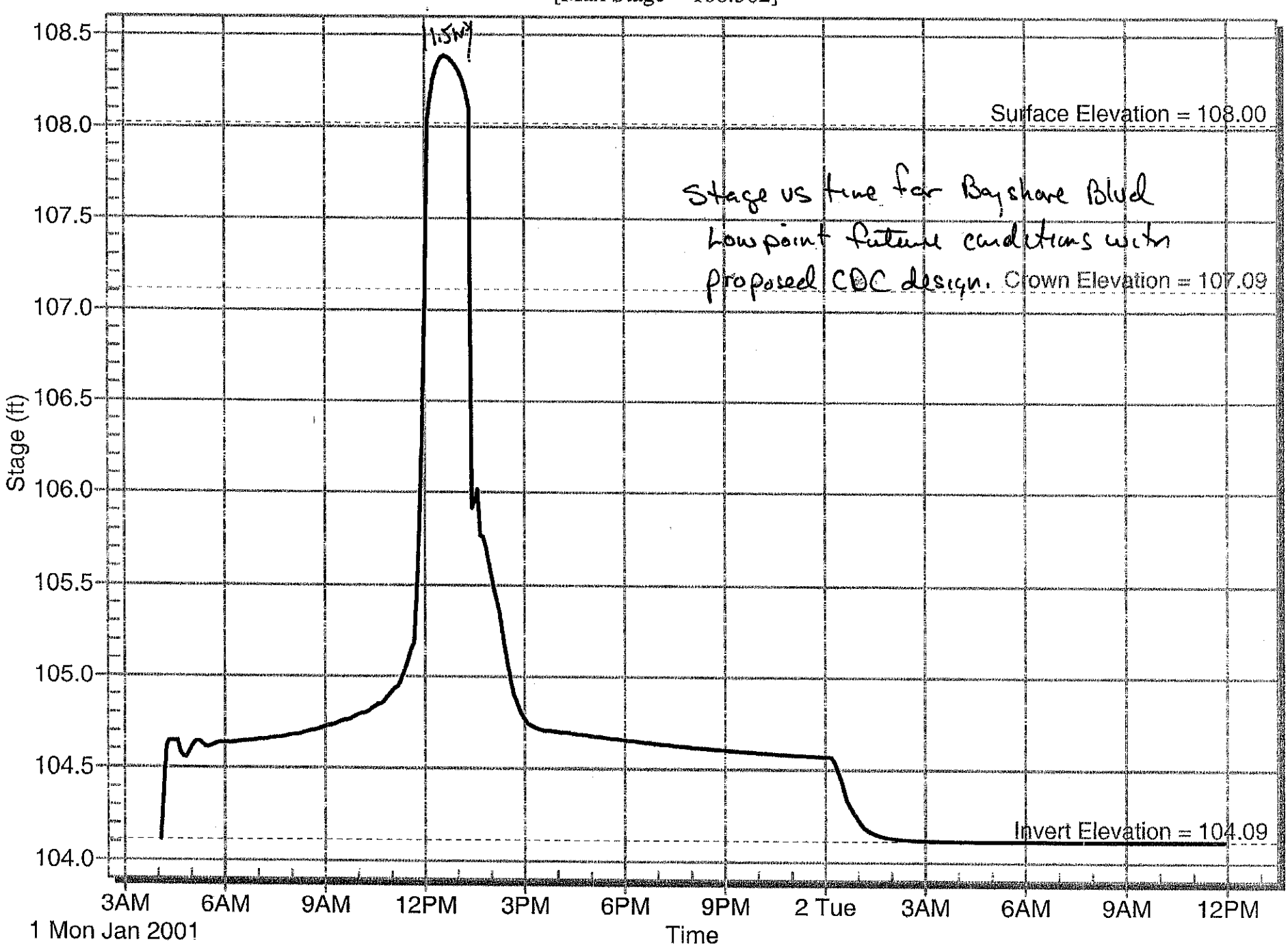
HEC-RAS Plan: 20hnhf(24x8) River: Sunquest Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	23	100-yr	702.25	-0.10	6.92		7.01	0.000261	2.43	288.42	62.14	0.20
1	22	25-yr	554.57	-0.10	5.85		5.94	0.000311	2.46	225.10	55.69	0.22
1	22	100-yr	702.25	-0.10	6.90		6.99	0.000265	2.45	286.71	61.97	0.20
1	21	25-yr	554.57	-0.20	5.82		5.91	0.000297	2.42	229.12	56.12	0.21
1	21	100-yr	702.25	-0.20	6.87		6.96	0.000254	2.41	291.45	62.43	0.20
1	20	25-yr	554.57	-0.20	5.79		5.88	0.000303	2.44	227.36	55.93	0.21
1	20	100-yr	702.25	-0.20	6.84		6.94	0.000257	2.42	289.79	62.27	0.20
1	19	25-yr	554.57	-0.30	5.76		5.85	0.000288	2.40	231.44	56.37	0.21
1	19	100-yr	702.25	-0.30	6.82		6.91	0.000246	2.38	294.60	62.73	0.19
1	18	25-yr	554.57	-0.30	5.73		5.82	0.000294	2.41	229.72	56.18	0.21
1	18	100-yr	702.25	-0.30	6.80		6.89	0.000250	2.40	292.98	62.58	0.20
1	17	25-yr	554.57	-0.40	5.70		5.79	0.000280	2.37	233.87	56.63	0.21
1	17	100-yr	702.25	-0.40	6.77		6.86	0.000239	2.36	297.86	63.04	0.19
1	16	25-yr	554.57	-0.40	5.67		5.76	0.000285	2.39	232.20	56.45	0.21
1	16	100-yr	702.25	-0.40	6.75		6.84	0.000242	2.37	296.28	62.89	0.19
1	15	25-yr	588.58	-0.50	5.64		5.73	0.000308	2.50	235.67	56.82	0.22
1	15	100-yr	766.14	-0.50	6.71		6.81	0.000278	2.55	299.97	63.24	0.21
1	14	25-yr	588.58	-0.60	5.61		5.70	0.000294	2.45	239.79	57.25	0.21
1	14	100-yr	766.14	-0.60	6.68		6.78	0.000266	2.51	304.73	63.69	0.20
1	13	25-yr	588.58	-0.60	5.58		5.67	0.000299	2.47	238.01	57.06	0.21
1	13	100-yr	766.14	-0.60	6.65		6.75	0.000270	2.53	302.95	63.52	0.20
1	12	25-yr	588.58	-0.70	5.55		5.64	0.000285	2.43	242.19	57.50	0.21
1	12	100-yr	766.14	-0.70	6.63		6.73	0.000259	2.49	307.77	63.98	0.20
1	11	25-yr	588.58	-0.70	5.52		5.61	0.000291	2.45	240.46	57.32	0.21
1	11	100-yr	766.14	-0.70	6.60		6.70	0.000263	2.50	306.03	63.82	0.20


Nod · 143
[Max Stage = 107.854]
Water surface upstream of railroad culvert for 100year event. Matches HECRAS
Stage (ft)
108
107
106
105
104
103
102
101
100
Invert Elevation = 100.00
3AM
6AM
9AM
12PM
3PM
6PM
9PM
2 Tue
3AM
6AM
9AM
12PM
1 Mon Jan 2001
Time

Nod · 277

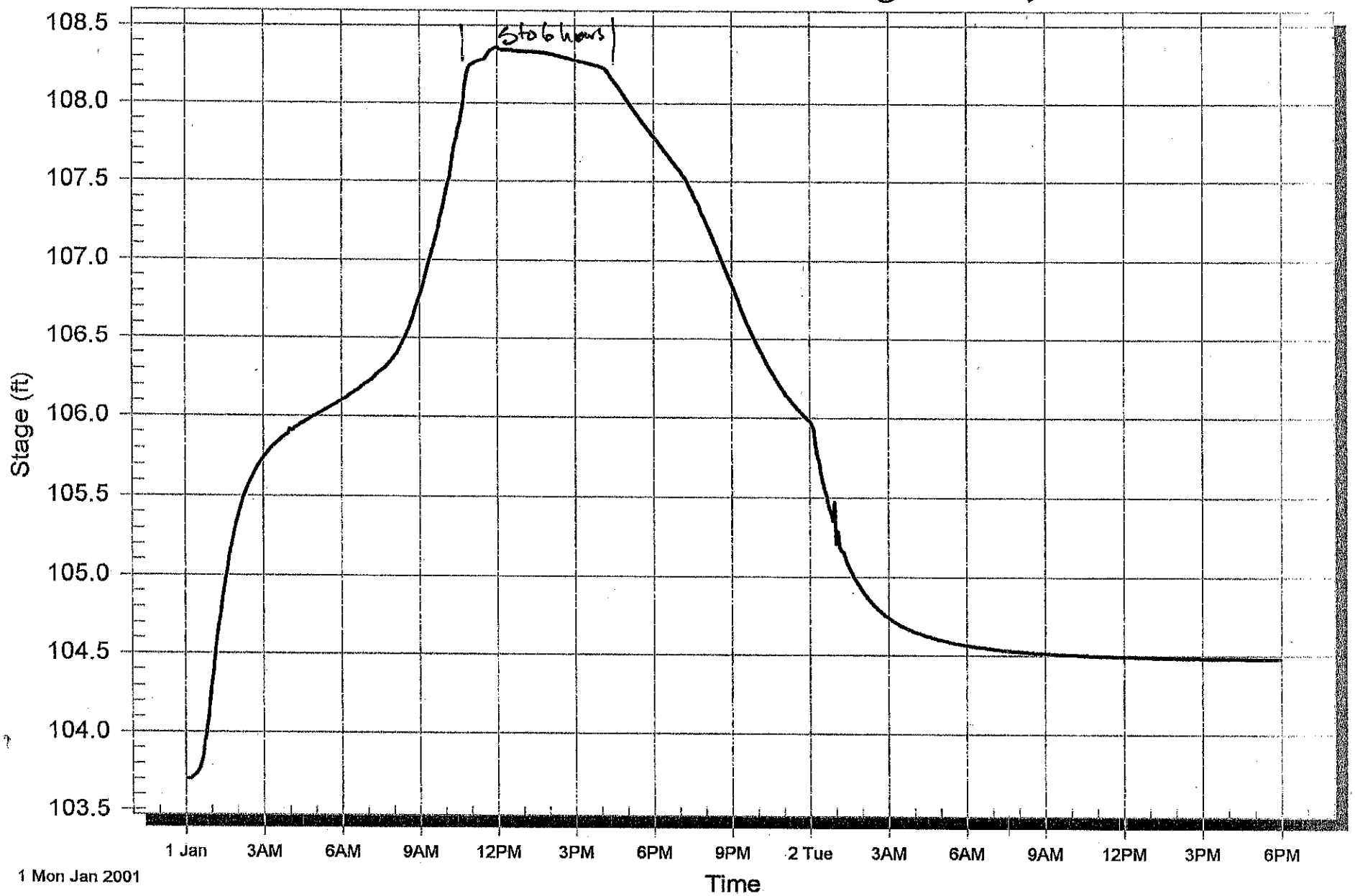
[Max Stage = 108.362]



Stage vs time graph for Bayshore Blvd from 2004 report.

Node - 753 Existing Conditions Bayshore Blvd

[Max Stage = 108.362] (Low Point)



1 Mon Jan 2001

Central Drainage Channel Mitigation Design Stormwater Report

Prepared For

Sunquest Properties Inc.

July 15, 2004

Burns & McDonnell Engineering Company
33107

CENTRAL DRAINAGE CHANNEL MIGATION DESIGN
STORMWATER REPORT
FOR
SUNQUEST PROPERTIES INC.

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CENTRAL DRAINAGE CHANNEL MITIGATION DESIGN

STORMWATER REPORT

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INTRODUCTION

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- The brick arch sewer extending from Bayshore Blvd. to the CDC does not have adequate capacity to convey stormwater flows

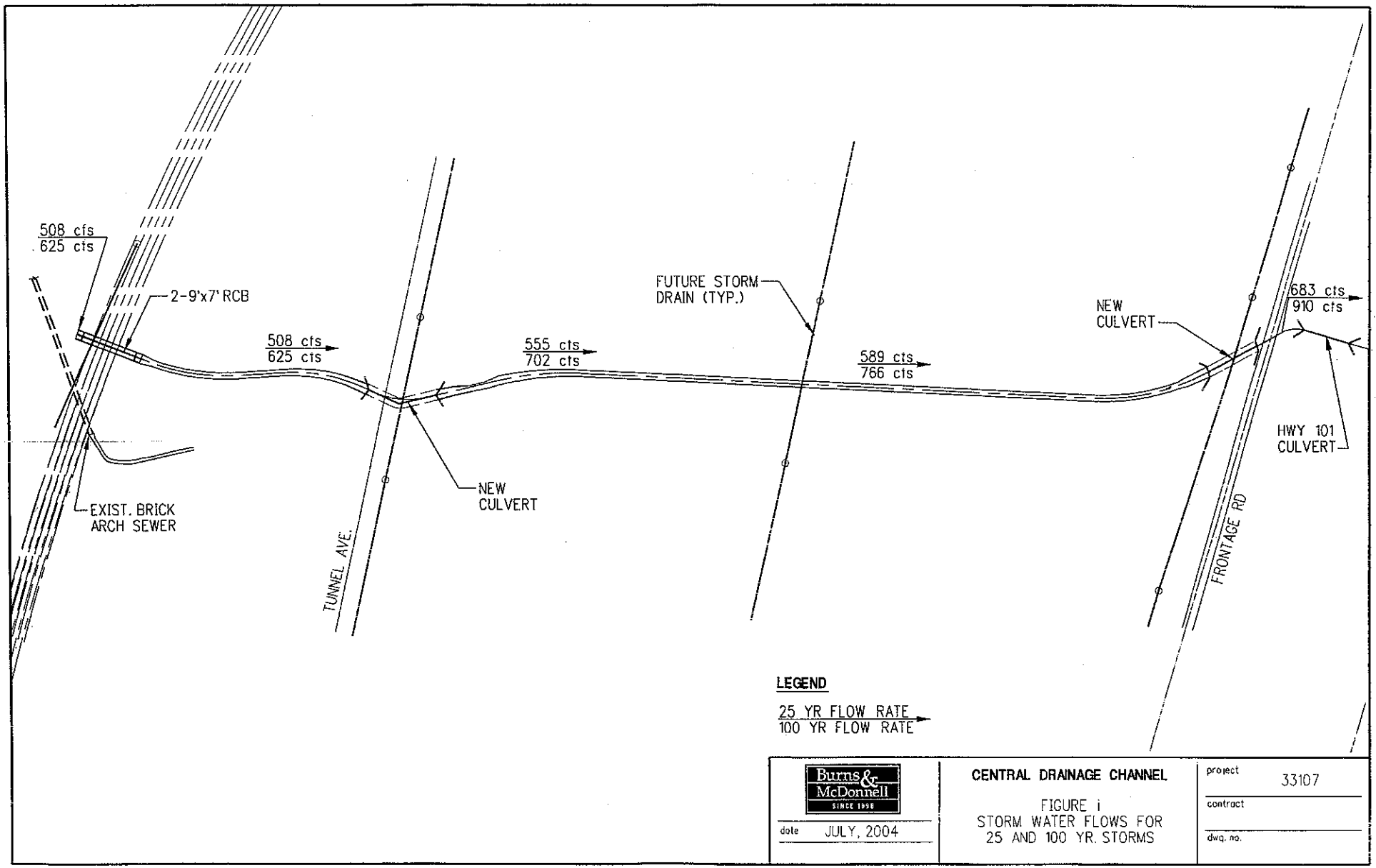
- Flooding on Bayshore Blvd occurs as predicted in the 1995 BKF report and as observed by City staff. The model predicts that flooding during the 100 year event will reach an elevation of 8.4' (approx. 0.4' above grade) and the duration of flooding is approx. 5 to 6 hours. A copy of the stage versus time graph at Bayshore from the 2004 report is included in Appendix A of this report

FUTURE CONDITIONS

Future conditions within the portion of the watershed west of Bayshore Blvd. are not expected to change markedly from existing conditions, because much of the watershed is fully developed. However, conditions within the railyard and landfill are expected to change significantly due to development of the areas by Sunquest. Sunquest has submitted a preliminary plan or "bubble plan" to the City showing that the site will be developed for commercial proposes with varying degrees of development density. The bubble plan also shows that numerous park features will be incorporated into the proposed development including a "river park" in the railyard and a park feature encompassing the CDC.

The proposed development plan for the railyard and landfill are in the initial planning stages only and the breakdown of land use between developed areas and park lands will likely undergo changes as the plans progress. Given this uncertainty, Sunquest directed Burns & McDonnell to proceed with a conservative or worst case design approach and assume that the majority of the site is fully developed, and that the proposed river park provides little or no storage for stormwater. By taking this approach, the CDC will be designed to convey the highest possible stormwater flow rates. If the actual development plan does incorporate on-site storage and less dense land uses, the channel will be over-designed and will convey flows more efficiently.

The 2001 *Brisbane Baylands Stormwater System Report* was developed based on full development of the railyard and landfill with no provisions for a river park. Therefore, the stormwater flows presented in that report for the 25 and 100 year events (with fixed high tide) can be considered worst case. The predicted flow rates in the CDC, from just upstream of the Caltrain tracks to Highway 101, were used as the basis of design for the current CDC improvements. The flows taken from the report and utilized for the current design are shown in Table 1 and in Figure 1.



Burns & McDonnell SINCE 1998

date JULY, 2004

CENTRAL DRAINAGE CHANNEL

FIGURE i
STORM WATER FLOWS FOR
25 AND 100 YR. STORMS

project 33107

contract

dwg. no.

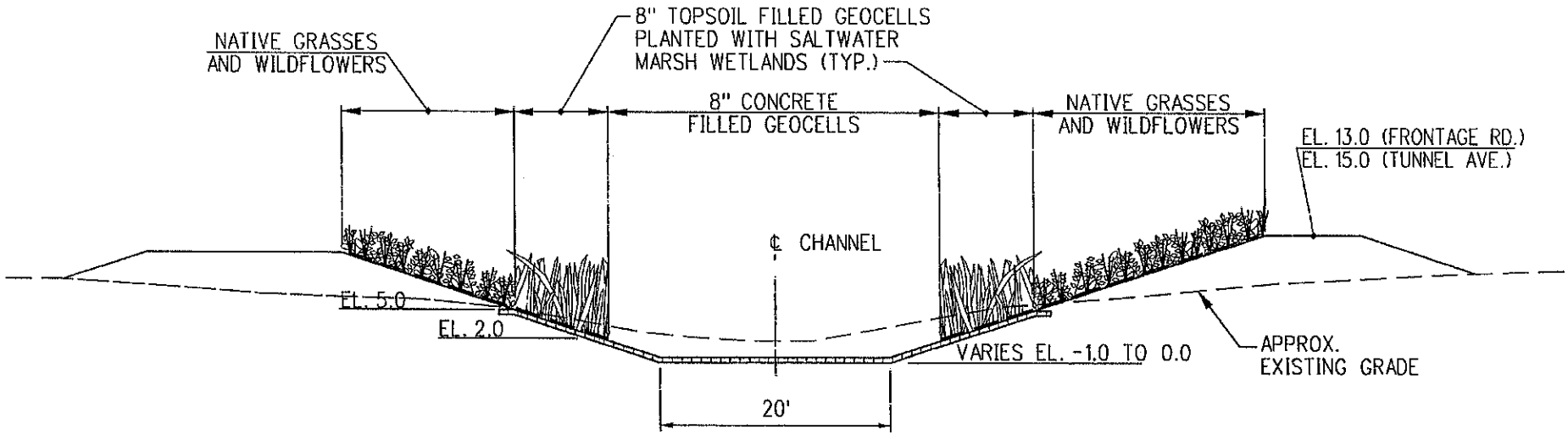
Table 1 – CDC Design Flow Rates

Location	25-yr Flow (cfs)	100-yr Flow (cfs)
Upstream of Caltrain ROW to Downstream of Tunnel Ave Culvert	508.72	624.88
Downstream of Tunnel Ave Culvert to Channel Midpoint	554.57	702.25
Channel Midpoint to Downstream End Frontage Road Culvert	588.58	766.14
Downstream of Frontage Road Culvert to Downstream of 101 Culvert	682.89	910.35

PROPOSED CHANNEL CONFIGURATION

The CDC was designed for the purposes of stormwater conveyance and to achieve mitigation of wetlands on the existing channel side slopes that will be destroyed during construction. The channel will be a typical trapezoidal configuration with 3:1 side slopes. The channel invert wills closely approximate the existing channel inverts of --1 0' National Geodetic Vertical Datum (NGVD) at the eastern end of the landfill (future Frontage Road), and 0.0' NGVD at both Tunnel Avenue and the Caltrain tracks. The channel invert and the sides slopes up to elevation 2 0' NGVD will be lined with concrete filled geocells for protection of the underlying liner and cover material. From elevation 2.0' to 5 0' NGVD, the geocells will be planted with different varieties of saltwater wetland plants. The remainder of the channel side slopes will be planted with native grasses and wildflowers. A graphical representation of the proposed channel cross section is shown in Figure 2.

Culvert crossings of the CDC are required at the Caltrain tracks, Tunnel Ave., and at Frontage Road (see Figure 1). The Caltrain culvert will consist of two 9' x 7' precast reinforced concrete boxes (RCBs) that are intended to pass flows from the Brick Arch Sewer and the future railyard development under the railroad right-of-way (ROW). The culvert was made large enough to pass flows form the Brick Arch Sewer because it was assumed that the portion of the Brick Arch Sewer lying within the ROW might be abandoned in the future. The culvert crossings at Tunnel Ave. and Frontage Road will consist of CON/SPAN culvert systems (arch culverts). The CONSPAN culverts were selected because their appearance is more aesthetically pleasing than typical concrete box culverts and they will fit in well with the proposed park setting envisioned for the CDC. The structure sizes were determined by hydraulic



TYPICAL CHANNEL SECTION BETWEEN RAILROAD R.O.W. AND FRONTAGE RD.

NOT TO SCALE

Burns & McDonnell SINCE 1898 date JULY, 2004	**CENTRAL DRAINAGE CHANNEL** FIGURE 2 TYPICAL SECTION	project 33107 contract dwg. no. rev. -

modeling as described in subsequent sections. It should be noted that the Tunnel Ave. culvert will consist of a double span structure due to foundation requirements determined by future fill heights. The actual or proposed future ROW widths and fill slope lengths at each location determined the culvert lengths.

The channel invert a short distance upstream of the Frontage Road culvert will be raised to elevation 2.0' NGVD, in order to permit 2 to 3 feet of water to be held in the channel at all times. The water is being held in the channel to help provide additional weight to offset bouyant forces acting on the liner that will be buried 5' below the channel invert. The water will also serve to soften the look of the concrete portion of the channel. Elevation 2.0' was selected to ensure that the daily tide cycle would be allowed to enter the channel and maintain the current hydrologic cycle (Mean daily high tide level is 3.1' NGVD)

MODELING AND RESULTS

The Corps of Engineers HEC-RAS computer model was used to determined the required channel width and the culvert sizes. Modeling scenarios were developed using the 25 and 100 year flow rates, the proposed channel configuration, and culvert locations. For the channel, Manning's Roughness Coefficient "N" was determined for each of the different surface treatments. The concrete filled geocells were assigned an "N" of 0.18 per the manufacturer's recommendations, the wetlands were assigned an "N" of 0.35 and the grassed slopes were assigned an "N" of 0.30. Boundary conditions consisted of a high tide elevation of 3.7' NGVD as described in both the 2001 and 2004 Burns & McDonnell reports and water surface elevations predicted in the 2001 report just upstream of the railroad culvert (@ Node 143 on the Node/Link Network Map presented in Appendix A of the 2001 report). The predicted water surface elevations are 6.4 feet for the 25 year event and 7.2 feet for the 100 year event. The 2001 report indicates that minimal flooding occurs at Bayshore Blvd. given these elevations

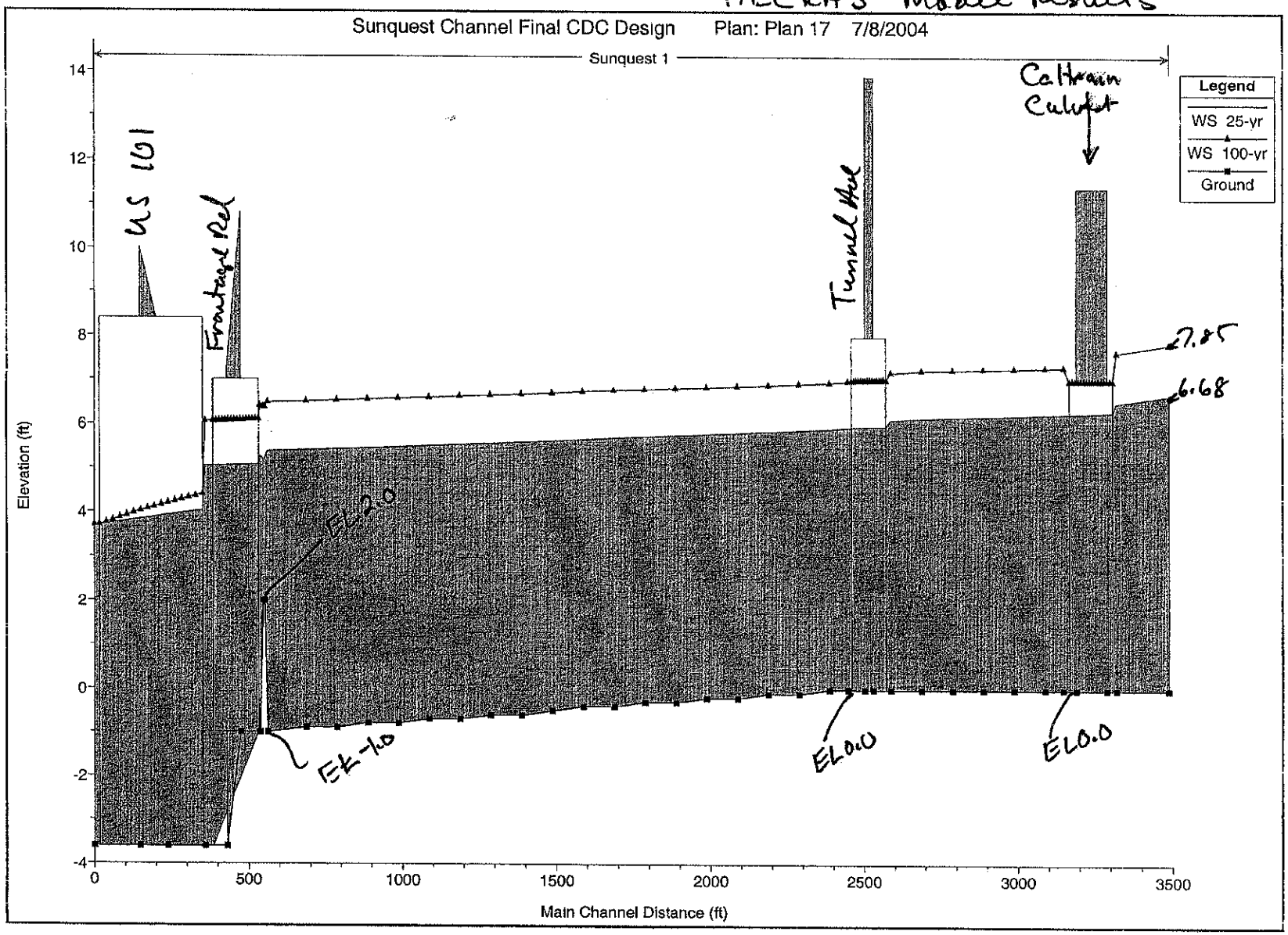
Multiple model runs were made varying the channel bottom width and the required culvert sizes. The final trial resulted in a channel with a bottom width of 20', a 24' x 8' CONSPAN culvert at Frontage Road, and 2-12' x 8' CONSPAN culverts at Tunnel Ave. The channel width was limited to a maximum of 20 feet in order to minimize the amount of refuse excavated during widening of the existing channel. The culvert under the railroad ROW was not revised and the double 9' x 7' RCBs will be used at this location because this is the maximum size that the railroad operator, the Peninsula Corridor Joint Powers Board (JPB or Caltrain), will consider for this location given the anticipated method of construction

The final channel and culvert configuration resulted in water levels upstream of the railroad ROW of elevation 6 68' NGVD and 7 85' NGVD The calculated levels exceeded the target levels at the upstream end of the railroad culvert; therefore additional modeling was required to determine if these stages affected flooding on Bayshore Blvd. The XP-SWMM model presented in the 2001 report was modified by reducing the size of the railroad culvert until the predicted upstream water levels approximated those obtained by the HEC-RAS modeling. The results of the revised model indicate that flooding on Bayshore does not occur during the 25 year event and flooding during the 100 year event occurs for a period of 1.5 hours with a corresponding elevation of 8.4' NGVD. This elevation is virtually identical to the level predicted for existing conditions and the duration of flooding is reduced by 4 to 5 hours

The model results demonstrate that the proposed design for the channel and culverts in conjunction with full development of the railyard and landfill will not adversely affect flooding on Bayshore Blvd In fact, the duration of flooding is actually reduced. If the final development plan for the site includes any type of detention or if significant park areas are provided, the runoff rates will be lower than those predicted in the 2001 report and the resulting stages in the CDC and at Bayshore Blvd. will be lower as well

Appendix A
Modeling Results

HECRAS Model Results



HEC-RAS Plan: 20hnhf(24x8) River: Sunquest Reach: 1

WS @ upstream

HEC-RAS model Results

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	34	25-yr	508.72	0.00	6.68		6.73	0.000168	1.90	267.26	60.06	0.16
1	34	100-yr	624.88	0.00	7.85		7.90	0.000133	1.83	341.68	67.08	0.14
1	33	25-yr	508.72	0.00	6.50	2.46	6.67	0.000161	3.29	154.76	59.02	0.23
1	33	100-yr	624.88	0.00	7.65	2.82	7.84	0.000140	3.43	182.38	65.93	0.22
1	32.5	Culvert										
1	32	25-yr	508.72	0.00	6.26		6.33	0.000215	2.09	242.91	57.58	0.18
1	32	100-yr	624.88	0.00	7.32		7.38	0.000176	2.04	306.84	63.89	0.16
1	31	25-yr	508.72	0.00	6.25		6.32	0.000217	2.10	242.14	57.49	0.18
1	31	100-yr	624.88	0.00	7.30		7.37	0.000177	2.04	306.14	63.83	0.16
1	30	25-yr	508.72	0.00	6.23		6.30	0.000220	2.11	240.84	57.36	0.18
1	30	100-yr	624.88	0.00	7.29		7.35	0.000179	2.05	304.97	63.72	0.17
1	29	25-yr	508.72	0.00	6.20	2.39	6.27	0.000223	2.12	239.52	57.22	0.18
1	29	100-yr	624.88	0.00	7.27	2.70	7.33	0.000181	2.06	303.79	63.60	0.17
1	28	25-yr	508.72	0.00	6.18	2.39	6.25	0.000226	2.14	238.18	57.08	0.18
1	28	100-yr	624.88	0.00	7.25	2.70	7.31	0.000183	2.07	302.60	63.49	0.17
1	27	25-yr	508.72	0.00	6.16		6.23	0.000230	2.15	236.84	56.94	0.19
1	27	100-yr	624.88	0.00	7.23		7.30	0.000185	2.07	301.40	63.38	0.17
1	26	25-yr	508.72	0.00	6.11	2.39	6.21	0.000171	2.48	205.21	56.67	0.19
1	26	100-yr	624.88	0.00	7.18	2.70	7.28	0.000141	2.54	245.72	63.06	0.18
1	25	Culvert										
1	24.5	25-yr	508.72	0.00	5.95	2.39	6.03	0.000263	2.26	225.11	55.69	0.20
1	24.5	100-yr	624.88	0.00	6.99	2.70	7.06	0.000211	2.18	286.32	61.93	0.18
1	24	25-yr	554.57	0.00	5.91		6.01	0.000320	2.49	222.94	55.46	0.22
1	24	100-yr	702.25	0.00	6.95		7.04	0.000273	2.47	283.75	61.68	0.20
1	23	25-yr	554.57	-0.10	5.88		5.97	0.000305	2.44	226.90	55.88	0.21

Tunnel ave

HEC-RAS Plan: 20hnhf(24x8) River: Sunquest Reach: 1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
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1	21	25-Yr	554.57	-0.20	5.82		5.91	0.000297	2.42	229.12	56.12	0.21
1	21	100-Yr	702.25	-0.20	6.87		6.96	0.000254	2.41	291.45	62.43	0.20
1	20	25-Yr	554.57	-0.20	5.79		5.88	0.000303	2.44	227.36	55.93	0.21
1	20	100-Yr	702.25	-0.20	6.84		6.94	0.000257	2.42	289.79	62.27	0.20
1	19	25-Yr	554.57	-0.30	5.76		5.85	0.000288	2.40	231.44	56.37	0.21
1	19	100-Yr	702.25	-0.30	6.82		6.91	0.000246	2.38	294.60	62.73	0.19
1	18	25-Yr	554.57	-0.30	5.73		5.82	0.000294	2.41	229.72	56.18	0.21
1	18	100-Yr	702.25	-0.30	6.80		6.89	0.000250	2.40	292.98	62.58	0.20
1	17	25-Yr	554.57	-0.40	5.70		5.79	0.000280	2.37	233.87	56.63	0.21
1	17	100-Yr	702.25	-0.40	6.77		6.86	0.000239	2.36	297.86	63.04	0.19
1	16	25-Yr	554.57	-0.40	5.67		5.76	0.000285	2.39	232.20	56.45	0.21
1	16	100-Yr	702.25	-0.40	6.75		6.84	0.000242	2.37	296.28	62.89	0.19
1	15	25-Yr	588.58	-0.50	5.64		5.73	0.000308	2.50	235.67	56.82	0.22
1	15	100-Yr	766.14	-0.50	6.71		6.81	0.000278	2.55	299.97	63.24	0.21
1	14	25-Yr	588.58	-0.60	5.61		5.70	0.000294	2.45	239.79	57.25	0.21
1	14	100-Yr	766.14	-0.60	6.68		6.78	0.000266	2.51	304.73	63.69	0.20
1	13	25-Yr	588.58	-0.60	5.58		5.67	0.000299	2.47	238.01	57.06	0.21
1	13	100-Yr	766.14	-0.60	6.65		6.75	0.000270	2.53	302.95	63.52	0.20
1	12	25-Yr	588.58	-0.70	5.55		5.64	0.000285	2.43	242.19	57.50	0.21
1	12	100-Yr	766.14	-0.70	6.63		6.73	0.000259	2.49	307.77	63.98	0.20
1	11	25-Yr	588.58	-0.70	5.52		5.61	0.000291	2.45	240.46	57.32	0.21
1	11	100-Yr	766.14	-0.70	6.60		6.70	0.000263	2.50	306.03	63.82	0.20

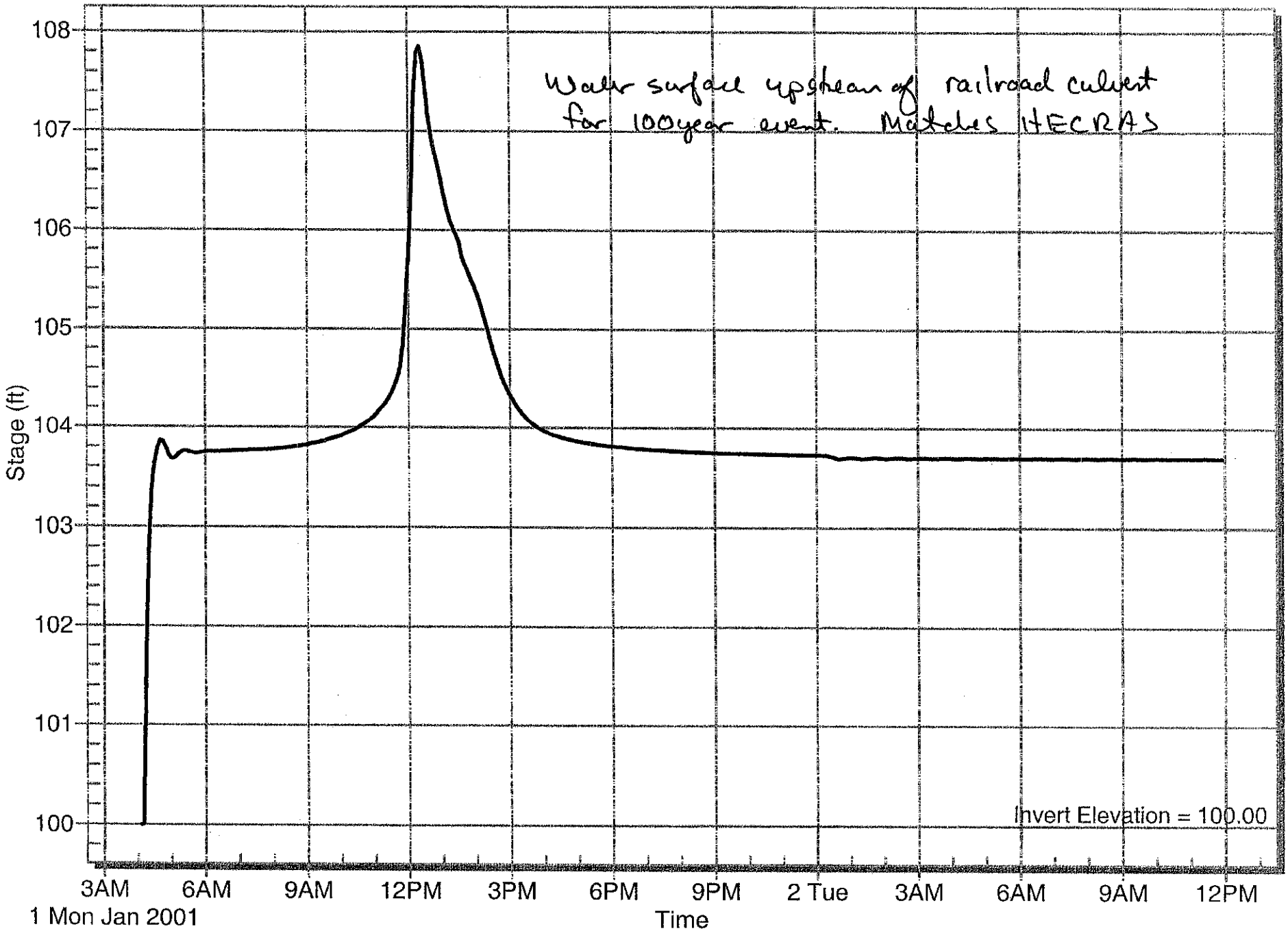
HEC-RAS Plan: 20hnhf(24x8) River: Sunquest Reach: 1 (Continued)

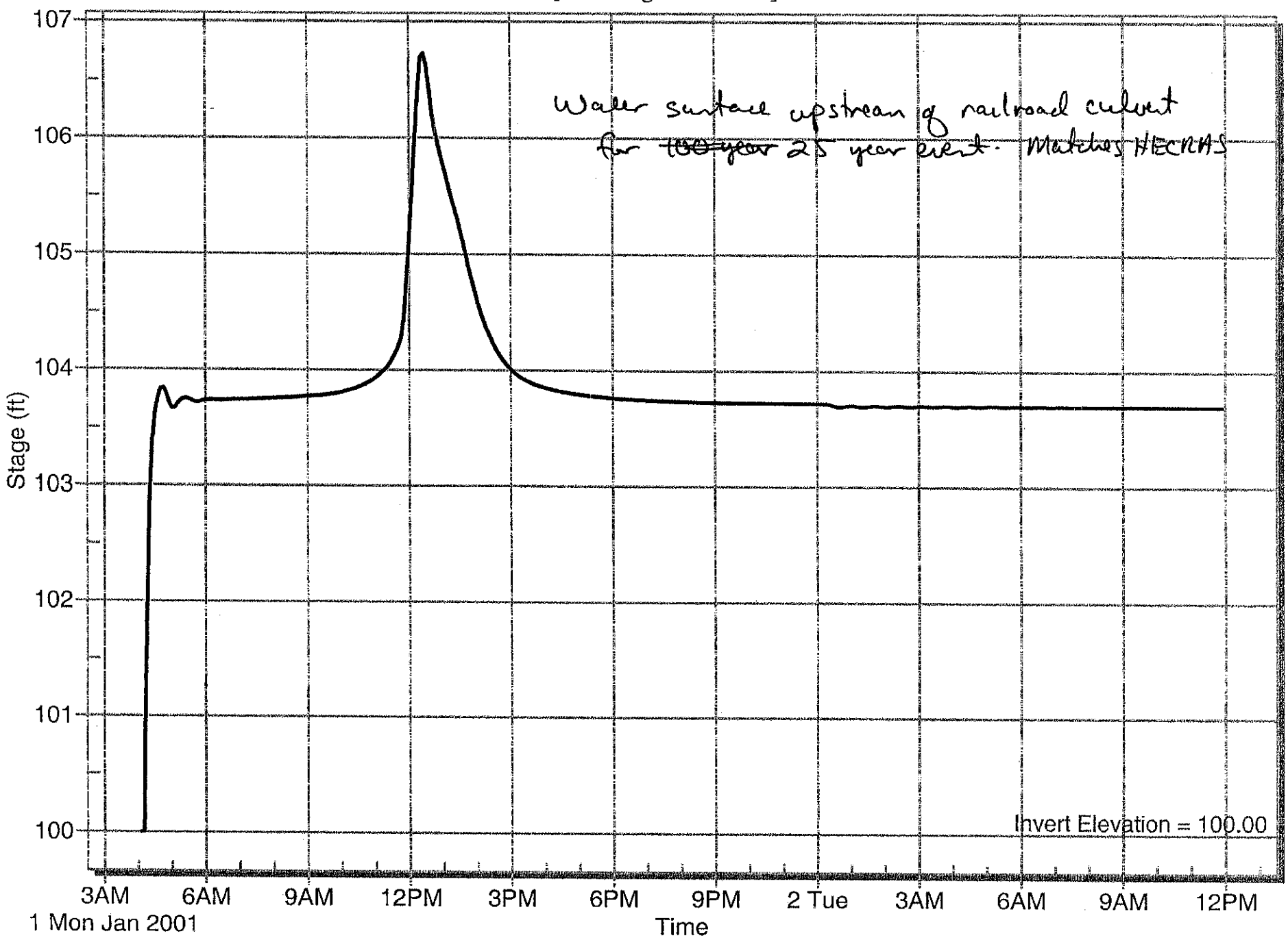
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	10	25-yr	588.58	-0.80	5.49		5.58	0.000277	2.41	244.71	57.76	0.21
1	10	100-yr	766.14	-0.80	6.58		6.67	0.000252	2.46	310.92	64.27	0.20
1	9	25-yr	588.58	-0.80	5.46		5.56	0.000282	2.42	243.02	57.59	0.21
1	9	100-yr	766.14	-0.80	6.55		6.65	0.000255	2.48	309.23	64.11	0.20
1	8	25-yr	588.58	-0.90	5.44		5.53	0.000269	2.38	247.33	58.03	0.20
1	8	100-yr	766.14	-0.90	6.53		6.62	0.000244	2.44	314.19	64.58	0.19
1	7	25-yr	588.58	-0.90	5.41		5.50	0.000274	2.40	245.69	57.86	0.20
1	7	100-yr	766.14	-0.90	6.50		6.60	0.000248	2.45	312.53	64.42	0.20
1	6.6	25-yr	588.58	-1.00	5.38		5.47	0.000262	2.36	249.67	58.28	0.20
1	6.6	100-yr	766.14	-1.00	6.48		6.57	0.000238	2.42	317.16	64.85	0.19
1	6.4	25-yr	588.58	2.00	5.22		5.45	0.001101	3.84	153.34	57.31	0.41
1	6.4	100-yr	766.14	2.00	6.37		6.55	0.000656	3.43	223.38	64.22	0.32
1	6.2	25-yr	588.58	2.00	5.21		5.44	0.001107	3.85	153.00	57.27	0.41
1	6.2	100-yr	766.14	2.00	6.37		6.55	0.000658	3.43	223.16	64.20	0.32
1	6	25-yr	588.58	-1.00	5.28	1.61	5.40	0.000189	2.78	211.82	57.71	0.21
1	6	100-yr	766.14	-1.00	6.39	2.04	6.53	0.000175	3.02	253.94	64.36	0.21
1	4.5		Culvert		Frontage Rd							
1	3	25-yr	682.89	-3.60	5.06	-2.10	5.07	0.000064	1.02	669.68	99.69	0.07
1	3	100-yr	910.35	-3.60	6.06	-1.78	6.08	0.000078	1.18	773.54	108.95	0.08
1	2.1		Culvert	101	Culverts							
1	1	25-yr	682.89	-3.60	3.70	-0.43	3.79	0.000594	2.46	277.73	59.70	0.20
1	1	100-yr	910.35	-3.60	3.70	0.12	3.87	0.001056	3.28	277.73	59.70	0.27

7.4

Nod - 143

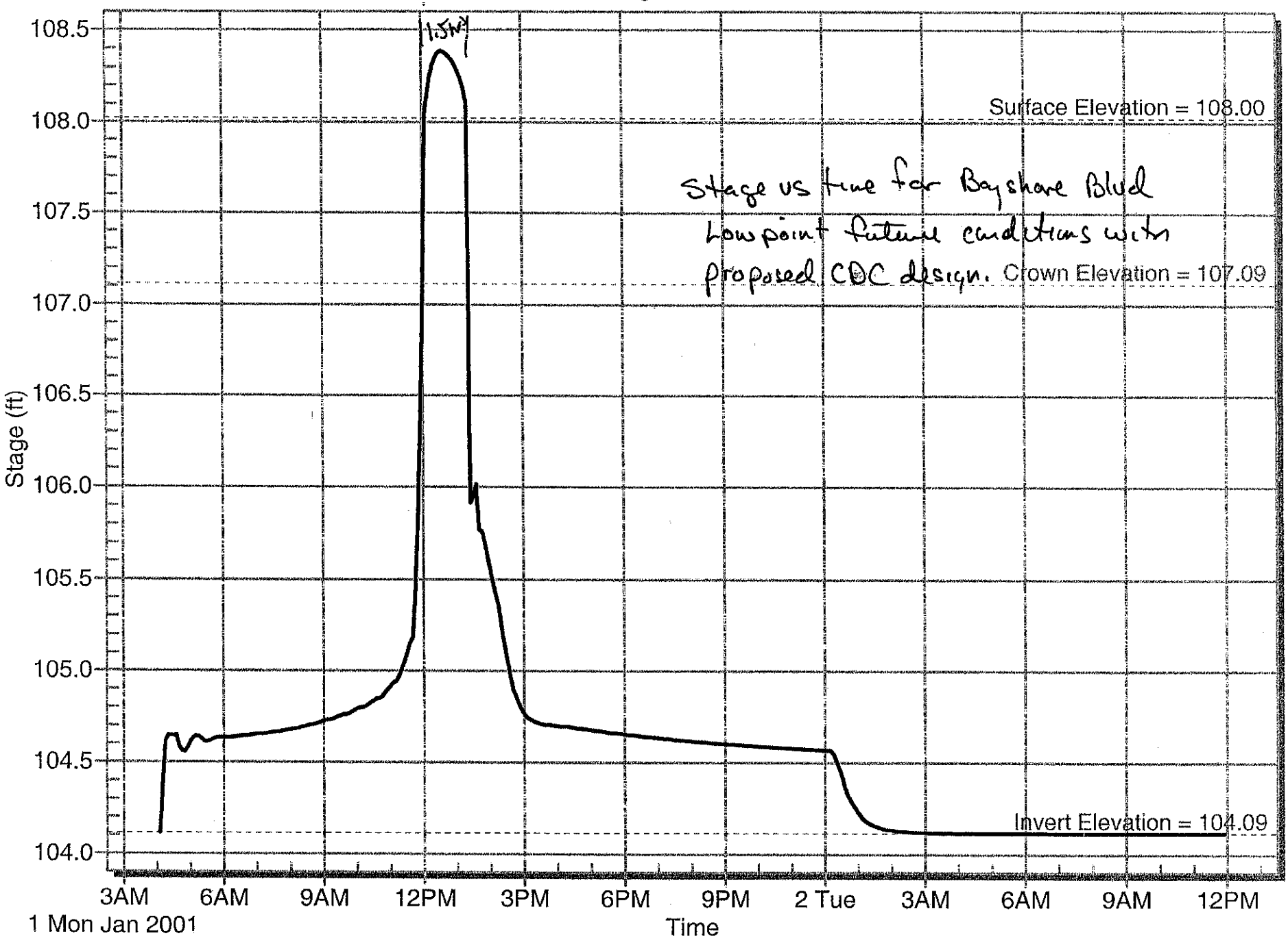
[Max Stage = 107.854]



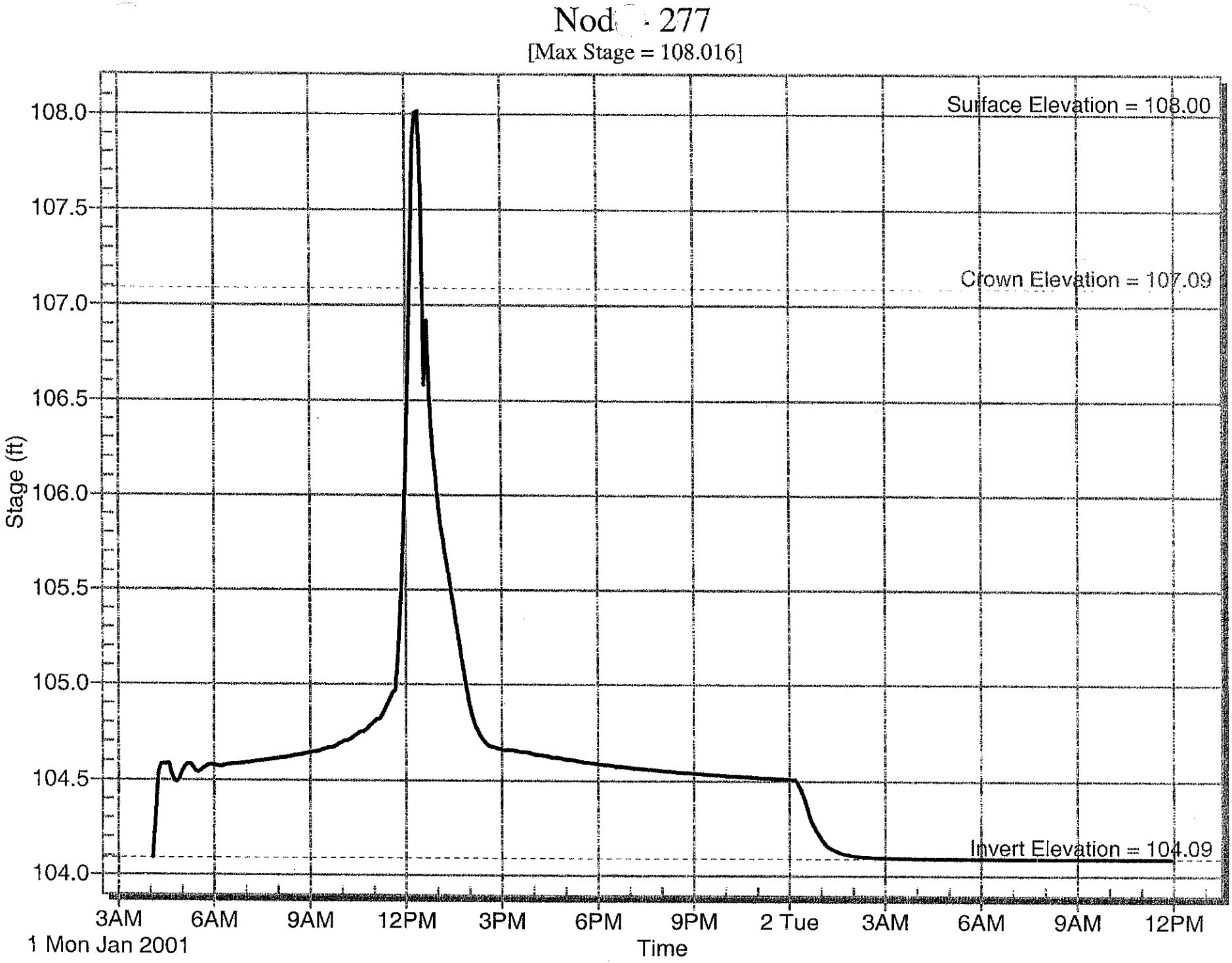

Node 143
[Max Stage = 106.733]
Water surface upstream of railroad culvert
for ~~100-year~~ 25 year event. Matches HECRAS
Stage (ft)
107
106
105
104
103
102
101
100
Invert Elevation = 100.00
3AM
6AM
9AM
12PM
3PM
6PM
9PM
2 Tue
3AM
6AM
9AM
12PM
1 Mon Jan 2001
Time

Node 277

[Max Stage = 108.362]



Stage vs time for Bayshore Blvd low point future conditions with proposed CDC design.


Nod · 277
[Max Stage = 108.016]
Surface Elevation = 108.00
Crown Elevation = 107.09
Invert Elevation = 104.09
Stage (ft)
108.0
107.5
107.0
106.5
106.0
105.5
105.0
104.5
104.0
3AM
6AM
9AM
12PM
3PM
6PM
9PM
2 Tue
3AM
6AM
9AM
12PM
1 Mon Jan 2001
Time

Stage vs time graph for Bayshore Blvd from 2004 report.

Node - 753 Existing Conditions Bayshore Blvd

[Max Stage = 108.362] (Low Point)