IN THE SUPREME COURT OF THE STATE OF NEVADA

Case No. 84345
and
Case No. 84640

Electronically Filed
May 02 2023 04:23 PM
Elizabeth A. Brown
Clerk of Supreme Court

CITY OF LAS VEGAS, a political subdivision of the State of Nevada,

Appellant

v.

180 LAND CO, LLC, a Nevada limited-liability company, FORE STARS LTD., a Nevada limited liability company,

Respondents

District Court Case No.: A-17-758528-J
Eighth Judicial District Court of Nevada

CITY OF LAS VEGAS' REPLY APPENDIX
VOLUME 9

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Docket 84345 Document 2023-13826

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CHRONOLOGICAL INDEX TO CITY'S REPLY APPENDIX

DATE	DOCUMENT	VOLUME	PAGE RANGE
2022-08-10	Plaintiff Landowners' Motion to Determine Take and for Summary Judgment on the Third and Fifth Claims for Relief, Case No. A-18-773268-C	1	REPLY APP 0001 - REPLY APP 0030
2022-08-11	Plaintiff Landowners' Appendix of Exhibits in Support of: Plaintiff Landowners' Motion to Determine Take and for Summary Judgment on the Third and Fifth Claims for Relief, Volume 22, Exhibit 214, Case No. A-18-773268-C	1	REPLY APP 0031 - REPLY APP 0227
2022-08-24	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Renewed Motion for Summary Judgment and Motions in Limine Volume 26, Exhibits KKKKK - LLLLL, Case No. A-18-773268-C	2	REPLY APP 0228 - REPLY APP 0364
2022-09-12	Plaintiff Landowners Reply Re: Plaintiff Landowners' Motion to Determine Take and For Summary Judgment on the Third and Fifth Claims for Relief, Case No. A-18-773268-C	2	REPLY APP 0365 - REPLY APP 0395

DATE	DOCUMENT	VOLUME	PAGE RANGE
2022-09-13	Defendant City of Las Vegas' Second Supplemental Appendix of Exhibits in Support of City's Renewed Motion for Summary Judgment and Motions in Limine Volume 32, Case No. A-18-773268-C	2	REPLY APP 0396 - REPLY APP 0432
2022-11-23	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Countermotion for Summary Judgment on Just Compensation Volume 34, Case No. A-18-773268-C	3	REPLY APP 0433 - REPLY APP 0652
2022-11-23	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Countermotion for Summary Judgment on Just Compensation Volume 35, Case No. A-18-773268-C	4 5	REPLY APP 0653 - REPLY APP 0902 REPLY APP 0903 - REPLY APP 0907
2022-11-23	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Countermotion for Summary Judgment on Just Compensation Volume 36, Case No. A-18-773268-C	5	REPLY APP 0908 - REPLY APP 1096
2022-11-23	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Countermotion for Summary Judgment on Just Compensation Volume 37, Case No. A-18-773268-C	6	REPLY APP 1097 - REPLY APP 1240

DATE	DOCUMENT	VOLUME	PAGE RANGE
2022-11-23	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Countermotion for Summary Judgment on Just Compensation Volume 38, Case No. A-18-773268-C	7	REPLY APP 1241 - REPLY APP 1406
2022-11-23	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Countermotion for Summary Judgment on Just Compensation Volume 39, Case No. A-18-773268-C	7	REPLY APP 1407 - REPLY APP 1476
2023-01-23	Defendant City of Las Vegas' Appendix of Exhibits in Support of Motion to Retax Memorandum of Costs, Volume 1, Exhibits B - C, Case No. A-18-773268-C	8	REPLY APP 1477 - REPLY APP 1667
2022-09-12	Plaintiff Landowners Second Supplement to Appendix of Exhibits in Support of Motion to Determine Take and for Summary Judgment on the Third and Fifth Claims for Relief Volume 24, Excerpt from Exhibit 228, Case No. A-18-773268-C	9	REPLY APP 1668 - REPLY APP 1742

ALPHABETICAL INDEX TO CITY'S REPLY APPENDIX

DATE	DOCUMENT	VOLUME	PAGE RANGE
2023-01-23	Defendant City of Las Vegas' Appendix of Exhibits in Support of Motion to Retax Memorandum of Costs, Volume 1, Exhibits B - C, Case No. A-18-773268-C	8	REPLY APP 1477 - REPLY APP 1667
2022-09-13	Defendant City of Las Vegas' Second Supplemental Appendix of Exhibits in Support of City's Renewed Motion for Summary Judgment and Motions in Limine Volume 32, Case No. A-18-773268-C	2	REPLY APP 0396 - REPLY APP 0432
2022-08-24	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Renewed Motion for Summary Judgment and Motions in Limine Volume 26, Exhibits KKKKK - LLLLL, Case No. A-18-773268-C	2	REPLY APP 0228 - REPLY APP 0364
2022-11-23	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Countermotion for Summary Judgment on Just Compensation Volume 34, Case No. A-18-773268-C	3	REPLY APP 0433 - REPLY APP 0652
2022-11-23	Defendant City of Las Vegas' Supplemental Appendix of Exhibits in Support of City's Countermotion for Summary Judgment on Just Compensation Volume 35, Case No. A-18-773268-C	4 5	REPLY APP 0653 - REPLY APP 0902 REPLY APP 0903 - REPLY APP 0907

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2022-08-11	Plaintiff Landowners' Appendix of Exhibits in Support of: Plaintiff Landowners' Motion to Determine Take and for Summary Judgment on the Third and Fifth Claims for Relief, Volume 22, Exhibit 214, Case No. A-18-773268-C	1	REPLY APP 0031 - REPLY APP 0227
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DATED this 2nd day of May, 2023.

BY: /s/ Debbie Leonard

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Attorneys for City of Las Vegas

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that I am an employee of Leonard Law, PC, and that on this date a copy of Appendix Volumes 2-9 were electronically filed with the Clerk of the Court for the Nevada Supreme Court by using the Nevada Supreme Court's E-Filing system (E-Flex). Participants in the case who are registered with E-Flex as users will be served by the E-Flex system. All others will be served by U.S. mail.

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DISTRICT COURT

CLARK COUNTY, NEVADA

FORE STARS, LTD; SEVENTY ACRES LLC, a Nevada liability company; DOE INDIVIDUALS I through X, DOE CORPORATIONS I through X, and DOE LIMITED LIABILITIES COMPANIES I through X, Plaintiffs, vs. CITY OF LAS VEGAS, a political subdivision of the State of Nevada; ROE government entities I though X, ROE LIMITED LIABILITY COMPANIES I though X, ROE quasi-governmental I through X, Defendants.	Case No.: A-18-773268-C Dept No.: XXIX **SECOND SUPPLEMENT TO APPENDIX OF EXHIBITS IN SUPPORT OF: PLAINTIFF LANDOWNERS' MOTION TO DETERMINE TAKE AND FOR SUMMARY JUDGMENT ON THE THIRD AND FIFTH CLAIMS FOR RELIEF** **VOLUME 24**

Plaintiffs Fore Stars, LTD. (hereinafter "Fore Stars"), and Seventy Acres, LLC (hereinafter "Seventy Acres LLC") (collectively "Plaintiffs," "Landowners," or "Plaintiff Landowners"), by and through their attorneys, the Law Offices of Kermitt L. Waters, hereby file this First Supplement to the

Appendix of Exhibits in Support of Plaintiff Landowners' Motion to Determine Take and for Summary Judgment on the Third and Fifth Claims for Relief as follows:

Exh. No.	Description	Vol. No.	Bates No.
1	October Findings of Fact and Conclusions of Law Regarding Plaintiff Landowners' Motion to Determine "Property Interest"	1	000001-000005
2	Map 1 of 250 Acre Land	1	000006
3	Map 2 of 250 Acre Land	1	000007
4	Notice of Related Cases	1	000008-000012
5	April 15, 1981 City Commission Minutes	1	000013-000050
6	December 20, 1984 City of Las Vegas Planning Commission hearing on General Plan Update	1	000051-000151
7	Findings of Fact and Conclusions of Law Regarding Plaintiffs' Motion for New Trial, Motion to Alter or Amend and/or Reconsider the Findings of Fact and Conclusions of Law, Motion to Stay Pending Nevada Supreme Court Directives	2	000152-000164
8	ORDER GRANTING the Landowners' Countermotion to Amend/Supplement the Pleadings; DENYING the Landowners' Countermotion for Judicial Determination of Liability on the Landowners' Inverse Condemnation Claims	2	000165-000188
9	City's Opposition to Motion to Determine "Property Interest"	2	000189-000216
10	City of Las Vegas' Motion for Judgment on the Pleadings on Developer's Inverse Condemnation Claims	2	000217-000230
11	Petition for Writ of Mandamus, or in the Alternative, Writ of Prohibition	2	000231-000282
12	Supreme Court Order Denying Petition for Writ of Mandamus or Prohibition	2	000283-000284
13	Supreme Court Order Denying Rehearing	2	000285-000286
14	Supreme Court Order Denying En Banc Reconsideration	2	000287-000288

15	Motion to Dismiss Complaint for Declaratory and Injunctive Relief and in Inverse Condemnation, *Fore Stars, Ltd. Seventy Acres, LLC v. City of Las Vegas, et al.*, Case No. A-18-773268-C	2	000289-000308
16	City's Sur Reply Memorandum of Points and Authorities in Support of Motion to Dismiss Complaint for Declaratory and Injunctive Relief and Inverse Condemnation, *Fore Stars, Ltd. Seventy Acres, LLC v. City of Las Vegas, et al.*, Case No. A-18-773268-C	2	000309-000319
17	City's Proposed Findings of Fact and Conclusion of Law Granting City's Motion to Dismiss Complaint, *Fore Stars, Ltd. Seventy Acres, LLC v. City of Las Vegas, et al.*, Case No. A-18-773268-C	2	000320-000340
18	Order Denying City of Las Vegas' Motion to Dismiss, *Fore Stars, Ltd. Seventy Acres, LLC v. City of Las Vegas, et al.*, Case No. A-18-773268-C	2	000341-000350
19	City of Las Vegas' Motion to Dismiss, *180 Land Co., LLC v. City of Las Vegas, et al.*, Case No. A-18-775804-J	2	000351-000378
20	2.15.19 Minute Order re City's Motion to Dismiss	2	000379
21	Respondents' Answer Brief, Supreme Court Case No. 75481	2	000380-000449
22	Order Granting Plaintiffs' Petition for Judicial Review, *Jack B. Binion, et al vs. The City of Las Vegas,* Case No. A-17-752344-J	2	000450-000463
23	Supreme Court Order of Reversal	2	000464-000470
24	Supreme Court Order Denying Rehearing	2	000471-000472
25	Supreme Court Order Denying En Banc Reconsideration	2	000473-000475
26	Findings of Fact, Conclusions of Law and Judgment Granting Defendants Fore Stars, Ltd., 180 Land Co LLC, Seventy Acres LLC, EHB Companies LLC, Yohan Lowie, Vickie Dehart and Frank Pankratz's NRCP 12(b)(5) Motion to Dismiss Plaintiffs' Amended Complaint	2	000476-000500
27	Notice of Entry of Findings of Fact, Conclusions of Law, Final Order of Judgment, *Robert Peccole, et al v. Peccole Nevada Corporation, et al.,* Case No. A-16-739654-C	2	000501-000545
28	Supreme Court Order of Affirmance	2	000546-000550
29	Supreme Court Order Denying Rehearing	2	000551-000553
30	November 1, 2016 Badlands Homeowners Meeting Transcript	2	000554-000562

31	June 13, 2017 Planning Commission Meeting Verbatim Transcript	2	000563-000566
32	Notice of Entry of Findings of Fact and Conclusions of Law Granting City of Las Vegas' Motion for Summary Judgment, *180 Land Co. LLC, et al v. City of Las Vegas,* Case No. A-18-780184-C	3	000567-000604
33	June 21, 2017 City Council Meeting Combined Verbatim Transcript	3	000605-000732
34	Declaration of Yohan Lowie	3	000733-000739
35	Declaration of Yohan Lowie in Support of Plaintiff Landowners' Motion for New Trial and Amend Related to: Judge Herndon's Findings of Fact and Conclusion of Law Granting City of Las Vegas' Motion for Summary Judgment, Entered on December 30, 2020	3	000740-000741
36	Master Declaration of Covenants, Conditions Restrictions and Easements for Queensridge	3	000742-000894
37	Queensridge Master Planned Community Standards - Section C (Custom Lot Design Guidelines)	3	000895-000896
38	Custom Lots at Queensridge Purchase Agreement, Earnest Money Receipt and Escrow Instructions	3	000897-000907
39	Public Offering Statement for Queensridge North (Custom Lots)	4	000908-000915
40	Deposition of Yohan Lowie, *In the Matter of Binion v. Fore Stars*	4	000916-000970
41	The City of Las Vegas' Response to Requests for Production of Documents, Set One	4	000971-000987
42	Respondent City of Las Vegas' Answering Brief, *Jack B. Binion, et al v. The City of Las Vegas, et al.*, Case No. 17-752344-J	4	000988-001018
43	Ordinance No. 5353	4	001019-001100
44	Original Grant, Bargain and Sale Deed	4	001101-001105
45	May 23, 2016 Par 4 Golf Management, Inc.'s letter to Fore Stars, Ltd. re Termination of Lease	4	001106-001107
46	December 1, 2016 Elite Golf Management letter to Mr. Yohan Lowie re: Badlands Golf Club	4	001108
47	October 30, 2018 Deposition of Keith Flatt, *Fore Stars, Ltd. v. Allen G. Nel*, Case No. A-16-748359-C	4	001109-001159

48	Declaration of Christopher L. Kaempfer	4	001160-001163
49	Clark County Real Property Tax Values	4	001164-001179
50	Clark County Tax Assessor's Property Account Inquiry - Summary Screen	4	001180-001181
51	Assessor's Summary of Taxable Values	5	001182-001183
52	State Board of Equalization Assessor Valuation	5	001184-001189
53	June 21, 2017 City Council Meeting Combined Verbatim Transcript	5	001190-001317
54	August 2, 2017 City Council Meeting Combined Verbatim Transcript	5	001318-001472
55	City Required Concessions signed by Yohan Lowie	5	001473
56	Badlands Development Agreement CLV Comments	5	001474-001521
57	Development Agreement for the Two Fifty, Section Four, Maintenance of the Community	5	001522-001529
58	Development Agreement for the Two Fifty	5	001530-001584
59	The Two Fifty Design Guidelines, Development Standards and Uses	5	001585-001597
60	The Two Fifty Development Agreement's Executive Summary	5	001598
61	Development Agreement for the Forest at Queensridge and Orchestra Village at Queensridge	5	001599-002246
62	Department of Planning Statement of Financial Interest	6	002247-002267
63	December 27, 2016 Justification Letter for General Plan Amendment of Parcel No. 138-31-702-002 from Yohan Lowie to Tom Perrigo	6	002268-002270
64	Department of Planning Statement of Financial Interest	6	002271-002273
65	January 1, 2017 Revised Justification letter for Waiver on 34.07 Acre Portion of Parcel No. 138-31-702-002 to Tom Perrigo from Yohan Lowie	6	002274-002275
66	Department of Planning Statement of Financial Interest	6	002276-002279
67	Department of Planning Statement of Financial Interest	6	002280-002290
68	Site Plan for Site Development Review, Parcel 1 @ the 180, a portion of APN 138-31-702-002	6	002291-002306

69	December 12, 2016 Revised Justification Letter for Tentative Map and Site Development Plan Review on 61 Lot Subdivision to Tom Perrigo from Yohan Lowie	6	002307-002308
70	Custom Lots at Queensridge North Purchase Agreement, Earnest Money Receipt and Escrow Instructions	7	002309-002501
71	Location and Aerial Maps	7	002502-002503
72	City Photos of Southeast Corner of Alta Drive and Hualapai Way	7	002504-002512
73	February 14, 2017 Planning Commission Staff Recommendations	7	002513-002538
74	June 21, 2017 Planning Commission Staff Recommendations	7	002539-002565
75	February 14, 2017 Planning Commission Meeting Verbatim Transcript	7	002566-002645
76	June 21, 2017 Minute re: City Council Meeting	7	002646-002651
77	June 21, 2017 City Council Staff Recommendations	7	002652-002677
78	August 2, 2017 City Council Agenda Summary Page	7	002678-002680
79	Department of Planning Statement of Financial Interest	7	002681-002703
80	Bill No. 2017-22	7	002704-002706
81	Development Agreement for the Two Fifty	7	002707-002755
82	Addendum to the Development Agreement for the Two Fifty	8	002756
83	The Two Fifty Design Guidelines, Development Standards and Permitted Uses	8	002757-002772
84	May 22, 2017 Justification letter for Development Agreement of The Two Fifty, from Yohan Lowie to Tom Perrigo	8	002773-002774
85	Aerial Map of Subject Property	8	002775-002776
86	June 21, 2017 emails between LuAnn D. Holmes and City Clerk Deputies	8	002777-002782
87	Flood Damage Control	8	002783-002809
88	June 28, 2016 Reasons for Access Points off Hualapai Way and Rampart Blvd. letter from Mark Colloton, Architect, to Victor Balanos	8	002810-002815
89	August 24, 2017 Access Denial letter from City of Las Vegas to Vickie Dehart	8	002816

90	19.16.100 Site Development Plan Review	8	002817-002821
91	8.10.17 Application for Walls, Fences, or Retaining Walls	8	002822-002829
92	August 24, 2017 City of Las Vegas Building Permit Fence Denial letter	8	002830
93	June 28, 2017 City of Las Vegas letter to Yohan Lowie Re Abeyance Item - TMP-68482 - Tentative Map - Public Hearing City Council Meeting of June 21, 2017	8	002831-002834
94	Declaration of Vickie Dehart, *Jack B. Binion, et al. v. Fore Stars, Ltd.*, Case No. A-15-729053-B	8	002835-002837
95	Supreme Court Order of Affirmance, *David Johnson, et al. v. McCarran International Airport, et al.,* Case No. 53677	8	002838-002845
96	De Facto Taking Case Law from State and Federal Jurisdictions	8	002846-002848
97	Department of Planning Application/Petition Form	8	002849-002986
98	11.30.17 letter to City of Las Vegas Re: 180 Land Co LLC ("Applicant's - Justification Letter for General Plan Amendment [SUBMITTED UNDER PROTEST] to Assessor's Parcel ("APN(s") 138-31-601-008, 138-31- 702-003, 138-31-702-004 (consisting of 132.92 acres collectively "Property"- from PR-OS (Park, Recreation and Open Space) to ML (Medium Low Density Residential) as part of applications under PRJ-11990, PRJ-11991, and PRJ-71992	8	002987-002989
99	January 9, 2018 City Council Staff Recommendations	8	002990-003001
100	Item #44 - Staff Report for SDR-72005 [PRJ-71990] - amended condition #6 (renumbered to #7 with added condition)	8	003002
101	January 9, 2018 WVR-72007 Staff Recommendations	8	003003-003027
102	January 9, 2018 WVR-72004, SDR-72005 Staff Recommendations	8	003028-003051
103	January 9, 2018 WVR-72010 Staff Recommendations	8	003052-003074
104	February 21, 2018 City Council Meeting Verbatim Transcript	8	003075-003108
105	May 17, 2018 City of Las Vegas Letter re Abeyance - TMP-72012 [PRJ-71992] - Tentative Map Related to WVR-72010 and SDR-72011	9	003109-003118
106	May 16, 2018 Council Meeting Verbatim Transcript	9	003119-003192

107	Bill No. 2018-5, Ordinance 6617	9	003193-003201
108	Bill No. 2018-24, Ordinance 6650	9	003202-003217
109	November 7, 2018 City Council Meeting Verbatim Transcript	9	003218-003363
110	October 15, 2018 Recommending Committee Meeting Verbatim Transcript	9	003364-003392
111	October 15, 2018 Kaempfer Crowell Letter re: Proposed Bill No. 2018-24 (part 1 of 2)	10	003393-003590
112	October 15, 2018 Kaempfer Crowell Letter re: Proposed Bill No. 2018-24 (part 2 of 2)	11	003591-003843
113	July 17, 2018 Hutchison & Steffen letter re Agenda Item Number 86 to Las Vegas City Attorney	11	003844-003846
114	5.16.18 City Council Meeting Verbatim Transcript	11	003847-003867
115	5.14.18 Bill No. 2018-5, Councilwoman Fiore Opening Statement	11	003868-003873
116	May 14, 2018 Recommending Committee Meeting Verbatim Transcript	11	003874-003913
117	August 13, 2018 Meeting Minutes	11	003914-003919
118	November 7, 2018 transcript In the Matter of Las Vegas City Council Meeting, Agenda Item 50, Bill No. 2018-24	12	003920-004153
119	September 4, 2018 Recommending Committee Meeting Verbatim Transcript	12	004154-004219
120	State of Nevada State Board of Equalization Notice of Decision, *In the Matter of Fore Star Ltd., et al.*	12	004220-004224
121	August 29, 2018 Bob Coffin email re Recommend and Vote for Ordinance Bill 2108-24	12	004225
122	April 6, 2017 Email between Terry Murphy and Bob Coffin	12	004226-004233
123	March 27, 2017 letter from City of Las Vegas to Todd S. Polikoff	12	004234-004235
124	February 14, 2017 Planning Commission Meeting Verbatim Transcript	12	004236-004237
125	Steve Seroka Campaign letter	12	004238-004243
126	Coffin Facebook Posts	12	004244-004245
127	September 17, 2018 Coffin text messages	12	004246-004257

128	September 26, 2018 email to Steve Seroka re: meeting with Craig Billings	12	004258
129	Letter to Mr. Peter Lowenstein re: City's Justification	12	004259-004261
130	August 30, 2018 email between City Employees	12	004262-004270
131	February 15, 2017 City Council Meeting Verbatim Transcript	12	004271-004398
132	May 14, 2018 Councilman Fiore Opening Statement	12	004399-004404
133	Map of Peccole Ranch Conceptual Master Plan (PRCMP)	12	004405
134	December 30, 2014 letter to Frank Pankratz re: zoning verification	12	004406
135	May 16, 2018 City Council Meeting Verbatim Transcript	13	004407-004480
136	June 21, 2018 Transcription of Recorded Homeowners Association Meeting	13	004481-004554
137	Pictures of recreational use by the public of the Subject Property	13	004555-004559
138	Appellees' Opposition Brief and Cross-Brief, *Del Monte Dunes at Monterey, Ltd., et al. v. City of Monterey*	13	004560-004575
139	Respondent City of Las Vegas' Answering Brief, *Binion, et al. v. City of Las Vegas, et al.*	13	004576-004578
140	Grant, Bargain and Sale Deed	13	004579-004583
141	City's Land Use Hierarchy Chart	13	004584
142	August 3, 2017 deposition of Bob Beers, pgs. 31-36 - *The Matter of Binion v. Fore Stars*	13	004585-004587
143	November 2, 2016 email between Frank A. Schreck and George West III	13	004588
144	January 9, 2018 email between Steven Seroka and Joseph Volmar re: Opioid suit	13	004589-004592
145	May 2, 2018 email between Forrest Richardson and Steven Seroka re Las Vegas Badlands Consulting/Proposal	13	004593-004594
146	November 16, 2017 email between Steven Seroka and Frank Schreck	13	004595-004597

147	June 20, 2017 representation letter to Councilman Bob Coffin from Jimmerson Law Firm	13	004598-004600
148	September 6, 2017, City Council Verbatim Transcript	13	004601-004663
149	December 17, 2015 LVRJ Article, Group that includes rich and famous files suit over condo plans	13	004664-04668
150	Affidavit of Donald Richards with referenced pictures attached	14, 15, 16	004669-004830
151	65 Acres Combined Clark County Tax Assessor Summary of Taxable Values	17	004831-004836
152	Clark County Assessor Valuation (includes 65 Acre Parcel)	17	004837-004861
153	Taxes Assessed on 65 Acre Property	17	004862-004864
154	(1990) Zoning Ordinance Z-17-90 including the Peccole Ranch Plan (1990)	17	004865-004921
155	04.11.84 Attorney General Opinion No. 84-6	17	004922-004928
156	Moccasin & 95, LLC v. City of Las Vegas, Eighth Judicial Dist. Crt. Case no. A-10-627506, 12.13.11 City of Las Vegas' Opposition to Plaintiff Landowner's Motion for Partial Summary Judgment on Liability for a Taking (partial)	17	004929-004933
157	Affidavit of Bryan K. Scott	17	004934-004935
158	Affidavit of James B. Lewis	17	004936-004937
159	12.05.16 Deposition Transcript of Tom Perrigo in case Binion v. Fore Stars	18	004938-004946
160	December 2016 Deposition Transcript of Peter Lowenstein in case Binion v. Fore Stars	18	004947-005008
161	2050 City of Las Vegas Master Plan (Excerpts)	19	005009-005011
162	City of Las Vegas Ordinance No. 3636	19	005012-005020
163	10.18.16 Special Planning Commission Meeting Transcript (partial)	19	005021-005026
164	05.16.18 City Council Meeting Partial Transcript	19	005027
165	04.15.81 City of Las Vegas Commission Minutes re Zone Change Z-34-81	19	005028-005065

166	Fore Stars Membership Interest Purchase and Sale Agreement, dated Dec. 1, 2014	19	005066-005082
167	LVMC 19.16.090	19	005083-005088
168	LVMC 19.10.050 R-PD Residential Planned Development District	19	005089
169	LVMC 19.18.020	19	005090
170	LVMC 19.12010 CLV Land Use Tables	19	005091-005092
171	LVMC 19.06.100 R-2 Medium-Low Density Residential District Designation	19	005093-005097
172	11.30.16 Findings of Fact, Conclusions of Law, and Judgment Granting Defendants' NRCP 12(b)(5) Motion to Dismiss Plaintiffs' Amended Complaint, Robert N. Peccole v. Peccole Nevada Corp. et al., Case No. A-16-739654-C	19	005098-005122
173	01.31.17 Notice of Entry of Findings of Fact, Conclusions of Law, Final Order, and Judgment, Robert N. Peccole v. Peccole Nevada Corp. et al., Case No. A-16-739654-C	19	005123-005167
174	11.27.18 NV Supreme Court Order Denying Rehearing, Robert N. Peccole v. Fore Stars, Ltd. et al., Case No. 72410	19	005168-005170
175	10.17.18 NV Supreme Court Order of Affirmance, Robert N. Peccole v. Fore Stars, Ltd. et al., Case No. 72455	19	005171-005175
176	09.21.17 Clark County Assessor Appraisal Division Stipulation for the State Board of Equalization	19	005176-005178
177	Chapter 278 applicable as of 1992	20	005179 – 005190
178	10.16.030 General Plan Amendment	20	005191-005195
179	City Master Plan Land Use Designations, showing the C-V zoning and PR-OS as consistent uses	20	005196-005198
180	Letter from Landowners' attorney James Jimmerson to City Attorney Brad Jerbic dated December 7, 2016.	20	005199-005207
181	Email from Peter Lowenstein to Landowners re submission of General Plan Amendment application filed under protest, dated November 13, 2017	20	005208
182	Letter from Landowners to Peter Lowenstein re GPA Justification dated November 30, 2017	20	005209-005211
183	The DiFederico Group Expert Report	20	005212-005347
184	Appraisal Report by Lubawy & Associates	20	005348-005350

185	Declaration of Tio DiFederico	20	005351-005352
186	November 1, 2016 Transcript of Badlands Homeowners Meeting	20	00535- 005361
187	August 16, 2019 Deposition Transcript of Clyde O. Spitze (In the matter of 180 Land Co. LLC vs City of Las Vegas, et al., A-17-758528-J)	20	005362-005376
188	Clark County Ordinance 728	20	005377-005390
189	January 7, 2019 Email from Robert Summerfield to Frank Pankratz	20	005391
190	Clark County Ordinance 1221	20	005392-005408
191	Certified Videotaped Deposition Transcript of Peter Lowenstein- Volumes 1 & 2	21	005409- 006061
192	Declaration of Elizabeth Ghanem Ham in Support of Plaintiffs' (1) Evidentiary Hearing Brief #1: Memorandum of Points and Authorities Regarding the Landowners' Property Interest; and (2) Evidentiary Hearing Brief #2: Memorandum of Points and Authorities Regarding the City's Actions Which Have Resulted in a Taking of the Landowners' Property	21	006062-006070
193	Declaration of Frank Pankratz Support of Plaintiff Landowners' Reply in Support of: Plaintiff Landowners' Evidentiary Hearing Brief #1: Memorandum of Points and Authorities Regarding the Landowners' Property Interest; and (2) Evidentiary Hearing Brief #2: Memorandum of Points and Authorities Regarding the City's Actions Which Have Resulted in a Taking of the Landowners' Property	21	006071-006075
194	Declaration of Yohan Lowie in Support of Plaintiff Landowners' Reply in Support of: Plaintiff Landowners' Evidentiary Hearing Brief #1: Memorandum of Points and Authorities Regarding the Landowners' Property Interest; and (2) Evidentiary Hearing Brief #2: Memorandum of Points and Authorities Regarding the City's Actions Which Have Resulted in a Taking of the Landowners' Property	21	006076-006083

195	Declaration of Stephanie Allen, Esq., which Supports Plaintiff Landowners' Reply in Support of: Plaintiff Landowners' Evidentiary Hearing Brief #1: Memorandum of Points and Authorities Regarding the Landowners' Property Interest; and (2) Evidentiary Hearing Brief #2: Memorandum of Points and Authorities Regarding the City's Actions Which Have Resulted in a Taking of the Landowners' Property	21	006084-006089
196	January 3, 2018 CLV Agenda Memo-Planning-Staff Recommendation of Denial	21	006090-006098
197	City Council Meeting of January 17, 2018 Transcript re Agenda Items 74-75	21	006099-006117
198	May 13, 2021 Transcript of Hearing re City's Motion for Reconsideration of Order Granting in Part and Denying in Part the Landowners' Motion to Compel the City to Answer Interrogatories	21	006118-006213
199	September 16, 2021 FFCL re Motion to Determine Property Interest [A-18-773268-C]	22	006214-006230
200	August 12, 2021 Deposition of Yohan Lowie [A-17-758528-J]	22	006231-006290
201	October 25, 2021 FFCL re Take (35 Acres)	22	006291-006340
202	December 20, 2021 Order Granting & Denying Motion to Reconsider Property Interest (17 Acres)	22	006341-006347
203	November 18, 2021 FFCL re Just Compensation (35 Acres)	22	006348-006367
204	March 16, 2022 CLV Response to Second Request for Production of Documents (17 Acres)	22	006368-006417
205	January 21, 2022 CLV Response to First Request for Production of Documents (17 Acres)	22	006418-006444
206	Summary of 13 Times the City's PR-OS Argument Was Made and Rejected by NV Courts	22	006445
207	DiFederico Appraisal (17 Acres)	22	006446-006599
208	January 3, 2018 City Council Meeting – Verbatim Transcript Item 78	22	006600-006670
209	September 24, 2021 Hearing Transcript (35 Acres)	22	006671-006674
210	October 21, 2021 KTNV News Report – Battle Over Badlands	22	006675-006684

211	Taxes for 17 Acres Property	22	006685
212	Tax Assessor Valuation Analysis for 17 Acre Property	22	006686
213	November 16, 2021 Order Granting Plaintiffs' Motions in Limine (35 Acres)	22	006687-006700
214	May 27, 2022 Charles jack Appraisal Report	22	006701-006881
215	June 16, 2022 Charles Jack Deposition Transcript	22	006882-006924
216	Dvorchak v. McCarran Intern. Airport	22	006925-006928
217	August 21, 2017 City of Las Vegas calendar entry re Badlands Fence Permit	22	006929
218	February 15, 2017 City Council Meeting Verbatim Transcript Items 100-102	22	006930-006943
219	July 16, 2021 William Bayne Deposition Transcript	22	006944-007005
220	May 16, 2018 City Council Meeting Verbatim Transcript Agenda Item 66 re Ordinance	22	007006-007026
221	March 21, 2018 City Council Meeting Transcript re Crockett Appeal	22	007027-007045
222	October 6, 2021 City Council Hearing Verbatim Transcript Item 63- 35 Acres Appeal (Partial)	22	007046-007050
223	August 10, 2022 James Leavitt Letter to Seth Floyd in response to July 19, 2022 Letter	22	007051-007052
224	Declaration of Elizabeth Ghanem Ham in Support of Plaintiff Landowners' Motion to Determine Take and for Summary Judgment on the Third and Fifth Claims for Relief	22	007053-007063
225	January 24, 2017 Drainage Agreement	23	007064-007075
226	August 3, 2022 City Council Agenda Item No. 28	23	007076
227	Declaration of George F. Ogilvie III in Support of Rule 56(d) Motion on Order Shortening Time	23	007077-007080
228	**Technical Drainage Study for the Seventy 840-050 March 2016**	**24**	**007081-007467**

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DATED this 12th day of September, 2022.

LAW OFFICES OF KERMITT L. WATERS

BY: */s/ James J. Leavitt*_____
KERMITT L. WATERS, ESQ.
Nevada Bar. No.2571
JAMES J. LEAVITT, ESQ.
Nevada Bar No. 6032
MICHAEL SCHNEIDER, ESQ.
Nevada Bar No. 8887
AUTUMN WATERS, ESQ.
Nevada Bar No. 8917
Attorneys for Plaintiffs Landowners

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that I am an employee of the Law Offices of Kermitt L. Waters, and that on the 12th day of September, 2022, pursuant to NRCP (5)(b) a true and correct copy of the foregoing **SECOND SUPPLEMENT TO APPENDIX OF EXHIBITS IN SUPPORT OF: PLAINTIFF LANDOWNERS' MOTION TO DETERMINE TAKE AND FOR SUMMARY JUDGMENT ON THE THIRD AND FIFTH CLAIMS FOR RELIEF – VOLUME 24** was served through the Eighth Judicial District Court's filing system, with the date and time of the electronic service substituted for the date and place of deposit in the mail and addressed to each of the following:

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/s/ Evelyn Washington
an employee of the Law Offices of Kermitt L. Waters

Exhibit 228

TECHNICAL DRAINAGE STUDY
FOR
THE SEVENTY

840-050

March 2016

Prepared For:

Seventy Acres LLC, Fore Stars LTD, and 180 Land Co LLC
9775 West Charleston Boulevard
Las Vegas, NV 89117
Phone: (702) 940-6930
Fax: (702) 940-6931

GCW
ENGINEERS \ SURVEYORS

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: The Seventy Date: March 2016

Location of Development a) Descriptive (Cross Streets) North/South: Hualapai Way

East/West: Rampart Boulevard

b) Section: 31, 32 Township: 20S Range: 60E

c) APN: 138-32-301-005, 138-32-301-006 138-32-210-008, 138-32-202-001, 138-31-702-002 and 138-31-801-002

Name of Owner: Seventy Acres LLC, Fore Stars LTD, and 180 Land Co LLC

Telephone No.: 702-940-6930 Fax No.:702-940-6931 E-Mail Address: Not available

Address: 9775 W. Charleston Blvd. Las Vegas, Nevada 89117

Contact Person-Name: Ryan R. Belsick, PE **Telephone No.:** (702) 804-2000

* **E-Mail Address:** rbelsick@gcwengineering.com **Fax No.:** (702) 804-2299

Firm: GCW, Inc.

Address: 1555 S. Rainbow Blvd. Las Vegas, NV 89146

Type of Land Development/Land Disturbance

☐	Rezoning	☐	Subdivision Map	☐	Clearing and Grading Only
☐	Parcel Map	☐	Planned Unit Development	☒	Other (Please specify below)
☐	Large Parcel Map	☐	Building Permit	Conceptual Drainage, Rough Grade and Storm Drain	

1. Total Owned Land Area: At Site: +/- 70.52 acres Being Developed/Disturbed: +/- 70.52 acres
2. Is a portion or all of the subject property located in a designated FEMA Flood Hazard Area? ☒ Yes** ☐ No
3. Is the property bordered or crossed by an existing or proposed Clark County Regional Flood Control District Master Planned Facility? ☒ Yes** ☐ No
4. Proposed type of development (Residential, Commercial, Etc.): Conceptual Drainage, Rough Grade and Storm Drain Improvements
5. Approximate upstream land area which drains to the subject site: +/- 3.73 sq. mi.
6. Has the site drainage been evaluated in the past? ☒ Yes ☐ No If yes, please identify documentation: Pecoole Ranch West Master Study, Queensridge LOMR, Queens Borough Culvert Study
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site: Existing dual (2) – 12'x12' RCB at northeast corner of site
8. Briefly describe your proposed schedule for the subject project: ASAP

PROFESSIONAL ENGINEER - STATE OF NEVADA
RYAN R. BELSICK
EXP. 12/31/16
CIVIL
No. 14697
3/3/16

Engineer's Seal

Submit this form as part of the required drainage study to the local entity which has jurisdiction over the subject property. This form may provide sufficient information to serve as the Conceptual Drainage Study.

*New Required Field

**Review and concurrence of the Clark County Regional Flood Control District is required.

Local Entity File No	Revision	Date

REFERENCE

STANDARD FORM 1

HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

DRAINAGE SUBMITTAL CHECKLIST

Project Name: The Seventy	Map ID:
Firm Name: GCW, Inc.	Engineer: Ryan R. Belsick
Address: 1555 S Rainbow Blvd	
City: Las Vegas	State: NV Zip: 89146
Phone Number: (702) 804-2000	Fax Number: (702) 804-2299
Property Owner: Seventy Acres LLC, Fore Stars LTD, and 180 Land Co LLC	
Address: 9755 W. Charleston Blvd	
City: Las Vegas	State: NV Zip: 89177

Reviewed By:	Date Received:	Date Accepted for Review:

The following checklist is intended as a guide for the engineer preparing a Technical Drainage Study to submit to the local entity and Clark County Regional Flood Control District (if necessary). The listed items are the minimum information required prior to the entity performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the Clark County Regional Flood Control District (CCRFCD) Hydrologic Criteria and Drainage Design Manual (MANUAL).

This document is intended as an aid in preparing Technical Drainage Studies. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT

Yes	No	
X		Design Manual **Standard Form 1** with the engineer's seal and signature.
X		Design Manual **Standard Form 4**.
X		2 copies of the 24" x 36" Drainage Plan.
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading or discharge.

II. MAPS AND EXHIBITS

Yes	No	
X		A copy of a current Flood Insurance Rate Map (FIRM) with the site delineated.
X		A copy of the current CCRFCD Master Plan Update Figure, (Fix), for Flood Control Facilities and Environmental areas with the site delineated.

REFERENCE:	**STANDARD FORM 2**

DRAINAGE SUBMITTAL CHECKLIST

II. MAPS AND EXHIBITS (Continued)

Yes	No	
X		Off-site drainage basin maps for existing, interim and future conditions showing the existing topography, basin boundaries, concentration points, and flows in cfs.
X		On-site drainage basin maps for existing and proposed conditions showing the existing topography, basin boundaries, concentration points, and on-site and off-site flows in cfs.
X		Vicinity Map with local and major cross streets identified and a north arrow.

III. DRAINAGE PLAN

Yes	No	
X		Sheet size: 24" x 36" sealed by a registered engineer in the State of Nevada.
X		Minimum scale: 1" = 60'.
X		Project name.
X		Vicinity Map with local and major cross streets.
X		Revision box.
X		North arrow and bar scale.
X		Engineer's/consultant's address and phone number.
X		Elevation datum and benchmark.
X		Legend for symbols and abbreviations.
X		Cut/fill scarps, where applicable.
X		Street names, grades, widths.
X		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street.
X		Existing contours encompassing the site and 100 feet beyond with spot elevations for important locations, where appropriate.
	N/A	Minimum finish floor elevations with top-of-curb elevations at upstream end of lot.
	N/A	Proposed typical street sections.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
____	N/A	Streets with off-set crowns.
X	____	Proposed contours or spot elevations in sufficient detail to exhibit intended drainage patterns and slopes.
X	____	Property lines.
X	____	Right-of-way lines and widths, existing and proposed.
X	____	Existing improvements and their elevations.
X	____	Delineation of proposed on-site drainage basins indicating area and 10-year and 100-year storm peak flows at basin concentration points.
____	N/A	Concentration points and drainage flow direction with Q100 and V100 and D100 in streets.
X	____	Cumulative flows, velocity, and direction of flow at upstream and downstream ends of site for the 10-year and 100-year flows.
____	N/A	Location and cross-section of street capacity calculations.
X	____	Cross-sectional detail for channels, including cutoff wall locations.
X	____	Existing and proposed drainage facilities, appurtenances, and connections (i.e., sidewalk, ditches, swales, storm drain systems, unimproved and improved channels, and culverts, etc.) stating size, material, shape, and slope with plan and profile and HGL calculations.
X	____	Existing and proposed drainage easements and widths shown with sufficient detail. A cross sectional detail must be provided that shows appropriate lining and reinforcement.
X	____	Location and detail of existing, proposed, and future block wall openings. Minimum size is 16" x 48". Wrought iron gate is required for flows > 10 cfs.
X	____	Location and detail of flood walls illustrating depth of flow, proposed grouting height, etc.
____	N/A	Perimeter retaining wall locations. All existing and proposed walls (retaining screen and flood) must be shown with adjacent ground elevations. Flood walls with 8-inch concrete masonry unit.
____	N/A	Building and/or lot numbers.
X	____	Alignment of all existing, proposed, or future Regional Facilities adjacent to the site.
X	____	Limits of existing floodplain based on current FIRM or best available information; limits of proposed floodplains based on best available information.

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

III. DRAINAGE PLAN (Continued)

Yes	No	
X		For areas in Zone A, AE, AH, and AO, base flood elevations (BFEs) must be shown for each lot; BFEs may be listed on each lot, or in a table. Finish floor elevations must be a minimum of 18 inches above BFE.
	N/A	Appropriately elevated "humps" 6 inches above the 100 year water surface elevation at site accesses where the intent is to protect the site from the Q100 flows.
	N/A	Street slopes for perimeter and interior streets. The minimum slope is 0.4 percent.
	N/A	Location and detail of best management practice (BMP) for parking lots and low impact development (LID) (if required).

IV. HYDROLOGIC ANALYSIS

Yes	No	
X		Appropriate soil information and Soils Map for existing and future conditions with subbasins and property delineated.
X		Input and output information for existing conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
X		Input and output information for future conditions from computer models (HEC-1 or TR-55). The flow routing diagram must be provided with HEC-1 models.
X		Use of correct precipitation values in and around the McCarran Airport rainfall area.
X		A discussion in the text of the hydrologic analysis justifying subbasin boundaries and cutoffs, supporting assumptions, and calculations.
X		A summary table of stormwater flows showing basin area, Q10 and Q100 for both individual basins and combined basin flows, where applicable.
X		Copies of supporting technical information referenced from a previously approved study and a statement accepting these results.
X		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners in accordance with current Nevada Drainage Law.
	N/A	Calculation for impervious area for parking lots and LIDs (if required).

REFERENCE:	STANDARD FORM 2

DRAINAGE SUBMITTAL CHECKLIST

V. HYDRAULIC ANALYSIS

Yes	No	
____	N/A	Flow split calculations and supporting documentation or reference for the method of flow split calculations used.
____	N/A	Normal depth street flow calculations and cross section diagrams for all interior and perimeter streets. Provide "d x v" products for the Q100 and Q10 flows representing the worst case for interior and all perimeter streets. Q100 d x v < 8. Q10 d x v < 6 and 12 foot dry lane for rights-of-way > 80 feet. Calculations must be labeled by street name as indicated on the Grading Plan.
____	N/A	A summary table of interior and exterior street capacity calculations showing the street name, Q100 flow, slope, depth of flow, velocity and depth times velocity product and streets needing to meet 12 foot dry lane criteria.
____	N/A	Appropriate hydraulic calculations for block wall openings assuming a 50 percent vertical clogging factor. (Assume the lower half of the opening is plugged.)
X	____	Appropriate hydraulic calculations at drainage easement entrance and discharge locations to set finish floor elevations. Hydraulic calculations must include submerged weir, superelevation and tee intersection losses, where appropriate.
X	____	Provide necessary freeboard requirements to set the finished floor elevations of all proposed buildings. 2 x depth of flow or depth of flow plus 18 inches of freeboard, whichever is less. The minimum requirement is 6 inches above adjacent upstream top of curb. Buildings adjacent to drainage easements must always be provided with 18 inches of freeboard above the Q100 weir height or flow depth, whichever is greater.
X	____	A complete water surface profile analysis (HEC-2, HEC-RAS, etc.) for channel flows and FEMA Zone A flood zones. • Field survey data. • Input and output information. • Plotted cross-sections based on survey with proper encroachments. • A map showing the location of the cross-sections. • Analysis of both sub and super-critical flow segments. • A summary table and a discussion of the results in the text of the report.
X	____	Provide a 50 percent clogging factor in the capacity calculation for drop inlets.
X	____	Hydraulic calculations for culverts and storm drains. D-Load calculations must be provided for storm drain pipes in public rights-of-way, including headwater pool inundation.
X	____	The mitigation of nuisance water, both during construction and in the fully developed condition, must be addressed.
____	N/A	Provide BMP type, size and supporting calculations for parking lots and LIDs (if required).

REFERENCE:	STANDARD FORM 2

CITY OF LAS VEGAS

MINIMUM DRAINAGE STUDY CRITERIA
STANDARD FORM 2 CHECKLIST SUPPLEMENT

(Revised 5/18/11)

The following checklist is intended as a supplemental guide for the engineer preparing a Technical Drainage Study submittal to the City of Las Vegas. This supplement focuses on requirements specific to the City of Las Vegas. The requirements presented are in addition to the Clark County Regional Flood Control District (CCRFCD) Manual Standard Form 2. The listed items are the minimum information required prior to the City performing a review. The engineer will remain responsible to ensure the Technical Drainage Study is prepared within the guidelines as set forth in the CCRFCD Hydrologic Criteria and Drainage Design Manual (Design Manual).

An appointment must be made to preview this checklist in conjunction with CCRFCD Standard Form 2 prior to the City accepting a new drainage study for review. The engineer must contact the Flood Control Section at (702) 229-6541 to schedule a submittal appointment.

If items are not applicable for the subject site, provide N/A.

I. GENERAL REQUIREMENT		
Yes	No	
	N/A	A notarized letter from the adjacent property owner(s) allowing off-site grading. (A copy of the letter must be received prior to final acceptance of the drainage study.)
X		Copies of all conditions of approval for development related to this property. (e.g. zoning, use permit, tentative map, etc.) Verify compliance with conditions.
X		An electronic copy of the complete submittal is required to be submitted with one original hard copy of the study. Electronic documents should be on a universal computer-readable digital output device replicating your submittal. An Indexed Portable Document Format (PDF) or Print Ready CAD file formats with a minimum of 300dpi are the desired formats. If figures are in color, they must be scanned in color and saved as a separate file. ____ by initial here, the engineer on record acknowledges that the electronic copy is an identical replicate of the original hard copy submitted to the City of Las Vegas.

II. GRADING PLAN INFORMATION		
Yes	No	
X		(1) 24" X 36" copy of the Grading Plan, (including all Detail Sheets) sealed by the engineer
X		Proposed future and existing spot grades for top of curbs and street crowns at lot lines, grade breaks, and along curb returns on both sides of the street. Note: Proposed top of curb elevations must be provided for both sides of roadways even if only half street construction is required.
X		Label existing topography at a minimum 5 foot elevation interval including adjacent developments, finished floor elevations of existing buildings and top of existing curbs extending 100 feet* around the perimeter of the site. (*Measured from the centerline of the adjacent roadway.)

II. GRADING PLAN INFORMATION		
Yes	No	
X		Proposed on-site and off-site storm drains and other flood control facilities with plan and profile sheets for public storm drains showing the class of pipe, (Class III, IV, V, etc.), design hydraulic grade line, (HGL) and 100 year storm flow. A public drainage easement must be provided over on-site storm drains conveying off-site flows. An overflow path must be provided over all storm drains.
X		All existing and "to be constructed" walls with cross-sections showing wall type, (e.g. block wall, retaining wall, flood wall, etc.), with limits clearly defined, adjacent ground elevations. Wall heights must meet current ordinances and in no case exceed 14 feet above the adjacent property.
	N/A	Street slopes for both interior and perimeter streets. Note: The minimum slope for a roadway is 0.4 percent, a minimum 18-inch storm drain must be provided where minimum slopes cannot be met.
	N/A	Back of lot elevations and lot drainage pattern for all lots including common lots.
X		Sites with a grade difference two feet above or below existing ground are required to have approval from City of Las Vegas Current Planning. Current Planning approval is required prior to final approval of the drainage study.
X		On-site facilities must perpetuate flows through or around the site without significantly impacting adjacent property owners. (The project must pass flows through the site every 600 feet where the project is blocking flow paths.)
	N/A	This project uses a solid grouted stem wall (or approved alternate) at the back of sidewalk to provide erosion protection for landscaped areas where the depth of flow in the roadway exceeds the back of walk elevation. A corresponding cross-section detail is included.
	N/A	Commercial and Common Lot Landscape areas are not allowed to drain over the sidewalk. The grading plans show flow lines with grades and sidewalk under drains for all landscape areas draining to the public ROW.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	N/A	Concrete valley gutters are required in parking lots with slopes less than 1 percent. Slopes through cul-de-sac must be at a 1 percent minimum where flow is drained through the cul-de-sac.
X		Ten-foot wide public drainage easements to be privately maintained are allowed for flow less than 20 cfs. The depth of flow entering the easement must be checked using the submerged weir calculation.
X		The limits of the flood zones and the base flood elevations (BFE) must be shown on all grading plans for all developments within a Special Flood Hazard Zone A, AO, AE, etc.
X		Minimum finish floor elevation is 6 inches above highest adjacent top of curb. Finish floor calculations must include allowances for super elevations on curves and velocity head for tee intersections.
X		Finished floor elevations for buildings adjacent to public drainage easements must be a minimum of 18 inches above the Q100 weir of submerged weir elevation, whichever is greater.

III. Local Entity Criteria - City of Las Vegas – Manual Section 1600		
Yes	No	
	N/A	Lots with "B and C Type Drainage" that drain from one lot to another through a drainage easement shall be required to install an underground nuisance drainage system or a 2-foot valley gutter. 16" x 24" minimum block wall openings are required for both options.
	N/A	Bubblers are required across 80 foot and greater ROW streets. When flows exceed 10 cfs, bubblers larger than 18 inches will be required up to a maximum of 36". Inlets must be sized to match the pipe size provided.

- Contact the Flood Control Section regarding the drainage study review fee. These fees are payable at the time of submittal.
- The Drainage Study must be conditionally approved prior to submitting improvement plans to the Civil and Planning Development of the Department of Building and Safety for review.

This document is intended as an **aid** in preparing Technical Drainage Studies for the City of Las Vegas. Each study submitted is reviewed for compliance with local and regional criteria. This form is not intended to be all-inclusive and does not limit the extent of the information, calculations or exhibits which may be necessary to properly evaluate the intended land use.

TECHNICAL DRAINAGE STUDY
FOR
THE SEVENTY

840-050

March 2016

Prepared For:

Seventy Acres LLC, Fore Stars LTD, and 180 Land Co LLC
9775 West Charleston Boulevard
Las Vegas, NV 89117
Phone: (702) 940-6930
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I. INTRODUCTION

Seventy Acres LLC, Fore Stars LTD, and 180 Land Co LLC are proposing to construct The Two Fifty, a multi-family residential and single-family residential development consisting of luxury multi-family and estate lots upon the land currently operated as the Badlands golf course located south of Alta Drive, north of Charleston Road, east of Hualapai Way and west of Rampart Boulevard, in Las Vegas, Nevada. A land use exhibit provided in Appendix A shows the proposed site layout. The project improvements include: 3,020 luxury multi-family units and minimum 1 acre to 5 acre estate lots on the 253 acres of APNs 138-32-301-005 (17.49 acres), 138-32-301-006 (53.03 acres), 138-32-210-008 (2.37 acres), 138-32-202-001 (2.13 acres) 138-31-702-002 (166.99 acres) and 138-31-801-002 (11.28 acres). Onsite storm drain facilities are proposed to convey the offsite flows from the existing storm drain facilities in Hualapai Way and Charleston Boulevard to the existing dual (2) - 12-foot wide by 12-foot high reinforced concrete box culverts (RCBC) in Rampart Boulevard at the Rampart Boulevard and Alta Drive intersection. The Two Fifty development will be constructed in three phases. The 1st phase of development consists of mass grading and storm drain improvements for approximately 70 acres of APNs 138-32-301-005, 138-32-301-006, 138-32-210-008, and 138-32-202-001 (hereafter referred to as The Seventy). The 2nd phase of development includes construction of the luxury multi-family units within The Seventy. The 3rd phase of development includes construction of the estate lots within approximately 180 acres of APNs 138-31-702-002 and 138-31-801-002 (hereafter referred to as The One Eighty). The purpose of this report is to provide a conceptual drainage analysis for The Two Fifty and serve as a technical drainage study for The Seventy to determine the impacts to downstream developments and facilities to establish allowable flow rates and drainage patterns for interior development, and to recommend storm drain facilities to convey storm flow through the project site. This study also addresses the 1st phase of development which includes The Seventy mass grading and onsite storm drain improvements. The 2nd phase of development will be addressed in a future technical drainage study updates and the 3rd phase of development will be addressed in a future technical drainage study for The One Eighty. The following tasks were performed in the preparation of this report:

- Identify and review previous drainage studies for the project site and areas adjacent to the project.
- Identify the existing FEMA floodplain designation for the project site.
- Determine recommended proposed FEMA floodplain designations within the project limits.

- Identify existing and proposed regional drainage facilities within and adjacent to the project site.
- Identify existing drainage areas and storm drain facilities that affect the site.
- Perform field investigation.
- Estimate peak runoff impacting the proposed grading and storm drain improvements during the 10-year and 100-year return period storms for existing and proposed conditions.
- Recommend conceptual drainage facilities for The One Eighty to protect the proposed project and downstream properties from storm runoff.
- Prepare hydraulic analyses for The Seventy storm drain and proposed channel improvements.
- Recommend drainage facilities to protect the proposed project from storm runoff.

GCW has obtained and reviewed technical drainage studies and grading plans from the City of Las Vegas (CLV) for the site and offsite properties adjacent to the site to determine existing conditions offsite and onsite drainage patterns and discharge flows into the site. The studies reviewed include:

1. *Technical Drainage Study for Peccole Ranch Golf Course (Phase II)* (DS 1347)
2. *Technical Drainage Study for Peccole West Commercial Center* (DS 2364)
3. *Technical Drainage Study for Rampart Boulevard* (DS 2696)
4. *Technical Drainage Study Update for Peccole Ranch Golf Course Maintenance Yard* (DS 1626)
5. *Hydrology Study Update for Queensridge Fairway Homes* (DS 2307)
6. *Technical Drainage Study Peccole West Lot 9 (Phase II)* (DS 1630)
7. *Technical Drainage Study for Peccole West Lot 12* (DS 1650)
8. *Technical Drainage Study for Village 12 Hualapai Way Improvements* (DS 1853)
9. *Technical Drainage Study for Hualapai Way Rough Grading, Alta Drive to Charleston Boulevard* (DS 1758)
10. *Technical Drainage Study for Peccole West Lot 11* (DS 1753)
11. *Technical Drainage Study for Peccole Ranch Parcel 19 & 20* (DS 2172)
12. *Technical Drainage Study for San Michelle West* (DS 2226)
13. *Technical Drainage Study for Peccole – Lot 10 Parcel 18* (DS 2203)
14. *Technical Drainage Study for Windsor at Queensridge* (DS 3279)

15. *Technical Drainage Study for Club House* (DS 1555)
16. *Technical Drainage Study for the Versailles* (DS 2236)
17. *Master Drainage Study for Peccole Ranch – Phase II* (DS 1140)
18. *Technical Drainage Study for Badlands Hole 9* (DS 1974)
19. *Technical Drainage Study for Peccole West Business Center* (DS 1856)
20. *Technical Drainage Study for Peccole West Lot 12 (Park Area)* (DS 1929)
21. *Technical Drainage Study for One Queensridge Place (Condo Towers) – Update 2* (DS 3746)
22. *Technical Drainage Study for Apple Drive at Peccole Ranch* (DS 1576)
23. *Technical Drainage Study for Alta Drive at Peccole Ranch* (DS 1588)
24. *Technical Drainage Study for Peccole Ranch Phase II Master Plan* (DS 273)
25. *Conceptual Drainage Study for Peccole Ranch Phase II Master Plan* (DS 1273)

An exhibit showing the name and general location of the adjacent developed areas and referenced studies listed above has been included in Appendix A. In order to identify offsite drainage patterns impacting the proposed site, a field visit was performed to confirm overall existing conditions drainage patterns for the site and offsite adjacent parcels.

Hydraulic information from the following study has been referenced for the purposes of this report:

The Technical Drainage Study for Queens Borough Culvert (Reference 1, hereinafter referred to as the Queens Borough Culvert Study) was approved by the CLV on August 30, 2005. The Queens Borough Culvert Study designed the existing approximately 2,000 linear foot dual (2) - 12-foot wide by 12-foot high RCB storm drain system (CCRFCD Facility APSO 0000) downstream of the existing dual (2) - 12-foot wide by 12-foot-high RCB at the Rampart Boulevard and Alta Drive intersection. Proposed flows discharged from the site will be conveyed by the Queens Borough Culvert Study storm drain north to the Angel Park Detention Basin (CCRFCD Facility APNO 0001). Pertinent referenced material from the Queens Borough Culvert Study has been included in Appendix C. Updates to the Queens Borough Culvert Study included the following:

- *Update to the Technical Drainage Study for Queens Borough Culvert (Reference 2)* – Approved by CLV on December 30, 2005.

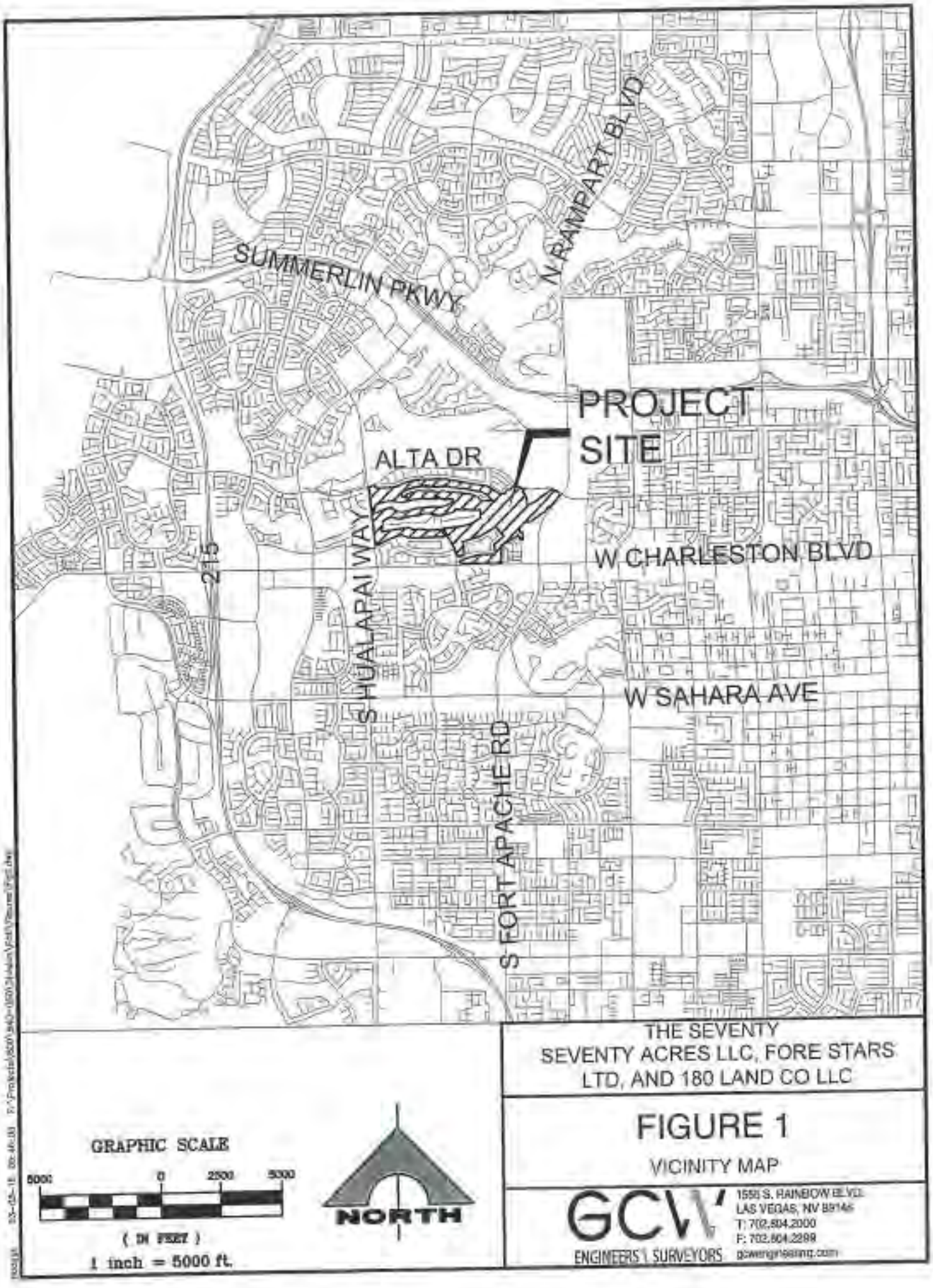
- *Update #2 to the Technical Drainage Study for Queens Borough Culvert (Reference 3*, hereinafter referred to as the Queens Borough Culvert Study Update #2 Study) – Approved by CLV on April 21, 2008.

II. LOCATION AND DESCRIPTION

The Seventy is located on approximately 70 acres in Sections 31 and 32, Township 20 South, Range 60 East, M.D.M., in the City of Las Vegas, Nevada. Please refer to Figures 1 and 2 for the vicinity and location of the project site. The site is presently developed as a golf course with existing washes traversing the project site conveying flows from west to east. Offsite flows are conveyed to the site from the west and south through existing reinforced concrete box culverts under Hualapai Way and Charleston Boulevard. Offsite flows from residential subdivisions and commercial development adjacent to the golf course are discharged to the existing golf course as surface flow through existing storm drain and/or drainage easements. The full street improvements are in place for Alta Drive, Charleston Road, Hualapai Way and Rampart Boulevard. For this study, the proposed improvements include mass grading and onsite storm drain facilities. Grading and development of the future onsite development will include multi-family and associated open space and parking area development and will be addressed in a future technical drainage study updates.

III. FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD HAZARD ANALYSIS

Based on the Flood Insurance Rate Map (FIRM) Community Panel 32003C 2145 F dated November 16, 2011, and FIRM Panel 32003 C 2150 E dated September 27, 2002, and revised to reflect the Letter of Map Revision (LOMR) Case No. 06-09-B483P dated September 21, 2006, and LOMR Case No. 06-09-B486P dated October 19, 2006, the project site is crossed by a FEMA-designated Special Flood Hazard Area (SFHA). The proposed improvements will construct closed conduit facilities that will contain and convey the 100-year flow (1% annual chance flood discharge) through The Seventy. Figure 3 shows the site denoted on a portion of the aforementioned FIRM panels. A Conditional Letter of Map Revision (CLOMR) will be obtained from FEMA prior to construction of this project. A LOMR will be obtained from FEMA once construction of the onsite RCB storm drain system is substantially completed and functional.


SUMMERLIN PKWY
N RAMPART BLVD
PROJECT SITE
ALTA DR
W CHARLESTON BLVD
215
S HUALAPAI WAY
W SAHARA AVE
S FORT APACHE RD
GRAPHIC SCALE
5000 0 2500 5000
(IN FEET)
1 inch = 5000 ft.
NORTH
THE SEVENTY
SEVENTY ACRES LLC, FORE STARS LTD, AND 180 LAND CO LLC
FIGURE 1
VICINITY MAP
GCW
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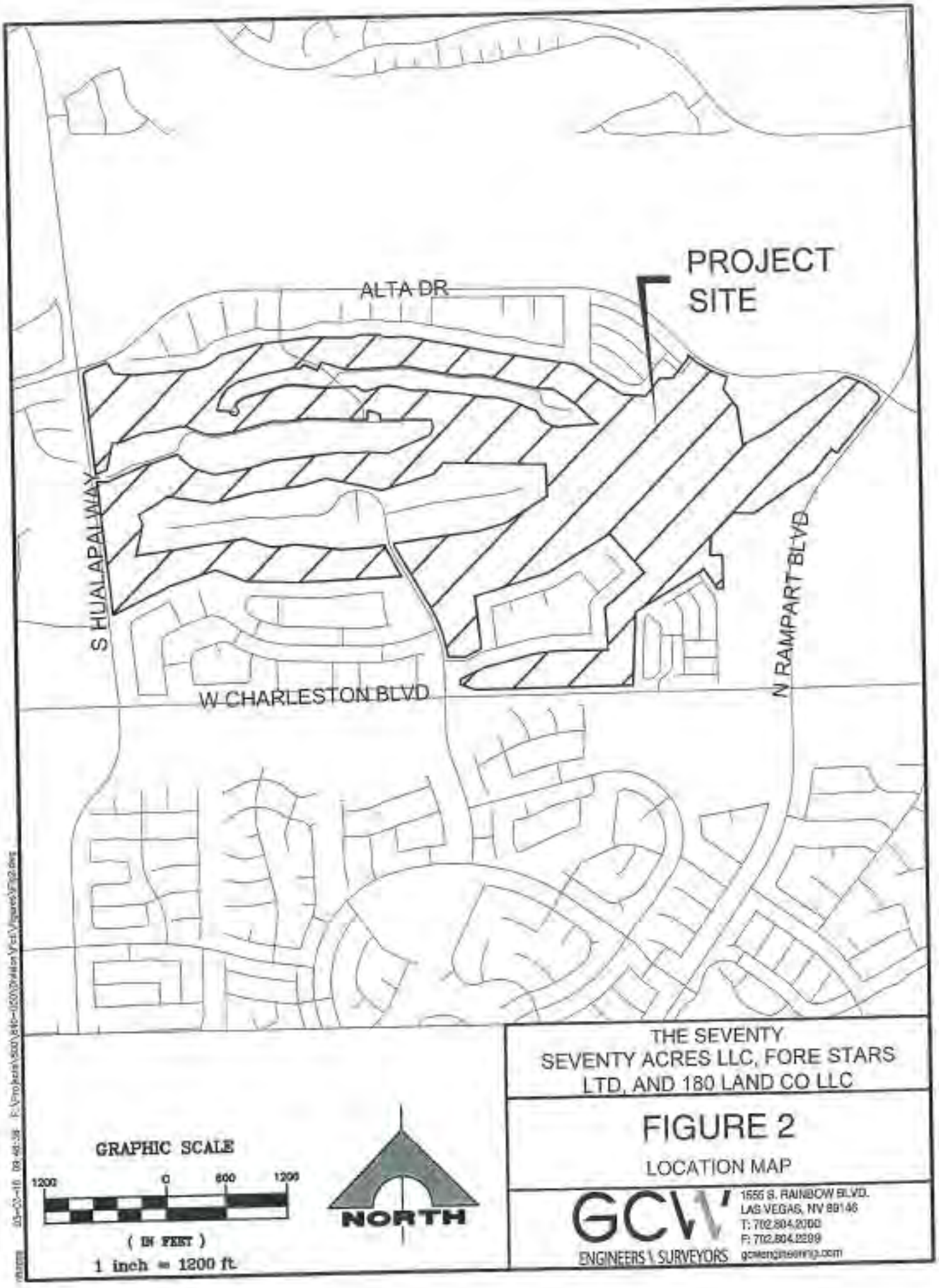

THE SEVENTY
SEVENTY ACRES LLC, FORE STARS LTD, AND 180 LAND CO LLC

FIGURE 2

LOCATION MAP

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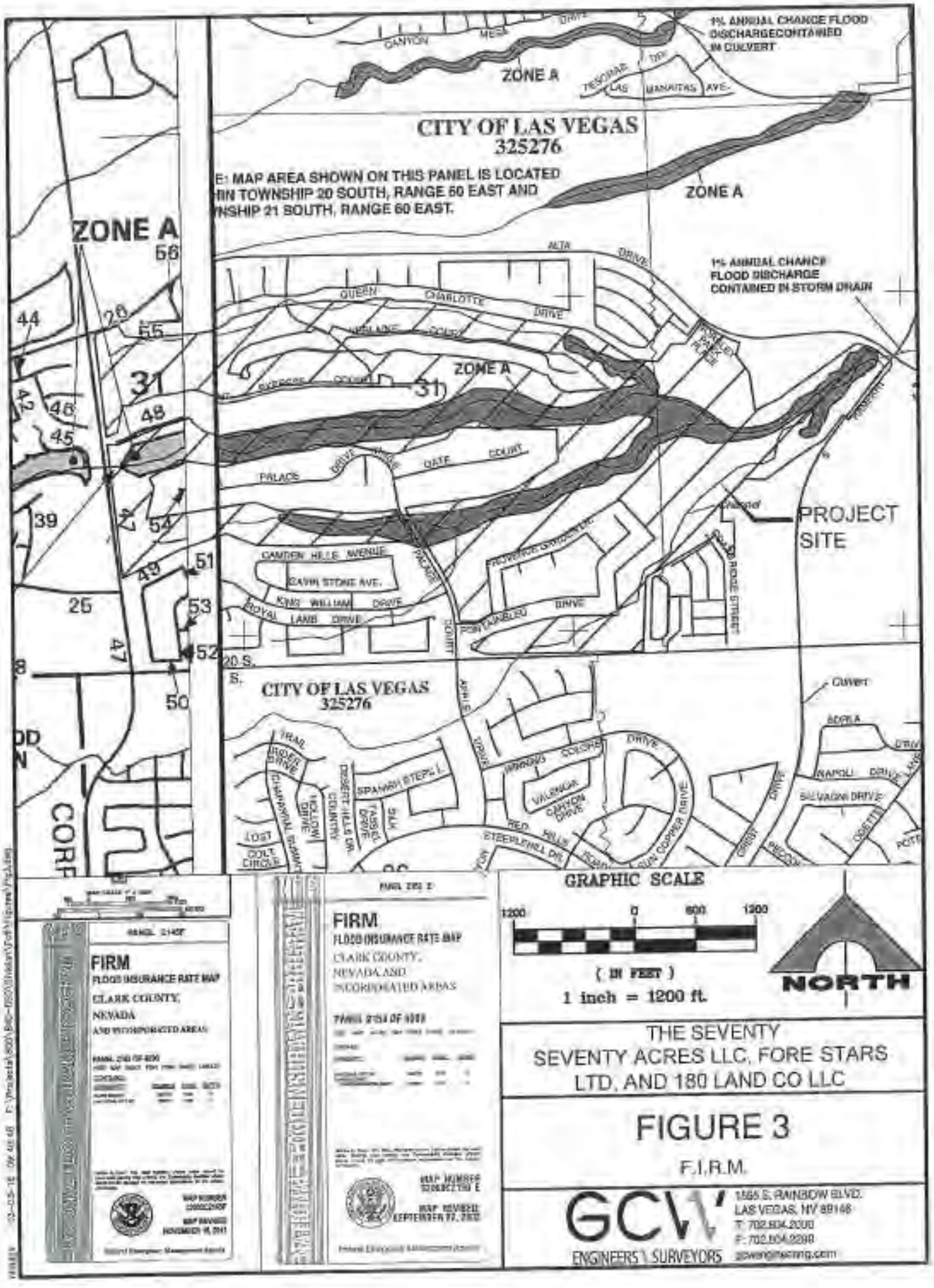
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
ZONE A
CITY OF LAS VEGAS
325276
E: MAP AREA SHOWN ON THIS PANEL IS LOCATED
IN TOWNSHIP 20 SOUTH, RANGE 60 EAST AND
NSHIP 21 SOUTH, RANGE 60 EAST.
ZONE A
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN STORM DRAIN
ZONE A
PROJECT SITE
CITY OF LAS VEGAS
325276
Culvert
GRAPHIC SCALE
1200 0 600 1200
(IN FEET)
1 inch = 1200 ft.
NORTH
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA
AND INCORPORATED AREAS
THE SEVENTY
SEVENTY ACRES LLC, FORE STARS LTD, AND 180 LAND CO LLC
FIGURE 3
F.I.R.M.
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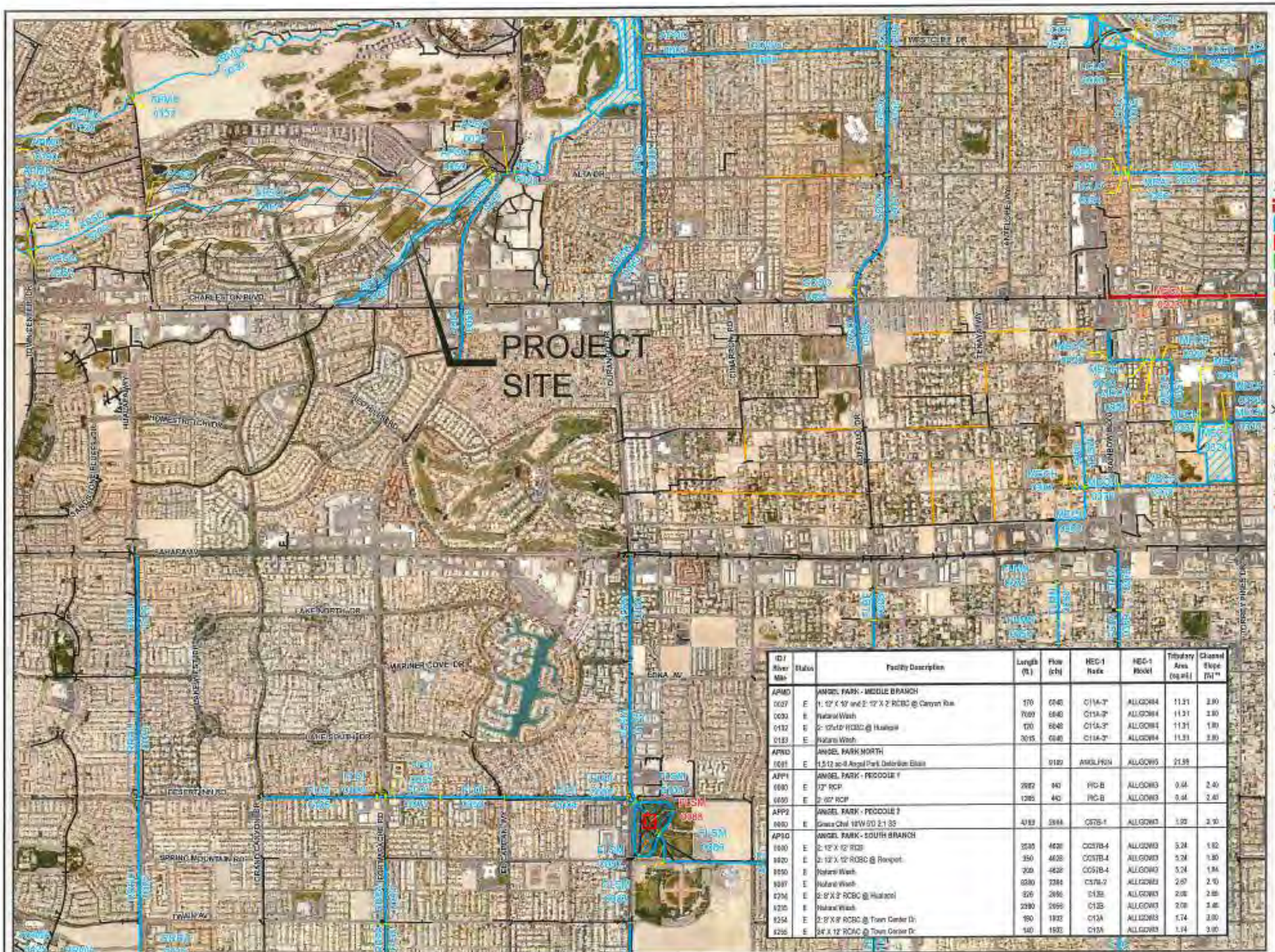
IV. CLARK COUNTY REGIONAL FLOOD CONTROL DISTRICT (CCRFCD) FACILITIES

Figure 4 is reproduced from Figures F-12 from the *2013 Las Vegas Valley Flood Control Master Plan Update* (Reference 4, hereinafter referred to as the 2013 MPU). The figure depicts the project site in relation to existing and proposed regional facilities. As shown on Figure 4, the following facilities are within or adjacent to the project site:

- Angel Park – South Branch (APSO 0000-0204)
- Angel Park – Peccole 1 (APP1 0000)
- Angel Park – Peccole 2 (APP2 0000)

The Two Fifty project site contains existing CCRFCD Facilities APSO 0050, APSO 0067 and APP2 0000. The existing CCRFCD Facilities within The Two Fifty project site are labeled as natural washes in the 2013 MPU. The One Eighty proposes approximately 4,700 linear feet of CCRFCD Facility APSO 0067 and approximately 2,300 linear feet of CCRFCD Facility APP2 0000 as future RCB storm drain. The Seventy proposes to construct CCRFCD Facility APSO 0050 and approximately 1,900 linear feet of CCRFCD Facility APSO 0067 and approximately 1,485 linear feet of CCRFCD Facility APP2 0000 as RCB storm drain.

The 2013 MPU flow rates for the proposed CCRFCD Facilities will be superseded by the project specific hydrology presented in this report. Flows conveyed through the site are discharged northeast to existing CCRFCD Facility APSO 0020 located at the Rampart Boulevard and Alta Drive intersection. CCRFCD Facility APSO 0020 is labeled as a dual (2) - 12-foot wide by 12-foot high RCB in the 2013 MPU. CCRFCD Facility APSO 0020 discharges flow east to existing CCRFCD Facility APSO 0000. CCRFCD Facility APSO 0000 is labeled as a dual (2) - 12-foot wide by 12-foot high RCB in the 2013 MPU. CCRFCD Facility APSO 0000 conveys flow northeast to the existing Angel Park Detention Basin. The hydraulic design for CCRFCD Facility APSO 0000 was presented in the Queens Borough Culvert Study. The Angel Park Detention Basin is labeled as CCRFCD Facility APNO 0001.



REGIONAL FLOOD CONTROL DISTRICT

2013
LAS VEGAS VALLEY
FLOOD CONTROL
MASTER PLAN UPDATE

FIGURE F- 30

FLOOD CONTROL FACILITIES

LEGEND

- Ultimate Development Boundary
- Existing Facilities
- Category A Proposed Facilities
- Category B Proposed Facilities
- Local Existing Facilities
- Local Proposed Facilities
- Detention Basin
- Stormdrain
- Lined Channel
- Unlined Channel
- Levee/Dike
- Natural Wash/Floodway
- ID-Mile Separator

Remove & Replace/Parallel Facilities

Category A	Category B
Channel	Channel
Stormdrain	Stormdrain

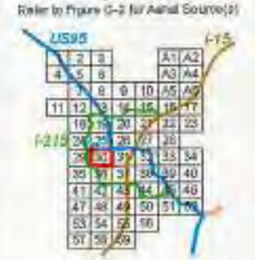
FIGURE 4

N

0 500 1,000 2,000 3,000
Feet

Scale: 1 inch = 2,000 feet

Refer to Figure C-2 for Aerial Source(s)



ID / River Mile	Status	Facility Description	Length (ft.)	Flow (cfs)	HEC-1 Node	HEC-1 Model	Tributary Area (sq.mi.)	Channel Slope (%)**
APM0		ANGEL PARK - MIDDLE BRANCH						
0027	E	1: 12' X 10' and 2: 12' X 2' RCBC @ Canyon Rim	170	6840	C11A-3*	ALLGOW4	11.31	2.80
0030	E	Natural Wash	7080	6840	C11A-3*	ALLGOW4	11.31	2.80
0132	E	2: 12'x10' RCBC @ Hualapai	120	6840	C11A-3*	ALLGOW4	11.31	1.80
0133	E	Natural Wash	3015	6840	C11A-3*	ALLGOW4	11.31	2.80
APN0		ANGEL PARK NORTH						
0001	E	1.5/12 ac-ft Angel Park Detention Basin		0100	ANGLPKN	ALLGOW5	21.99	
APP1		ANGEL PARK - PECCOLE 1						
0000	E	12" RCP	2882	440	PIC-B	ALLGOW3	0.44	2.40
0000	E	2: 60" RCP	1285	440	PIC-B	ALLGOW3	0.44	2.40
APP2		ANGEL PARK - PECCOLE 2						
0000	E	Grass Chnl 10'W 0.0 2:1 SS	4153	2866	CS7B-1	ALLGOW3	1.00	2.10
APS0		ANGEL PARK - SOUTH BRANCH						
0000	E	2: 12' X 12' RCB	3535	4620	CC5TB-4	ALLGOW3	5.24	1.82
0020	E	2: 12' X 12' RCBC @ Rexport	350	4620	CC5TB-4	ALLGOW3	5.24	1.80
0050	E	Natural Wash	200	4620	CC5TB-4	ALLGOW3	5.24	1.84
0087	E	Natural Wash	6380	3384	CS7B-2	ALLGOW3	2.67	2.10
0216	E	2: 8' X 3' RCBC @ Hualapai	920	2866	C13B	ALLGOW3	2.08	2.66
0235	E	Natural Wash	2280	2866	C13B	ALLGOW3	2.08	3.46
0254	E	2: 8' X 8' RCBC @ Town Center Dr.	180	1933	C13A	ALLGOW3	1.74	2.80
0256	E	24' X 12' RCBC @ Town Center Dr.	140	1933	C13A	ALLGOW3	1.74	3.80

V. HYDROLOGY

The methodology presented in this study is in compliance with the *CCRFCD Hydrologic Criteria and Drainage Design Manual* (Reference 5, hereinafter referred to as the Manual).

Model Description - The drainage subbasins were modeled using the SCS Unit Hydrograph method within the U.S. Army Corps of Engineers *HEC-1 Flood Hydrograph Package* (Reference 6). Since the drainage area for each watershed within the project is less than 8 square miles, an SDN 3 design storm was selected for use in the HEC-1 computer model. The 2013 MPU ALLGOW3.dat HEC-1 model has been referenced and revised for the purposes of this report.

Precipitation – The project site and tributary drainage areas lie outside of the McCarran Rainfall Area as identified in the Manual. Rainfall depths for the project site were calculated utilizing GIS data distributed by the Clark County GISMO (Geographic Information Systems Management Office). The GIS rainfall depths were extracted from the NOAA Rainfall Atlas and have been adjusted according to the approach outlined in Section 500 of the Manual. The adjusted point precipitation values for the onsite drainage subbasins range from 2.88 inches to 3.08 inches for the 100-year storm event and 1.64 inches to 1.76 inches for the 10-year storm events. The rainfall exhibit has been included in Appendix A.

Curve Numbers (CN) – The soils information for the project watershed was referenced from the *Soil Survey of Las Vegas Valley Area, Nevada, Part of Clark County* (Reference 7). This survey delineates families of soil types and the Hydrologic Soil Group (HSG) of each family. A soils map containing the project site is included in Appendix A. The soil classification for the site has been revised since the 2013 MPU was prepared and the soil classification used for the onsite portion of the model has been revised accordingly. A copy of the *Custom Soil Resource Report for the Soil Survey of the Las Vegas Valley Area, Nevada, Part of Clark County* from the U.S. Department of Agriculture and Natural Resource Conservation Service (Reference 7) have been included in Appendix A. The report shows that the project area and offsite subbasins consist of Soil Type 152 (Cave). Soil Type 152 is classified as 100 percent Hydrologic Soil Group (HSG) Type "D". Note that the 2013 MPU hydrology shows Soil Type 152 classified as 5 percent HSG Type "A", 10 percent HSG Type "B", and 85 percent HSG Type "D". As a result of the revisions, CNs for the offsite and onsite

existing conditions subbasins are slightly higher than the CNs presented in the 2013 MPU.

The land uses or land covers used for the subbasins shown for the adjacent parcels and The One Eighty portions of the site are referenced from the 2013 MPU. Due to the size of the future estate lots (minimum 1 to 5± acres), curve numbers for the future The One Eighty subbasins will be less than or equal to the curve numbers presented in this report for existing and proposed conditions.

The land uses or land covers used for the developed The Seventy portion of the site consist of "commercial and business." Weighted curve numbers for the subbasins were calculated using GIS. The land covers used for the mass graded portion of the site in the proposed conditions model conservatively assumes "commercial and business" in lieu of "newly graded areas" since the difference in the calculated curve numbers are comparable (commercial CN 95 vs. newly graded CN 94).

Curve numbers for existing and developed conditions basins, as well as a curve number matrix of the soil type and for each land use, are included in Appendix A.

For the given soils, CN values were determined from appropriate columns of Table 602 and 602A of the Manual. Composite CN values of 82 to 95 were determined for the existing and developed conditions onsite subbasins, respectively.

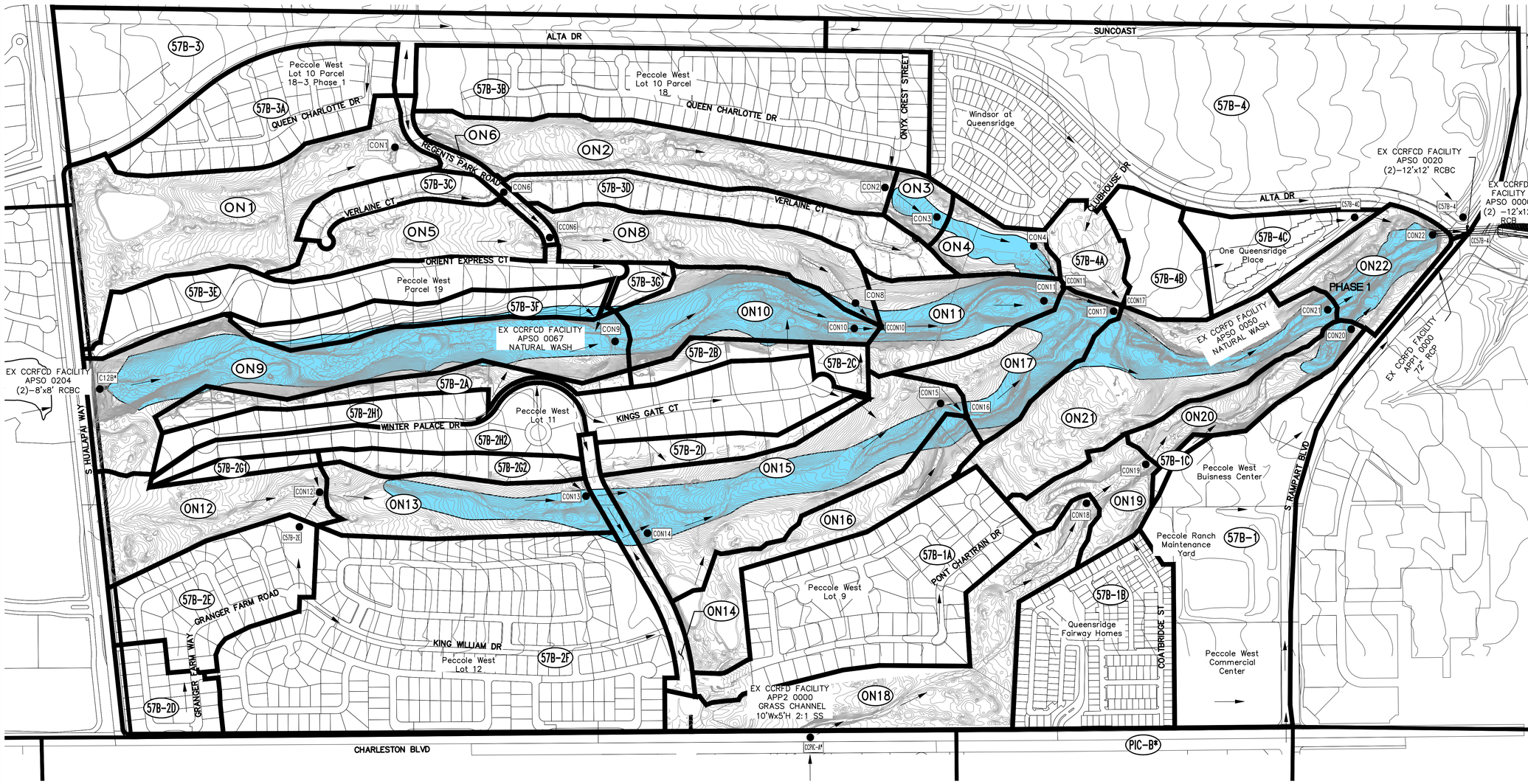
Drainage Areas and Flow Patterns - The subbasins and flow patterns used for the hydrologic modeling were determined from elevations established for the project site in a master grading digital file. Offsite hydrology was determined from research of existing drainage studies for adjacent developments.

Lag Time - The lag time (TLAG) is described as the time between the center of mass of rainfall and the time of peak discharge from a basin. Lag time can be related to time of concentration (T_c) by the following relationship: TLAG = 0.6 (T_c). The time of concentration (T_c) is defined as the time required for runoff to flow from the most hydraulically distant area of the basin to the outlet of the basin or a design point. The procedure for calculating T_c is outlined in Section 602 of the Manual. Lag time calculations for the drainage subbasins have been included in Appendix A on Standard Form 4.

VI. EXISTING CONDITIONS

The site is presently developed as a golf course with existing washes traversing the project site conveying flows from west to east. A site visit was performed to confirm drainage patterns within the site and for parcels adjacent to the site. Offsite flows impact the site from the west and south. Offsite flows are conveyed to the site from the west via an existing dual (2) 8-foot wide by 8-foot high RCBC (CCRFCD Facility APSO 0204) under Hualapai Way. Additionally, offsite flows are conveyed to the site from the south via an existing RCBC under Charleston Boulevard. Offsite flows from residential subdivisions and commercial development adjacent to the golf course are discharged to the existing golf course as surface flow through existing storm drain and/or drainage easements. Flows conveyed through the site are discharged northeast to existing CCRFCD Facility APSO 0020 a dual (2) - 12-foot wide by 12-foot high RCB located at the Rampart Boulevard and Alta Drive intersection.

Figure 5 depicts the subbasins and drainage patterns used in the existing conditions hydrologic analysis. Offsite subbasins west of Hualapai Way and south of Charleston Boulevard are referenced from the 2013 MPU ALLGOW3 HEC-1 Model. The portion of the 2013 MPU tributary to 2013 MPU Concentration Point CC57B-4 located at the intersection of Alta and Rampart has been revised with this report. The model has been revised to determine onsite project specific flow rates and existing conditions flow rates discharged to CCRFCD Facilities APSO 0020 and APSO 0000. Copies of Figures H-29 and H-30 from the 2013 MPU have been included in Appendix C. The results of the Existing Conditions HEC-1 model are summarized in Table 1. A copy of the Existing Conditions HEC-1 model output is included in Appendix A.



SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	10 YR (CFS)
57B-1	31.1	80	40
57B-1A	28.4	54	20
57B-1B	19.3	51	25
57B-1C	0.6	2	1
57B-2A	6.3	14	6
57B-2B	3.0	8	3
57B-2C	1.7	5	2
57B-2D	5.7	16	7
57B-2E	14.5	42	19
57B-2F	57.8	147	69
57B-2G1	1.6	5	2
57B-2G2	4.6	12	5
57B-2H1	18.6	32	13
57B-2H2	10.0	21	9
57B-2I	4.6	12	5
57B-3	30.8	44	28
57B-3A	16.6	36	14
57B-3B	32.8	66	25
57B-3C	4.4	11	4
57B-3D	11.8	26	11
57B-3E	16.0	32	13
57B-3F	7.4	17	7
57B-3G	1.5	4	2
57B-4	82.7	202	101
57B-4A	4.5	8	3
57B-4B	7.1	24	13
57B-4C	7.8	23	12
C12B*	-	2134	990
C57B-2E	-	56	26
C57B-4	-	259	127
C57B-4C	-	47	25
CC57B-4	-	4720	2354
CCON6	-	36	14
CCON10	-	2128	1025
CCON11	-	2227	1065
CCON17	-	2472	1171
CCPIC-A*	-	1885	900
CON1	-	86	32
CON2	-	164	55
CON3	-	189	64
CON4	-	195	66
CON6	-	18	8
CON8	-	54	19
CON9	-	2120	1012
CON10	-	2120**	1015
CON11	-	2128	1017
CON12	-	83	36
CON13	-	118	49
CON14	-	174	79
CON15	-	346	142
CON16	-	367	150
CON17	-	368	153
CON18	-	1912	906
CON19	-	1954	923
CON20	-	1944	923
CON21	-	2493	1177
CON22	-	4209	2065
ON1	25.4	50	18
ON2	17.5	31	11
ON3	2.5	6	2
ON4	4.7	9	3
ON5	9.4	18	7
ON6	2.3	8	4
ON8	12.2	27	9
ON9	25.5	41	14
ON10	11.4	24	8
ON11	10.0	19	7
ON12	11.6	23	8
ON13	12.0	23	8
ON14	3.5	6	2
ON15	22.5	42	15
ON16	11.5	23	8
ON17	9.1	20	7
ON18	20.3	31	10
ON19	6.4	12	4
ON20	6.6	12	4
ON21	22.3	34	12
ON22	8.5	18	6
PIC-B*	282.2	442	205

* Referenced Subbasin/Concentration Point from 2013 MPU
**The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow for routing.

LEGEND

- SUBBASIN BOUNDARY
- OFF1 DRAINAGE SUBBASIN
- CP1 CONCENTRATION POINT
- FLOW DIRECTION
- ZONE A SFHA FLOODPLAIN

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SEVENTY ACRES LLC, FORE STARS LTD, AND 180 LAND CO LLC

THE SEVENTY

EXISTING CONDITIONS DRAINAGE MAP

DRAWING
FIG5
OF SHTS

REPLY APP 1712

CLV17-00545

TABLE 1
SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL

SB OR CP*	AREA (AC)	100 YR (CFS)	10 YR (CFS)
57B-1	31.1	80	40
57B-1A	28.4	54	20
57B-1B	19.3	51	25
57B-1C	0.6	2	1
57B-2A	6.3	14	6
57B-2B	3.0	8	3
57B-2C	1.7	5	2
57B-2D	5.7	16	7
57B-2E	14.5	42	19
57B-2F	57.8	147	69
57B-2G1	1.6	5	2
57B-2G2	4.6	12	5
57B-2H1	18.6	32	13
57B-2H2	10.0	21	9
57B-2I	4.6	12	5
57B-3	30.8	44	28
57B-3A	16.6	36	14
57B-3B	32.8	66	25
57B-3C	4.4	11	4
57B-3D	11.8	26	11
57B-3E	16.0	32	13
57B-3F	7.4	17	7
57B-3G	1.5	4	2
57B-4	82.7	202	101
57B-4A	4.5	8	3
57B-4B	7.1	24	13
57B-4C	7.8	23	12
C12B*	-	2134	990
C57B-2E	-	56	26
C57B-4	-	259	127
C57B-4C	-	47	25
CC57B-4	-	4720	2354
CCON6	-	36	14
CCON10	-	2128	1025
CCON11	-	2227	1065
CCON17	-	2472	1171
CCPIC-A*	-	1895	900
CON1	-	86	32
CON2	-	164	55
CON3	-	189	64
CON4	-	195	66
CON6	-	18	8
CON8	-	54	19
CON9	-	2120	1012
CON10	-	2120**	1015
CON11	-	2126	1017

REPLY APP 1713 Docket 94345 Document 2023-13826 007109 CLV17-300546

TABLE 1
SUMMARY OF EXISTING CONDITIONS HEC-1 MODEL

SB OR CP*	AREA (AC)	100 YR (CFS)	10 YR (CFS)
CON12	-	83	36
CON13	-	118	49
CON14	-	174	79
CON15	-	346	142
CON16	-	367	150
CON17	-	368	153
CON18	-	1912	906
CON19	-	1954	923
CON20	-	1944	923
CON21	-	2493	1177
CON22	-	4209	2065
ON1	25.4	50	18
ON2	17.5	31	11
ON3	2.5	6	2
ON4	4.7	9	3
ON5	9.4	18	7
ON6	2.3	8	4
ON8	12.2	27	9
ON9	25.5	41	14
ON10	11.4	24	8
ON11	10.0	19	7
ON12	11.6	23	8
ON13	12.0	23	8
ON14	3.5	6	2
ON15	22.5	42	15
ON16	11.5	23	8
ON17	9.1	20	7
ON18	20.3	31	10
ON19	6.4	12	4
ON20	6.6	12	4
ON21	22.3	34	12
ON22	8.5	18	6
PIC-B**	282.2	442	205

*See Figure 5

**The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow for routing

The existing conditions flow rate of 4,720 cfs (Concentration Point CC57B-4) conveyed to the CCRFCD Facilities APSO 0020 and APSO 0000 is slightly greater (<2%) than the 2013 MPU flow rate of 4,628 cfs shown at this location. The increase in flow rate is due to the increase in the CN values as a result of the updated soils classification for the site, and project specific hydrology revisions within the area bounded by Alta Drive, Rampart Boulevard, Charleston Boulevard and Hualapai Way

VII. PROPOSED CONDITIONS

The Seventy will be mass graded and the proposed onsite storm drain improvements will be constructed during proposed conditions. Proposed conditions drainage patterns are similar to existing conditions. Figure 6A depicts the subbasins and drainage patterns used in the proposed conditions hydrologic analysis. The results of the Proposed Conditions HEC-1 model are summarized in Table 2. A copy of the Proposed Conditions HEC-1 model output is included in Appendix A.

TABLE 2
SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL

SB OR CP[1]	AREA (AC)	100 YR (CFS)	10 YR (CFS)
57B-1	31.1	80	40
57B-1A	28.4	54	20
57B-1B	19.3	51	25
57B-1C	0.6	2	1
57B-2A	6.3	14	6
57B-2B	3.0	8	3
57B-2C	1.7	5	2
57B-2D	5.7	16	7
57B-2E	14.5	42	19
57B-2F	57.8	147	69
57B-2G1	1.6	5	2
57B-2G2	4.6	12	5
57B-2H1	18.6	32	13
57B-2H2	10.0	21	9
57B-2I	4.6	12	5
57B-3	30.8	63	28
57B-3A	16.6	36	14
57B-3B	32.8	66	25
57B-3C	4.4	11	4
57B-3D	11.8	26	11
57B-3E	16.0	32	13
57B-3F	7.4	17	7
57B-3G	1.5	4	2
57B-4	82.7	202	101
57B-4B	7.1	24	13

TABLE 2
SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL

SB OR CP[1]	AREA (AC)	100 YR (CFS)	10 YR (CFS)
57B-4C	7.8	23	12
C12B*	-	2134	990
C57B-2E	-	58	26
C57B-4	-	259	127
C57B-4C	-	47	25
CC57B-4	-	4673	2326
CCON10	-	2128	1025
CCON6	-	36	14
CCON18R	-	1933	913
CCPIC-A*	-	1895	900
CDON2	-	2476	1169
CDON3	-	4177	2058
CDON4	-	4177**	2059
CON1	-	86	32
CON2	-	164	55
CON3R	-	191	65
CON6	-	18	8
CON8	-	54	19
CON9	-	2120	1012
CON10	-	2120**	1015
CON11R	-	2130	1026
CON12	-	83	36
CON13	-	118	49
CON14	-	174	79
CON15R	-	344	142
CON16R	-	364	149
CON18R	-	1910	905
CP19	-	1933**	920
CP20	-	1933**	920
CPPH1	-	2450	1153
DON1	10.8	34	18
DON2	19.5	60	31
DON3	21.1	65	34
DON4	17.4	44	23
ON1	25.4	50	18
ON2	17.5	31	11
ON3R	4.1	9	3
ON5	9.4	18	7
ON6	2.3	6	4
ON8	12.2	27	9
ON9	25.5	41	14
ON10	11.4	24	8
ON11R	5.1	11	4
ON12	11.6	23	6
ON13	12.0	23	8
ON14	3.5	6	2
ON15R	21.5	41	14

TABLE 2
SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL

SB OR CP[1]	AREA (AC)	100 YR (CFS)	10 YR (CFS)
ON16R	10.9	23	8
ON18R	18.5	28	10
PIC-B*	282.2	442	205

[1]See Figure 6A

*Referenced Subbasin/Concentration Point from 2013 MPU

**The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow for routing.

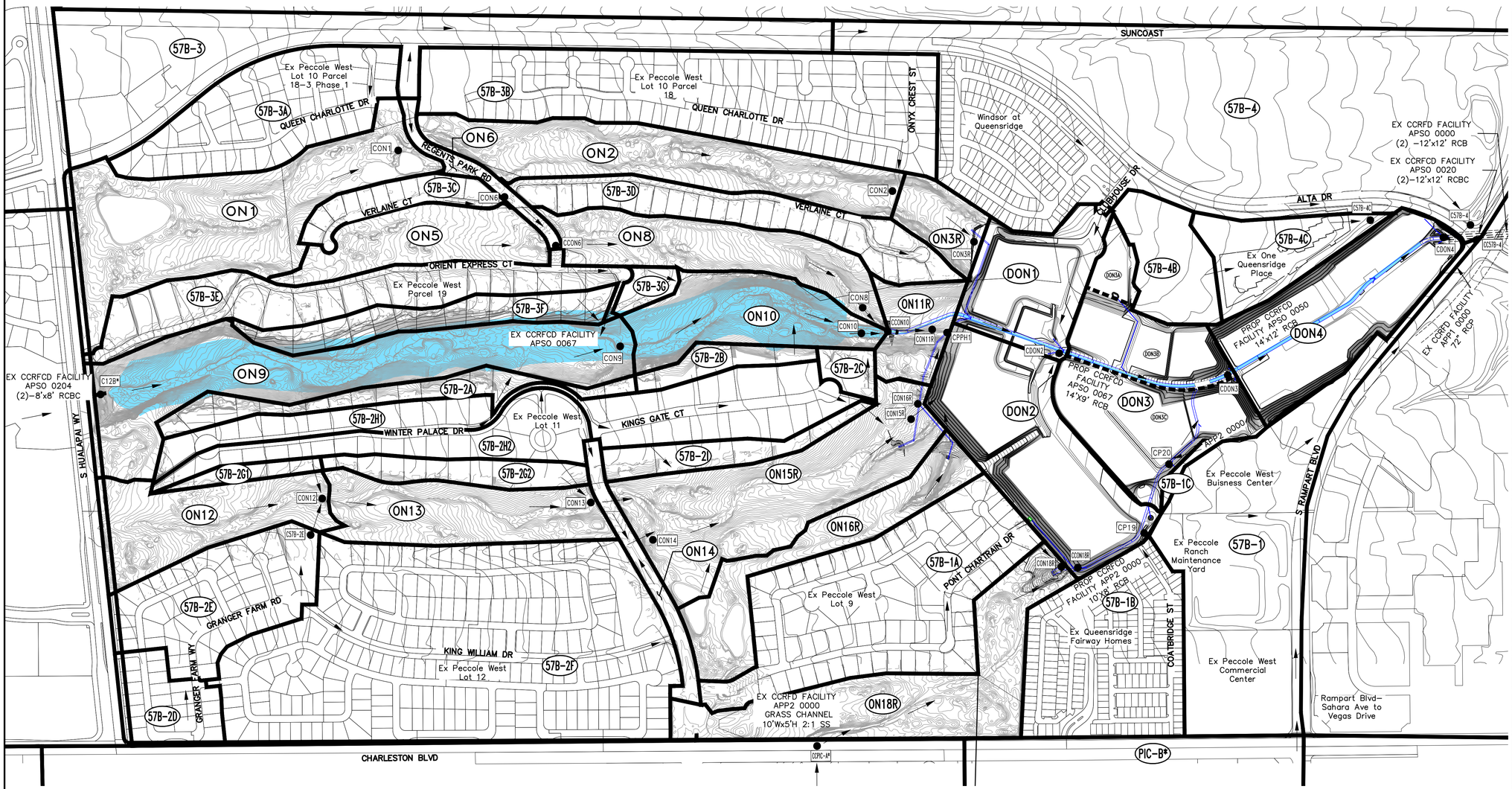
The proposed conditions flow rate of 4,673 cfs (Concentration Point CC57B-4) conveyed to the CCRFCD Facilities APSO 0020 and APSO 0000 is slightly lower than the existing conditions flow rate of 4,720 cfs. Additionally, the proposed conditions flow rate of 4,673 cfs is slightly greater (<1%) than the 2013 MPU flow rate of 4,628 cfs shown at this location. The increase in flow rate is due to the increase in the CN values for onsite subbasins as a result of the updated soils classification for the site and reducing the size of the onsite subbasins for project specific hydrology. The existing CCRFCD Facilities have adequate hydraulic capacity to convey proposed conditions flow rates from the site to the existing Angel Park Detention Basin.

GRAPHIC SCALE

300 0 150 300

(IN FEET)
1 inch = 300 ft.

NORTH



SUMMARY OF PROPOSED CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	10 YR (CFS)
57B-1	31.1	80	40
57B-1A	28.4	54	20
57B-1B	19.3	51	25
57B-1C	0.6	2	1
57B-2A	6.3	14	6
57B-2B	3.0	8	3
57B-2C	1.7	5	2
57B-2D	5.7	16	7
57B-2E	14.5	42	19
57B-2F	57.8	147	69
57B-2G1	1.6	5	2
57B-2G2	4.6	12	5
57B-2H1	16.6	32	13
57B-2H2	10.0	21	9
57B-2I	4.6	12	5
57B-3	30.8	63	28
57B-3A	16.6	36	14
57B-3B	32.8	66	25
57B-3C	4.4	11	4
57B-3D	11.8	26	11
57B-3E	16.0	32	13
57B-3F	7.4	17	7
57B-3G	1.5	4	2
57B-4	82.7	202	101
57B-4B	7.1	24	13
57B-4C	7.8	23	12
C12B*	-	2134	990
C57B-2E	-	56	26
C57B-4	-	259	127
C57B-4C	-	47	25
CC57B-4	-	4673	2326
CCON10	-	2128	1025
CCON6	-	36	14
CCON18R	-	1933	913
CCPIC-A*	-	1895	900
CDON2	-	2476	1169
CDON3	-	4177	2058
CDON4	-	4177**	2059
CON1	-	86	32
CON2	-	164	55
CON3R	-	191	83
CON6	-	18	8
CON8	-	54	19
CON9	-	2120	1012
CON10	-	2120**	1015
CON11R	-	2130	1026
CON12	-	83	36
CON13	-	118	49
CON14	-	174	79
CON15R	-	344	142
CON16R	-	364	149
CON18R	-	1910	905
CP19	-	1933**	920
CP20	-	1933**	920
CPPH1	-	2450	1153
DON1	10.8	34	18
DON2	19.5	60	31
DON3	21.1	65	34
DON4	17.4	44	23
ON1	25.4	50	18
ON2	17.5	31	11
ON3R	4.1	9	3
ON5	9.4	18	7
ON6	2.3	8	4
ON8	12.2	27	9
ON9	25.5	41	14
ON10	11.4	24	8
ON11R	5.1	11	4
ON12	11.6	23	8
ON13	12.0	23	8
ON14	3.5	6	2
ON15R	21.5	41	14
ON16R	10.9	23	8
ON18R	18.5	28	10
PIC-B*	282.2	442	205

*Referenced Subbasin/Concentration Point from 2013 MPU

**The HEC-1 node shown identifies the controlling concentration point for the associated facility and is located upstream of this facility due to decreasing peak flow with increasing tributary area caused by storm distribution transitions, depth area reduction factors, or attenuation of flow for routing.

LEGEND

- SUBBASIN BOUNDARY
- PRORATE SUBBASIN BOUNDARY
- OFF1 — DRAINAGE SUBBASIN
- CP1 — CONCENTRATION POINT
- FLOW DIRECTION
- ZONE A SFHA FLOODPLAIN

PROPOSED CONDITIONS PRORATED FLOW SUMMARY

Ultimate Onsites			
Subbasin#	Q_{100} (cfs)	Area (acres)	cfs/acre
DON3	65	21.1	3.08
Proposed Onsite Prorated Basins			
Subbasin*	Q_{100} (cfs)	Area (acres)	cfs/acre
DON3A	6	1.9	3.08
DON3B	23	7.4	3.08
DON3C	36	11.8	3.08
TOTAL	65	21.1	NA

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SEVENTY ACRES LLC, FORE STARS LTD, AND 180 LAND CO LLC

THE SEVENTY

PROPOSED CONDITIONS DRAINAGE MAP

DRAWING
FIG6A
OF SHTS

Onsite Mass Grading

Proposed onsite drainage patterns and rough grading are depicted on Figure 6B. Subbasins impacting the proposed rough graded channels have been prorated to determine the specific flow rates to the proposed rough graded channel sections. The prorated flows are based on the total cfs per acre of tributary area. Prorated flows are summarized on Table 3.

TABLE 3
PROPOSED CONDITIONS
PRORATED FLOW SUMMARY

Subbasin[1]	Q_{100} (cfs)	Area (acres)	cfs/acre
Proposed Onsite Subbasins			
DON3	65	21.1	3.08
Proposed Onsite Prorated Subbasins			
Subbasin*	Q_{100} (cfs)	Area (acres)	cfs/acre
DON3A	6	1.9	3.08
DON3B	23	7.4	3.08
DON3C	36	11.8	3.08
TOTAL	65	21.1	NA

[1]See Figures 6A and 6B

The onsite rough graded ditches are summarized in Table 4. Ditch calculations have been included in Appendix B.

TABLE 4
100-YEAR ROUGH GRADING DITCH CHARACTERISTICS

Ditch[1]	Min Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Section A	0.65	44	0.54	2.91	24	Trap	9.5:1/5:1	N/A	1.50	DON4
Section B	1.20	44	0.33	2.97	42	Trap	5:1/5:1	N/A	1.50	DON4
Section C	5.65	59	0.33	4.21	42	Trap	3:1/2:1	12	1.50	DON3B + DON3C
Section D	4.26	59	0.36	3.81	42	Trap	3:1/3:1	12	1.50	DON3B + DON3C
Section E	0.50	60	1.08	3.60	10	Trap	8:1/2:1	N/A	2.00	DON2
Section F	0.73	60	1.07	4.64	10	Trap	2:1/2:1	N/A	2.50	DON2
Section G	0.61	34	0.80	3.55	10	Trap	3:1/2:1	N/A	2.00	DON1
Section H (north)	6.15	33	0.56	3.93	0	V-ditch	3:1/50:1	12	2.00	1/2 DON2
Section H (south)	6.15	33	0.57	3.97	0	V-ditch	2:1/50:1	12	2.00	1/2 DON2

[1]See Figures 6A and 6B.

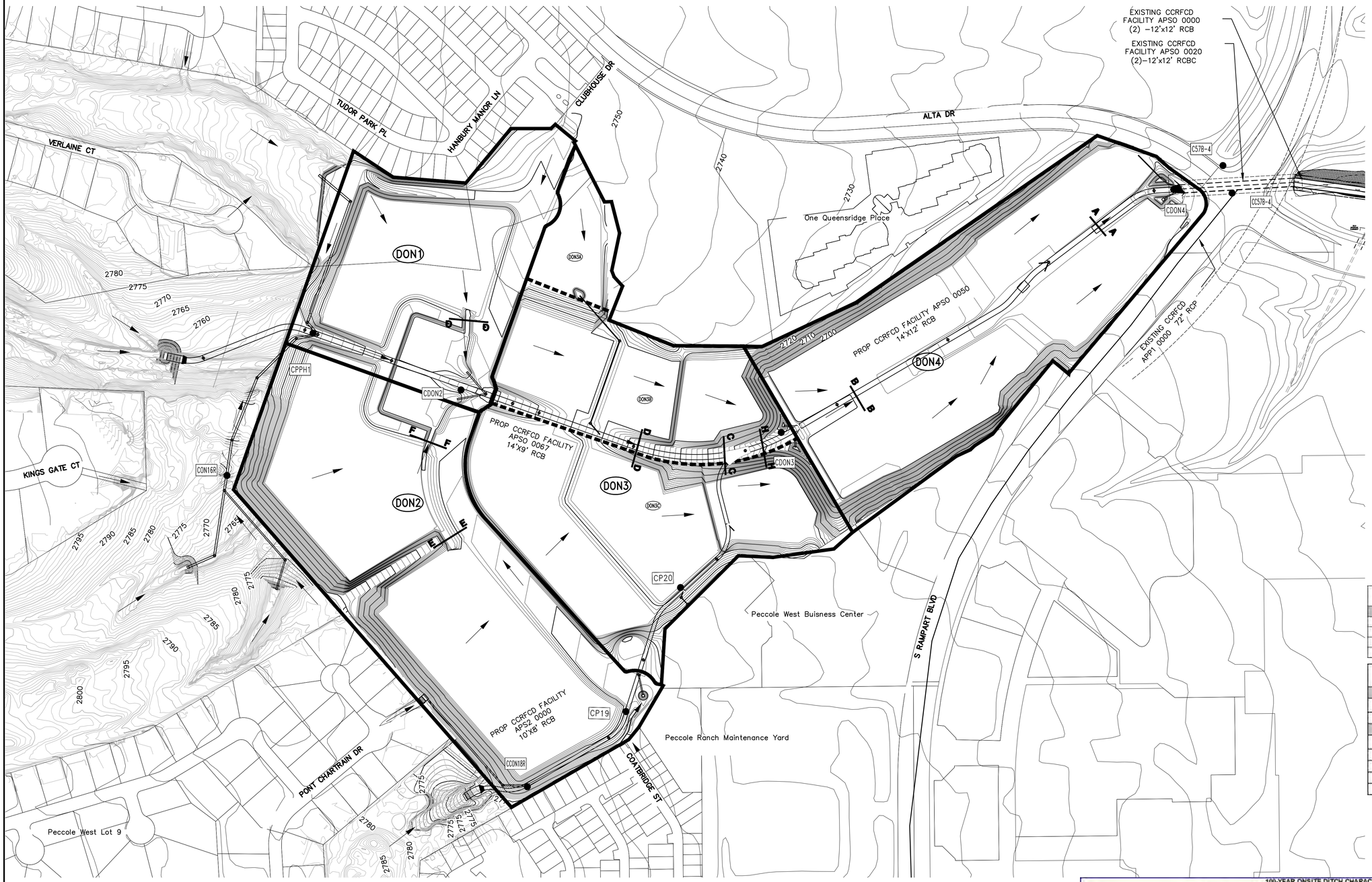
REPLY APP 1719 Docket 84345 Document 2023-13826 007115 CLV17-300552

GRAPHIC SCALE

150 0 75 150

(IN FEET)
1 inch = 150 ft.

NORTH



LEGEND

- SUBBASIN BOUNDARY
- (OFF1) DRAINAGE SUBBASIN
- PRORATED SUBBASIN BOUNDARY
- (OFF1) PRORATED SUBBASIN
- (CP) CONCENTRATION POINT
- FLOW DIRECTION
- (1) FACILITY IDENTIFICATION
- EXISTING CCRFCD FACILITY MAP

SUMMARY OF ONSITE SUBBASINS FROM THE PROPOSED CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	10 YR (CFS)
DON1	10.8	34	18
DON2	19.5	60	31
DON3	21.1	65	34
DON4	17.4	44	23

PROPOSED CONDITIONS PRORATED FLOW SUMMARY

Ultimate Onsites			
Subbasin*	Q_{100} (cfs)	Area (acres)	cfs/acre
DON3	65	21.1	3.08
Proposed Onsite Prorated Basins			
Subbasin*	Q_{100} (cfs)	Area (acres)	cfs/acre
DON3A	6	1.9	3.08
DON3B	23	7.4	3.08
DON3C	36	11.8	3.08
TOTAL	65	21.1	NA

100-YEAR ONSITE DITCH CHARACTERISTICS

Ditch	Min Slope (%)	Q_{100} (cfs)	Depth of flow (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Section A	0.65	44	0.54	2.91	24	Trap	9.5:1/5:1	N/A	1.50	DON4
Section B	1.20	44	0.33	2.97	42	Trap	9:1/9:1	N/A	1.50	DON4
Section C	5.85	59	0.33	4.21	42	Trap	3:1/2:1	12	1.50	DON3B + DON3C
Section D	4.26	59	0.38	3.81	42	Trap	3:1/3:1	12	1.50	DON3B + DON3C
Section E	0.50	60	1.08	3.60	10	Trap	6:1/2:1	N/A	2.00	DON2
Section F	0.73	60	1.07	4.64	10	Trap	2:1/2:1	N/A	2.50	DON2
Section G	0.61	34	0.80	3.55	10	Trap	3:1/2:1	N/A	2.00	DON1
Section H (north)	6.15	33	0.56	3.95	0	V-ditch	3:1/50:1	12	2.00	1/2 DON2
Section H (south)	6.15	33	0.57	3.97	0	V-ditch	2:1/50:1	12	2.00	1/2 DON2

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SEVENTY ACRES LLC, FORE STARS LTD, AND 180 LAND CO LLC

THE SEVENTY

ONSITE DRAINAGE MAP

DRAWING
FIG6B
OF SHTS

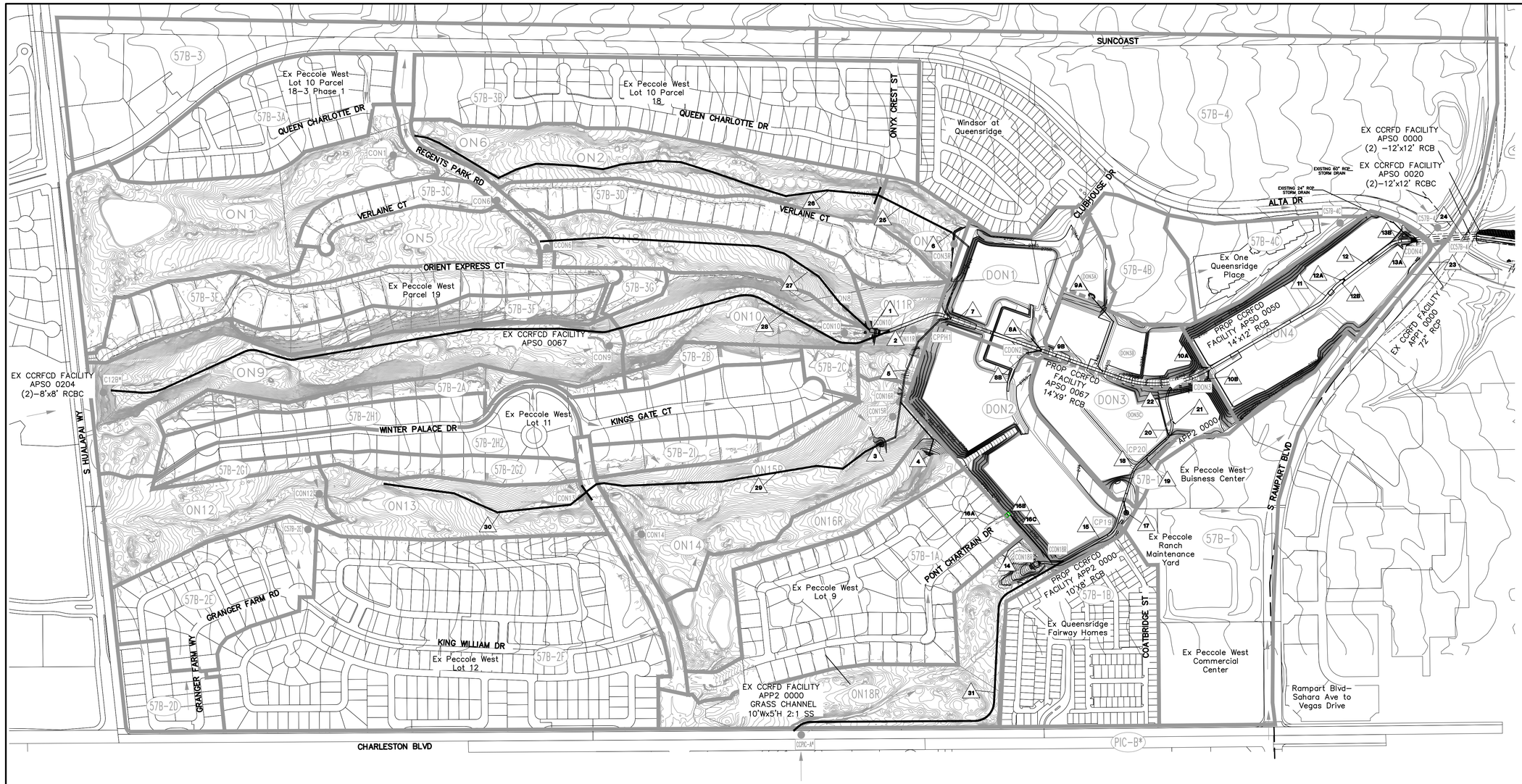
A site visit was performed to determine drainage patterns within APNs 138-32-311-002, 138-32-311-004, and 138-32-311-005. The total area tributary to site from these parcels was determined to be approximately 0.6 acres. The tributary area from these parcels is shown as Subbasin 57B-1C in the existing and proposed conditions hydrologic analyses. Subbasin 57B-1C generates 2 cfs during the 100-year storm event. The total flow is discharged at three locations along the boundary of the site. The discharge from the offsite parcel includes flow from an existing block wall opening, sheet flow from the site, and discharge from a curb opening. An NDOT Type 2 Drop Inlet and stub is proposed to intercept flow from the block wall opening. Two additional 18-inch RCP capped storm drain stubs are provided to intercept flows from these areas in the future. The future improvements for the site will safely convey flows from these adjacent parcels to the onsite storm drain system.

VIII. ULTIMATE CONDITIONS

The Two Fifty and all offsite areas are fully developed during ultimate conditions. Due to the size of the future estate lots (minimum 1 to 5± acres), curve numbers for the future One Eighty subbasins will be less than or equal to the curve numbers presented in this report for existing and proposed conditions. A separate analysis for ultimate conditions was not warranted since all offsite areas tributary to the site upstream of the overall Two Fifty development at Hualapai Way and Charleston Boulevard are already developed in proposed conditions. The proposed conditions flow rate of 4.673 cfs at CC57B-4 is considered to be the ultimate conditions flow rate conveyed to the dual (2) - 12-foot wide by 12-foot high RCB located at the Rampart Boulevard and Alta Drive intersection for the purposes of this report.

IX. STORM DRAIN FACILITIES AND PROTECTION

All proposed flood control facilities have been shown on Figure 7 and the plans included herewith. The design for the proposed facilities has been based on proposed conditions flow rates. Design of the storm drain facilities within the future One Eighty development have been based on normal depth calculations. Proposed mainline and lateral pipe sizes within the future One Eighty development were calculated using normal depth and have been upsized by 6 inches in diameter to provide for losses and future design flexibility. Proposed mainline and lateral RCB sizes include 1 foot of freeboard to account for storm



NORTH

GRAPHIC SCALE

300 0 150 300

(IN FEET)
1 inch = 300 ft.

LEGEND

ON1	SUBBASIN NAME
OFF1	PRORATED SUBBASIN NAME
	SUBBASIN BOUNDARY
	FLOW DIRECTION
23	FACILITY IDENTIFICATION
	PRORATED SUBBASIN
	FACILITY BREAKLINE
CP1	CONCENTRATION POINT

FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} (cfs)	FACILITY	TRIBUTARY	MPU Q_{100} (cfs)	MPU FACILITY
1	2,130	20'x9' RCB; 14' DEEP MIN SUMP; D50=12";T=24"	CCON10	-	-
2	2,130	15'x9' RCB	CON11R	2384	APSP 0067
3	344	72" RCP; 11.0' DEEP MIN SUMP; D50=12";T=24"	ON15R	-	-
4	23	48" RCP; 3.0' DEEP MIN SUMP; D50=12";T=24"	ON16R	-	-
5	364	72" RCP	CON16R	-	-
6	191	72" RCP	CON3R	-	-
7	2,450	14'x9' RCB	CPPH1	2384	APSP 0067
8A	34	48" RCP; 3.5' DEEP MIN SUMP; D50=12";T=24"	DON1	-	-
8B	60	48" RCP; 4.5' DEEP MIN SUMP; D50=12";T=24"	DON2	-	-
9A	6	24" RCP; 3.5' DEEP MIN SUMP; D50=12";T=24"	DON3A	-	-

LOCATION	Q_{100} (cfs)	FACILITY	TRIBUTARY	MPU Q_{100} (cfs)	MPU FACILITY
9B	2476	14'x9' RCB	CDON2	-	-
10A	23	48" RCP; 3.5' DEEP MIN SUMP; D50=12";T=24"	DON3B	-	-
10B	36	48" RCP; 4' DEEP MIN SUMP; D50=12";T=24"	DON3C	-	-
11	4,177	14'x12' RCB	CDON3	4,628	APS0 0050
12	4,177	14'x12' RCB	CDON3	4,628	APS0 0050
12A	22	24" RCP CAPPED	N/A	-	-
12B	22	24" RCP CAPPED	N/A	-	-
13A	22	36" RCP; 3.5' DEEP MIN SUMP; D50=12";T=24"	1/2 DON4	-	-
13B	22	36" RCP; 3.5' DEEP MIN SUMP; D50=12";T=24"	1/2 DON4	-	-
14	1,910	20'x9' RCB; 12' DEEP MIN SUMP; D50=12";T=24"	CON18R	-	-

LOCATION	Q_{100} (cfs)	FACILITY	TRIBUTARY	MPU Q_{100} (cfs)	MPU FACILITY
15	1,933	10'x8' RCB	CON18R	2,004	APP2 0000
16A	54	EX. CONCRETE DRAINAGE EASEMENT	57B-1A	-	-
16B	54	PROPOSED CONCRETE FLUME	57B-1A	-	-
16C	54	48" RCP	57B-1A	-	-
17	51	42" RCP; 4.5' DEEP MIN SUMP; D50=12";T=24"	57B-1B	-	-
18	1,933	10'x8' RCB	CCON18R	2,004	APP2 0000
19	2	18" RCP; 0.5' DEEP MIN AREA DRAIN; NDOT TYPE 2A	1/2 57B-1C	-	-
20	1,933	10'x8' RCB	CP20	2,004	APP2 0000
21	2	18" RCP; STUB (PLUGGED)	N/A	-	-
22	1,933	10'x8' RCB	CP20	2,004	APP2 0000

LOCATION	Q_{100} (cfs)	FACILITY	TRIBUTARY	MPU Q_{100} (cfs)	MPU FACILITY
23	-	-	-	442	APP1 0000
24	-	-	-	4,628	APSO 0020
25	191	54" RCP	CON3R	-	
26	164	54" RCP	CON2	-	
27	54	36" RCP	CON8	2,384	APSO 0067
28	2,128	11'x9' RCB	CCON10	-	
29	344	66" RCP	CON15R	-	
30	116	48" RCP	CON13	-	
31	1,910	11'x8' RCB	CON8R	2,004	APP2 0000

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THE SEVENTY

RECOMMENDED STORM DRAIN FACILITIES MAP

DRAWING
FIG7
OF SHTS

drain losses. Normal depth calculations with proposed future slopes for The One Eighty recommended facilities have been included in Appendix B. Note that detailed hydraulic analysis for The One Eighty proposed facilities will be required in future technical drainage study submittals for this project. Hydraulic calculations for the recommended facilities have been included in Appendix B.

The Seventy proposed Mainline 1 RCB extends the existing CCRFCD Facility APSO 0020 dual (2) - 12-foot wide by 12-foot high RCB's in Rampart Boulevard approximately 3,500 linear feet west through the proposed site. Mainline 1 consists of an approximately 30 linear feet junction structure; 1,560 linear feet of 14-foot wide by 12-foot high RCB; an 87 linear feet junction structure; 1,345 linear feet of 14-foot wide by 9-foot high RCB; 415 linear feet of 15-foot wide by 9-foot high RCB; a 12 linear feet transition structure; and 49 linear feet of 20-foot wide by 9-foot high RCB improved inlet. Mainline 1 will collect and convey offsite flows generated west and south of the project site northeast to the existing dual (2) - 12-foot wide by 12-foot high RCB located at the Rampart Boulevard and Alta Drive intersection.

Mainline 2 consists of approximately 1,425 linear feet of 10-foot wide by 8-foot high RCB; a 12 linear feet transition structure; and 49 linear feet of 20-foot wide by 9-foot high RCB improved inlet. Mainline 2 will collect and convey offsite flows generated south of the project site north to Mainline 1.

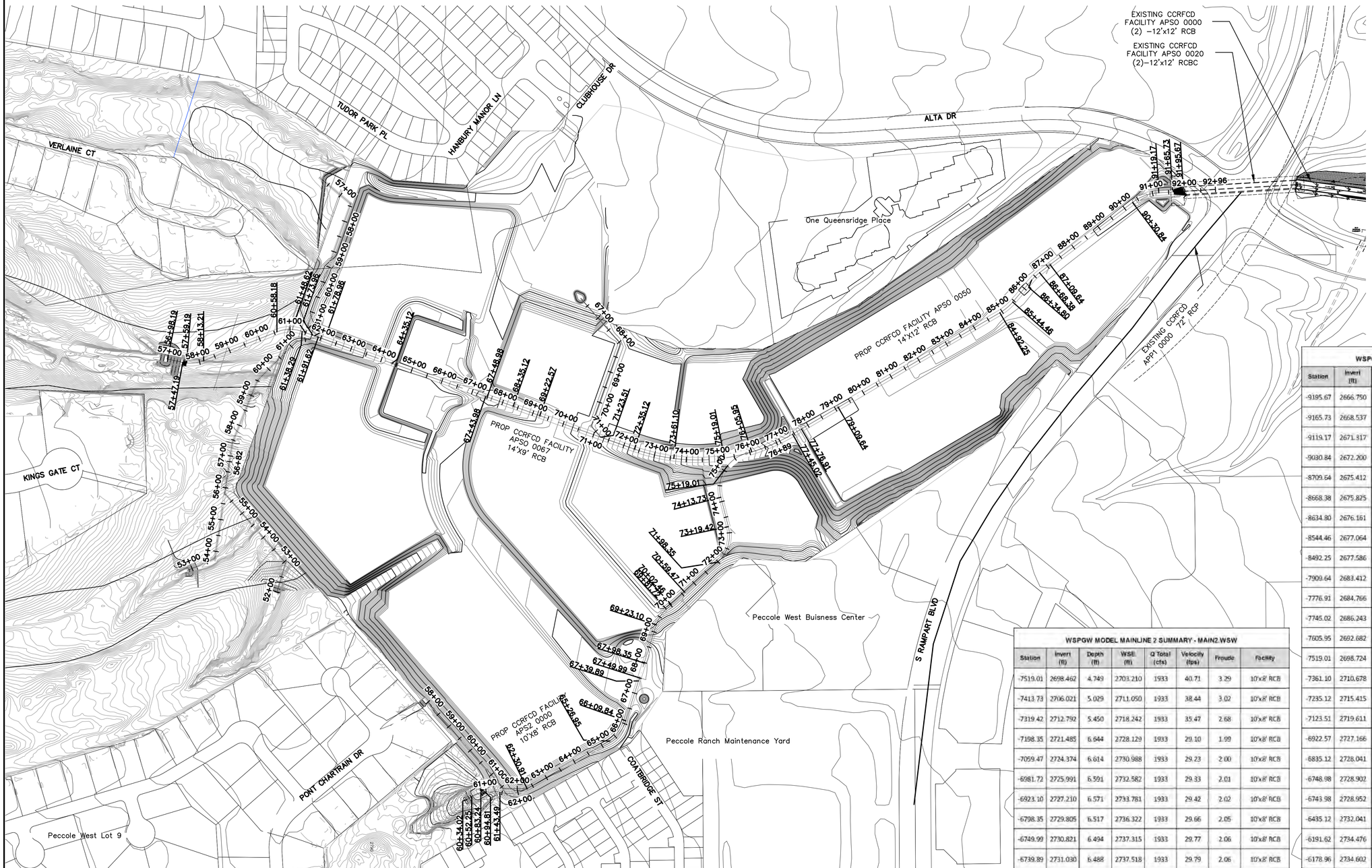
Hydraulic modeling for the proposed RCB storm drain mainlines and RCP laterals were performed with the CIVILDESIGN Corp. WSPGW Water Surface Pressure Gradient Package (Reference 8, hereinafter referred to as WSPGW). Copies of the WSPGW models for the proposed storm drain facilities have been included in Appendix B. Electronic copies of the models have been included on CD in the Appendix. Note that the flows at the concentration points nodes from the proposed conditions HEC-1 Model were used to model the proposed storm drain mainlines. Lateral storm flows in the mainline WSPGW models were adjusted, so the 100-year storm flows in downstream reaches match the concentration point peak flows along the mainline. The WSPGW models labeled "MAIN1" and "MAIN2" are for the proposed conditions Mainline 1 and Mainline 2 storm drain mainlines, respectively. A summary of the WSPGW results have been shown on Figure 8. The results of the WSPGW Mainline 1 and 2 models are summarized in Tables 5A and 5B, respectively.

GRAPHIC SCALE

150 0 75 150

(IN FEET)
1 inch = 150 ft.

NORTH



WSPGW MODEL MAINLINE 1 SUMMARY - MAIN1.WSW

Station	Invert (ft)	Depth (ft)	WSE (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility
-9195.67	2666.750	4.619	2671.37	4177	36.17	2.97	EXISTING (2) - 12'X12'RCB
-9165.73	2668.537	9.477	2678.01	4177	31.48	1.80	TRANSITION STRUCTURE
-9119.17	2671.317	10.738	2682.06	4177	27.78	1.49	14'X12' RCB
-9030.84	2672.200	10.624	2682.82	4177	28.08	1.52	14'X12' RCB
-8709.64	2675.412	10.063	2685.48	4177	29.65	1.65	14'X12' RCB
-8668.38	2675.825	9.977	2685.80	4177	29.91	1.67	14'X12' RCB
-8634.80	2676.161	9.904	2686.06	4177	30.13	1.69	14'X12' RCB
-8544.46	2677.064	9.694	2686.76	4177	30.78	1.74	14'X12' RCB
-8492.25	2677.586	9.566	2687.15	4177	31.19	1.78	14'X12' RCB
-7909.64	2683.412	7.828	2691.24	4177	38.11	2.40	14'X12' RCB
-7776.91	2684.766	7.381	2692.15	4177	40.42	2.62	14'X12' RCB
-7745.02	2686.243	7.473	2693.72	4177	39.93	2.57	14'X12' RCB
-7605.95	2692.682	8.017	2700.70	4177	37.22	2.32	14'X12' RCB
-7519.01	2698.724	4.391	2703.12	2476	40.27	3.39	TRANSITION STRUCTURE
-7361.10	2710.678	5.164	2715.84	2476	34.25	2.66	14'X9' RCB
-7235.12	2715.415	5.421	2720.84	2476	32.62	2.47	14'X9' RCB
-7123.51	2719.611	5.794	2725.41	2476	30.52	2.23	14'X9' RCB
-6922.57	2727.166	7.785	2734.95	2476	22.72	1.43	14'X9' RCB
-6835.12	2728.041	7.860	2735.90	2476	22.50	1.41	14'X9' RCB
-6748.98	2728.902	7.961	2736.86	2476	22.22	1.39	14'X9' RCB
-6743.98	2728.952	7.647	2736.60	2450	22.88	1.46	14'X9' RCB
-6435.12	2732.041	7.948	2739.99	2450	22.02	1.38	14'X9' RCB
-6191.62	2734.476	8.862	2743.34	2450	19.75	1.17	14'X9' RCB
-6178.96	2734.602	9.000	2743.60	2450	19.44	1.14	14'X9' RCB
-6173.96	2734.651	11.911	2746.56	2130	15.78	0.93	JUNCTION STRUCTURE
-6148.62	2734.902	11.822	2746.72	2130	15.78	0.93	15'x9' RCB
-6138.29	2735.004	11.786	2746.79	2130	15.78	0.93	15'x9' RCB
-6058.18	2735.797	12.026	2747.82	2130	15.78	0.93	15'x9' RCB
-5813.21	2738.222	11.166	2749.39	2130	15.78	0.93	15'x9' RCB
-5759.19	2738.757	11.408	2750.17	2130	15.78	0.93	15'x9' RCB
-5747.19	2738.876	13.460	2752.34	2130	11.83	0.70	TRANSITION STRUCTURE
-5698.19	2739.361	13.129	2752.49	2130	11.83	0.70	20'x9' RCB

WSPGW MODEL MAINLINE 2 SUMMARY - MAIN2.WSW

Station	Invert (ft)	Depth (ft)	WSE (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility
-7519.01	2698.462	4.749	2703.210	1933	40.71	3.29	10'x8' RCB
-7413.73	2706.021	5.029	2711.050	1933	38.44	3.02	10'x8' RCB
-7319.42	2712.792	5.450	2718.242	1933	35.47	2.68	10'x8' RCB
-7198.35	2721.485	6.644	2728.129	1933	29.10	1.99	10'x8' RCB
-7059.47	2724.374	6.614	2730.988	1933	29.23	2.00	10'x8' RCB
-6981.72	2725.991	6.591	2732.582	1933	29.33	2.01	10'x8' RCB
-6923.10	2727.210	6.571	2733.781	1933	29.42	2.02	10'x8' RCB
-6798.35	2729.805	6.517	2736.322	1933	29.66	2.05	10'x8' RCB
-6749.99	2730.821	6.494	2737.315	1933	29.77	2.06	10'x8' RCB
-6739.89	2731.030	6.488	2737.518	1933	29.79	2.06	10'x8' RCB
-6609.84	2733.736	6.400	2740.136	1933	30.20	2.10	10'x8' RCB
-6526.95	2734.565	6.068	2740.633	1933	31.86	2.28	10'x8' RCB
-6230.91	2740.485	5.194	2745.679	1910	36.77	2.84	10'x8' RCB
-6143.49	2748.869	6.290	2755.159	1910	30.37	2.13	10'x8' RCB
-6094.81	2753.537	8.000	2761.537	1910	23.88	1.49	10'x8' RCB
-6083.24	2754.647	15.899	2770.546	1910	10.61	0.62	TRANSITION STRUCTURE
-6052.25	2757.619	13.190	2770.809	1910	10.61	0.62	20'x9' RCB
-6034.02	2759.370	11.723	2771.094	1910	10.61	0.62	20'x9' RCB

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THE SEVENTY

WSPGW EXHIBIT

DRAWING
FIG8
OF SHTS

REPLY APP 1724 CLV17-00557

TABLE 5A
WSPGW MODEL MAINLINE 1 SUMMARY - MAIN1.WSW

Station*	Invert (ft)	Depth (ft)	WSE (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility
-9195.67	2666.750	4.619	2671.37	4177	36.17	2.97	EXISTING (2) – 12'X12'RCB
-9165.73	2668.537	9.477	2678.01	4177	31.48	1.80	TRANSITION STRUCTURE
-9119.17	2671.317	10.738	2682.06	4177	27.78	1.49	14'X12' RCB
-9030.84	2672.200	10.624	2682.82	4177	28.08	1.52	14'X12' RCB
-8709.64	2675.412	10.063	2685.48	4177	29.65	1.65	14'X12' RCB
-8668.38	2675.825	9.977	2685.80	4177	29.91	1.67	14'X12' RCB
-8634.80	2676.161	9.904	2686.06	4177	30.13	1.69	14'X12' RCB
-8544.46	2677.064	9.694	2686.76	4177	30.78	1.74	14'X12' RCB
-8492.25	2677.586	9.566	2687.15	4177	31.19	1.78	14'X12' RCB
-7909.64	2683.412	7.828	2691.24	4177	38.11	2.40	14'X12' RCB
-7776.91	2684.766	7.381	2692.15	4177	40.42	2.62	14'X12' RCB
-7745.02	2686.243	7.473	2693.72	4177	39.93	2.57	14'X12' RCB
-7605.95	2692.682	8.017	2700.70	4177	37.22	2.32	14'X12' RCB
-7519.01	2698.724	4.391	2703.12	2476	40.27	3.39	TRANSITION STRUCTURE
-7361.10	2710.678	5.164	2715.84	2476	34.25	2.66	14'X9' RCB
-7235.12	2715.415	5.421	2720.84	2476	32.62	2.47	14'X9' RCB
-7123.51	2719.611	5.794	2725.41	2476	30.52	2.23	14'X9' RCB
-6922.57	2727.166	7.785	2734.95	2476	22.72	1.43	14'X9' RCB
-6835.12	2728.041	7.860	2735.90	2476	22.50	1.41	14'X9' RCB

REPLY APP 1725
007121
CLV17-300558

TABLE 5A WSPGW MODEL MAINLINE 1 SUMMARY - MAIN1.WSW							
Station*	Invert (ft)	Depth (ft)	WSE (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility
-6748.98	2728.902	7.961	2736.86	2476	22.22	1.39	14'X9' RCB
-6743.98	2728.952	7.647	2736.60	2450	22.88	1.46	14'X9' RCB
-6435.12	2732.041	7.948	2739.99	2450	22.02	1.38	14'X9' RCB
-6191.62	2734.476	8.862	2743.34	2450	19.75	1.17	14'X9' RCB
-6178.96	2734.602	9.000	2743.60	2450	19.44	1.14	14'X9' RCB
-6173.96	2734.651	11.911	2746.56	2130	15.78	0.93	JUNCTION STRUCTURE
-6148.62	2734.902	11.822	2746.72	2130	15.78	0.93	15'x9' RCB
-6138.29	2735.004	11.786	2746.79	2130	15.78	0.93	15'x9' RCB
-6058.18	2735.797	12.026	2747.82	2130	15.78	0.93	15'x9' RCB
-5813.21	2738.222	11.166	2749.39	2130	15.78	0.93	15'x9' RCB
-5759.19	2738.757	11.408	2750.17	2130	15.78	0.93	15'x9' RCB
-5747.19	2738.876	13.460	2752.34	2130	11.83	0.70	TRANSITION STRUCTURE
-5698.19	2739.361	13.129	2752.49	2130	11.83	0.70	20'x9' RCB

*See Figure 8.

TABLE 5B WSPGW MODEL MAINLINE 2 SUMMARY - MAIN2.WSW							
Station*	Invert (ft)	Depth (ft)	WSE (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility
-7519.01	2698.462	4.749	2703.210	1933	40.71	3.29	10'x8' RCB
-7413.73	2706.021	5.029	2711.050	1933	38.44	3.02	10'x8' RCB
-7319.42	2712.792	5.450	2718.242	1933	35.47	2.68	10'x8' RCB

007122
REPLY APP 1726
CLV17-300559

TABLE 5B WSPGW MODEL MAINLINE 2 SUMMARY - MAIN2.WSW							
Station*	Invert (ft)	Depth (ft)	WSE (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility
-7198.35	2721.485	6.644	2728.129	1933	29.10	1.99	10'x8' RCB
-7059.47	2724.374	6.614	2730.988	1933	29.23	2.00	10'x8' RCB
-6981.72	2725.991	6.591	2732.582	1933	29.33	2.01	10'x8' RCB
-6923.10	2727.210	6.571	2733.781	1933	29.42	2.02	10'x8' RCB
-6798.35	2729.805	6.517	2736.322	1933	29.66	2.05	10'x8' RCB
-6749.99	2730.821	6.494	2737.315	1933	29.77	2.06	10'x8' RCB
-6739.89	2731.030	6.488	2737.518	1933	29.79	2.06	10'x8' RCB
-6609.84	2733.736	6.400	2740.136	1933	30.20	2.10	10'x8' RCB
-6526.95	2734.565	6.068	2740.633	1933	31.86	2.28	10'x8' RCB
-6230.91	2740.485	5.194	2745.679	1910	36.77	2.84	10'x8' RCB
-6143.49	2748.869	6.290	2755.159	1910	30.37	2.13	10'x8' RCB
-6094.81	2753.537	8.000	2761.537	1910	23.88	1.49	10'x8' RCB
-6083.24	2754.647	15.899	2770.546	1910	10.61	0.62	TRANSITION STRUCTURE
-6052.25	2757.619	13.190	2770.809	1910	10.61	0.62	20'x9' RCB
-6034.02	2759.370	11.723	2771.094	1910	10.61	0.62	20'x9' RCB

*See Figure 8.

Mainline 1

The approved WSPGW model for the existing dual (2) - 12-foot wide by 12-foot high RCBC (CCRFCD Facility APSO 0000) storm drain downstream of the existing dual (2) - 12-foot wide by 12-foot high RCBC (CCRFCD Facility APSO 0020) at the Rampart Boulevard and Alta Drive intersection has been referenced from the Queens Borough Culvert Study. Please note that the approved Queens Borough Culvert Study referenced a design flow rate of 4,497 cfs from the 2002 MPU. As previously stated, the 2013 MPU shows a flow rate of 4,628 cfs and the proposed conditions HEC-1 model presented in this report shows a proposed 100-year flow rate of 4,672 cfs. The approved Queens Borough Culvert Study WSPGW model has been extended south with this report to include the existing CCRFCD Facility APSO 0020 and the proposed Mainline 1 storm drain. The model also includes the junction where an existing 60-inch RCP and 72-inch RCP connect to APSO 0020 in Rampart Boulevard and the proposed condition flow rates at pertinent HEC-1 nodes. Inverts used in the hydraulic calculations for the existing dual (2) - 12-foot wide by 12-foot high RCBC are based on survey and as-built information. The WSPGW Model Stations from the Queens Borough Culvert Study have been included in the Mainline 1 Model and converted to match the proposed Mainline 1 Stationing. The WSPGW Model Station Conversion has been summarized in Table 6. Pertinent referenced material from the Queens Borough Culvert Study has been included in Appendix C.

TABLE 6
WSPGW MODEL STATION CONVERSION SUMMARY – MAIN1.WSW

WSPGW Stations Referenced from Queens Borough Culvert Study	MAIN 1 WSPGW Stations[1]
-3625.00	-12270.67
-3550.00	-12195.67
-3500.00	-12145.67
-3401.01	-12046.68
-3350.81	-11996.48
-3325.95	-11971.62
-3315.95	-11961.62
-3225.64	-11871.31
-3223.32	-11868.99
-3152.70	-11798.37
-3135.29	-11780.96

REPLY APP 1728 Docket 94345 Document 2023-13826 007124 CLV17-300561

TABLE 6 WSPGW MODEL STATION CONVERSION SUMMARY – MAIN1.WSW	
WSPGW Stations Referenced from Queens Borough Culvert Study	MAIN 1 WSPGW Stations*
-3049.99	-11695.66
-2906.52	-11552.19
-2433.63	-11079.30
-2318.22	-10963.89
-2200.00	-10845.67
-1733.86	-10379.53
-1565.00	-10210.67
-1000.00	-9645.67

*See Figure 6.

The Mainline 1 model shows the existing CCRFCD Facility APSO 0000 has adequate capacity to convey proposed conditions 100-year storm event flow rates to the existing Angel Park Detention Basin. Proposed flow depths and flow velocities within the existing dual (2) - 12-foot wide by 12-foot high RCB are comparable to the approved Queens Borough Culvert Study Design. Approximately 2,819 linear feet of the proposed Mainline 1 RCB storm drain hydraulic grade line will be more than 1-foot below the RCB soffit between the connection to the dual (2) - 12-foot wide by 12-foot high RCB and approximately 197 linear feet downstream of the junction structure with the two 72-inch RCP laterals that connect to the mainline at WSPGW Station -6176.46. The hydraulic grade line is 2.4 feet to 2.9 feet above the 15-foot wide by 9-foot high RCB mainline for approximately 417 linear feet south of the junction with the two 72-inch RCP laterals that connect to Mainline 1 at WSPGW Station -6176.46. However, the hydraulic grade line will be more than 1-foot below finished grade elevation along the storm drain mainline. The maximum flow velocity of 41.04 feet per second occurs in Mainline 1 at WSPGW Station -7519.00.

Per Section 705.7.1.2 in the Manual, all concrete lining shall have a minimum thickness of 7 inches for flow velocities 30 feet per second and greater. Additionally, the pre-cast RCB will have an additional 1-inch of cover over the rebar and a 6,000 psi concrete strength where velocities exceed 25 feet per second.

Mainline 2

Approximately 1,400 linear feet of the proposed Mainline 2 RCB hydraulic grade line will be more than 1-foot below the RCB soffit.

The maximum flow velocity of 40.71 feet per second occurs in Mainline 2 just upstream of the connection to the Mainline 1 junction structure. Per Section 705.7.1.2 in the Manual, all concrete lining shall have a minimum thickness of 7 inches for flow velocities 30 feet per second and greater. Additionally, the pre-cast RCB will have an additional 1-inch of cover over the rebar and a 6,000 psi concrete strength where velocities exceed 25 feet per second.

WSPGW models have been included for proposed laterals extending to collect flows from future onsite development and existing offsite developments. Please refer to tables on Figure 7 for facility flows and sizes.

The proposed onsite ditches will convey the existing flows with a minimum of 1-foot of freeboard. Maximum slope was selected to verify velocity. Flows from the proposed ditches will be conveyed into the proposed Mainline 1 and 2 storm drain systems. Riprap (Minimum: d_{50} = 12 inches, Thickness = 24 inches) has been provided at the lateral sump locations up to the ponding depth, determined by an inlet control calculation. The inlet control calculations have been provided in Appendix B.

Area drains have been provided to collect flows at some of the sump locations. Calculations for the area drains have been included in Appendix B.

X. FEMA CONDITIONAL LETTER OF MAP REVISION (CLOMR)

Hydrologic Summary

As a part of this project development, a CLOMR and Letter of Map Revision (LOMR) will be processed with FEMA to remap the Special Flood Hazard Area (SFHA) that currently routes through the site.

Since this project re-evaluates the existing hydrologic analysis for the subject wash, the project specific existing and proposed condition hydrologic analysis was used as the

effective hydrologic model to determine peak flow rates for use in establishing the limits of the revised SFHA.

Existing Condition

See Figure 9 - Existing Conditions HEC-RAS X-Section Map. The main wash through the site labeled Main 1 represents the major conveyance corridor for the mapped Zone A SFHA overlaying the site. Several fingers of the SFHA extend out from Main 1, and will be removed from the SFHA with the CLOMR submittal connected with this study since they are either remnant washes cut-off by upstream improvements or ineffective flow areas inundated by flows in the Main 1. Please note that the existing SFHA does not impact existing development.

Main 1

100-Year Flow at Upstream End = 2,128 cfs (Concentration Point CCON10)

This reach will be the remaining conveyance corridor of the mapped SFHA upon completion of the LOMR remapping.

North Finger

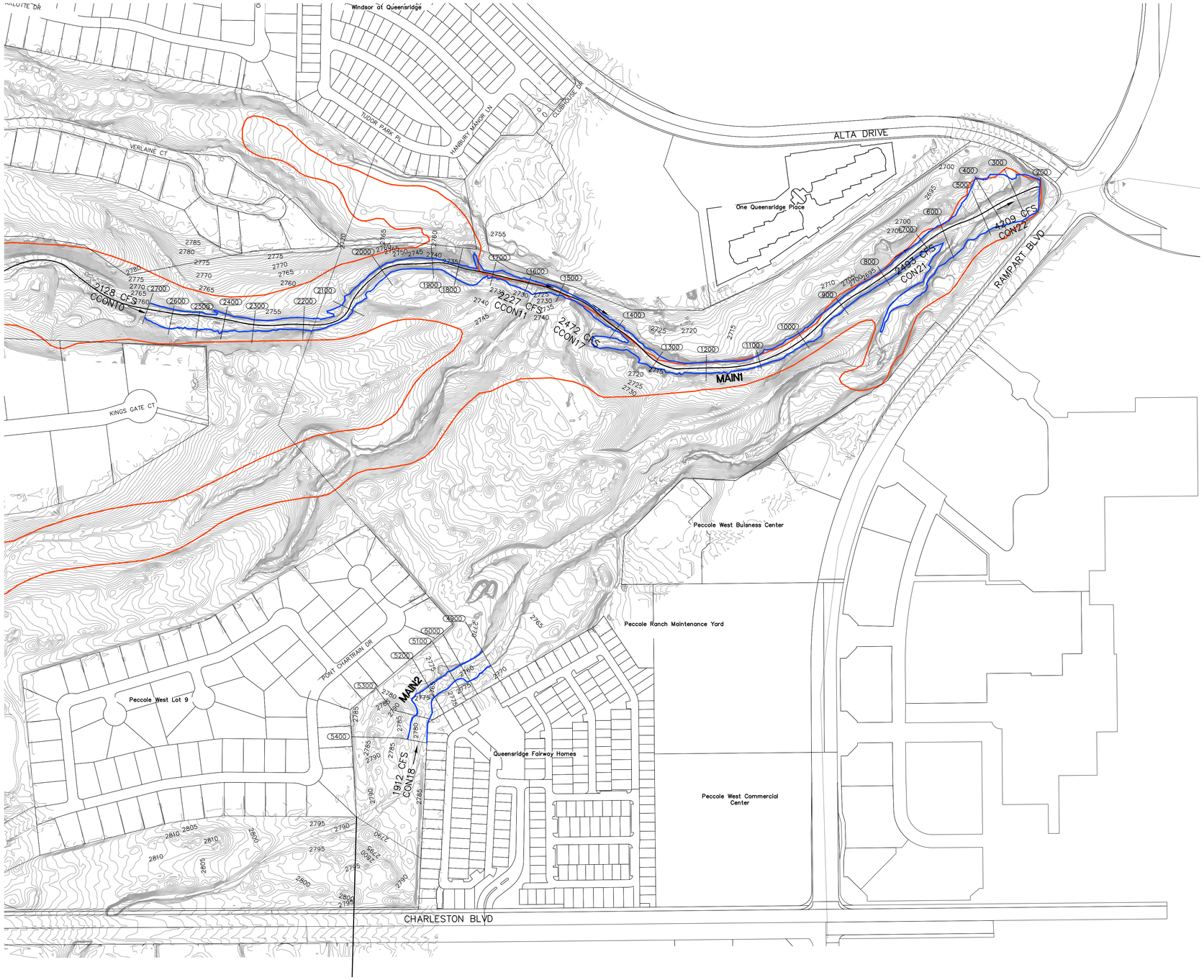
100-Year Flow = 195 cfs (Concentration Point CON4)

A finger of SFHA extends up an existing wash north of Main 1 for approximately 1,000 linear feet. Since this wash is a remnant wash, cut off by Hualapai Way and no longer conveying the historical flows originating from west of Hualapai Way, this finger will be removed from the SFHA. The wash located within an existing golf course conveys local drainage areas, and does not impact existing development.

South Finger

100-Year Flow = 368 cfs (Concentration Point CON17)

Similar to the North Finger, a finger of SFHA extends up an existing wash south of Main 1 for approximately 4,000 linear feet. This wash is also a remnant wash, cut off by Hualapai Way and no longer conveying the historical flows originating from west of Hualapai Way, and will be removed from the SFHA. The wash located within an existing golf course conveys local drainage areas, and does not impact existing development.



GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

NORTH

LEGEND

- EFFECTIVE FLOODPLAIN LIMITS
- EXISTING CONDITION INUNDATION LIMITS
- 2147 CFS — Q100 FLOW
- CCON10 — HEC-1 CONCENTRATION POINT
- FLOW DIRECTION
- MAIN1 — HEC-RAS REACH
- 2200 — HEC-RAS STATION LABEL
- HEC-RAS CROSS SECTION

MAIN 1 HEC-RAS STATION SUMMARY TABLE

Sta	Q (cfs)	FL Elevation (ft)	W.S. Elevation (ft)	Depth (ft)	Vel (ft/s)	Top Width (ft)	Froude #	Notes
2700	2128	2756.00	2760.89	4.89	10.46	60.70	1.01	Existing Wash
2600	2128	2752.00	2758.31	6.31	9.90	71.48	1.01	Existing Wash
2500	2128	2748.00	2754.37	6.37	10.20	66.36	1.01	Existing Wash
2400	2128	2747.00	2751.80	4.80	9.95	69.58	1.00	Existing Wash
2300	2128	2744.00	2749.36	5.36	11.68	43.51	1.01	Existing Wash
2200	2128	2740.00	2745.49	5.49	11.33	47.51	1.00	Existing Wash
2100	2128	2736.00	2742.08	6.08	11.35	46.89	1.00	Existing Wash
2000	2128	2729.00	2735.65	6.65	11.69	43.15	1.00	Existing Wash
1900	2128	2724.00	2733.14	9.14	8.94	43.40	0.67	Existing Wash
1800	2128	2719.00	2732.45	13.45	8.8	57.08	0.75	Existing Wash
1700	2227	2716.00	2728.08	12.08	15.22	20.20	1.00	Existing Wash
1600	2227	2711.00	2725.34	14.34	11.67	45.98	1.01	Existing Wash
1500	2472	2707.00	2720.77	13.77	14.77	24.93	1.00	Existing Wash
1400	2472	2702.00	2713.84	11.84	14.09	28.74	1.00	Existing Wash
1300	2472	2699.00	2704.43	5.43	11.42	53.98	1.01	Existing Wash
1200	2472	2695.00	2700.84	5.84	12.19	44.49	1.01	Existing Wash
1100	2472	2691.00	2697.30	6.30	12.57	40.56	1.01	Existing Wash
1000	2472	2687.00	2692.52	5.52	11.69	47.97	1.01	Existing Wash
900	2472	2683.00	2689.15	6.15	12.63	39.48	1.00	Existing Wash
800	2493	2679.00	2685.65	6.65	12.43	41.88	1.00	Existing Wash
700	2493	2676.00	2685.62	9.62	7.03	49.85	0.46	Existing Wash
600	2493	2674.00	2685.89	11.89	4.01	133.33	0.24	Existing Wash
500	4209	2672.00	2685.74	13.74	4.33	143.10	0.29	Existing Wash
400	4209	2671.00	2685.77	14.77	3.56	213.18	0.27	Existing Wash
300	4209	2669.00	2685.77	16.77	3.04	178.22	0.19	Existing Wash
200	4209	2668.00	2684.83	16.83	7.74	110.66	0.62	Existing (2)12x 12 RCB

MAIN 2 HEC-RAS STATION SUMMARY TABLE

Sta	Q (cfs)	FL Elevation (ft)	W.S. Elevation (ft)	Depth (ft)	Vel (ft/s)	Top Width (ft)	Froude #	Notes
5400	1912	2780.00	2783.62	3.62	9.02	85.33	1.01	Existing Wash
5300	1912	2778.00	2781.81	3.81	10.54	67.57	1.13	Existing Wash
5200	1912	2764.00	2766.49	2.49	27.67	46.38	3.99	Existing Wash
5100	1912	2759.00	2762.99	3.99	16.44	44.34	1.79	Existing Wash
5000	1912	2758.00	2762.37	4.37	12.44	70.25	1.48	Existing Wash
4900	1912	2756.00	2760.64	4.64	10.50	63.82	1.09	Existing Wash

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EXISTING CONDITIONS HEC-RAS X-SECTION MAP

DRAWING

FIG9

OF SHTS

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Main 2 Finger

100-Year Flow = 1,944 cfs (Concentration Point CON20)

A short finger extends south near the downstream end of the project at Rampart Boulevard for approximately 300 linear feet. This finger is located completely with the developed portion of the site and will be removed from the SFHA. The flows in this wash will be conveyed and contained in the Mainline 2 underground storm drain to Rampart Boulevard.

Several flow changes occur in the Main 1 wash as the above mentioned fingers combine with Main 1. Table 7 summarizes the effective flow rates used through the Main 1 wash to establish the effective water surface elevations through the Main 1 SFHA used to compare with the proposed condition water surface elevations.

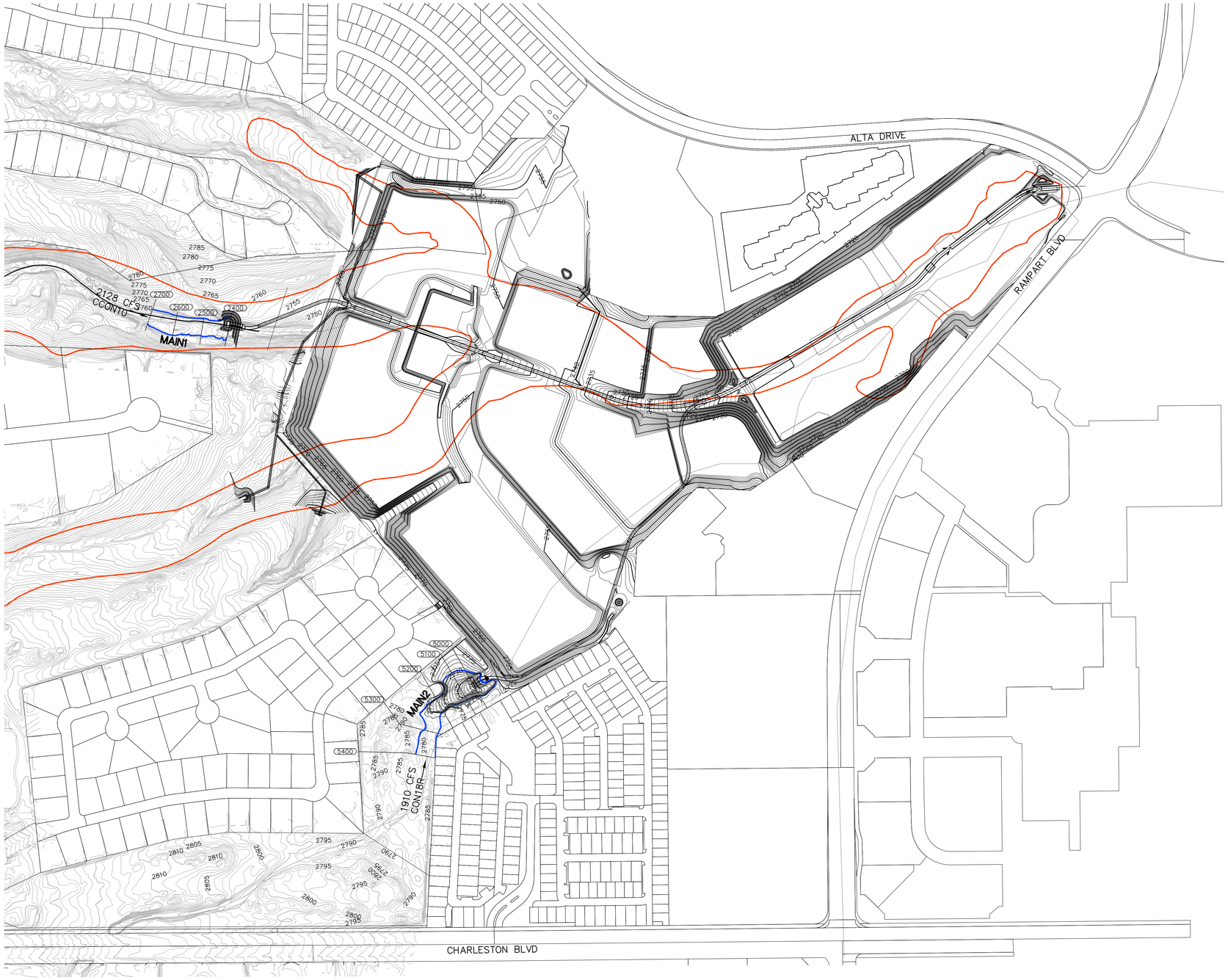
TABLE 7
EFFECTIVE FLOW RATES – MAIN 1 WASH

HEC-RAS River Station*	Effective Flow Rate (cfs)
2700	2,128
1700	2,227
1500	2,472
800	2,493
500	4,209

*See Figure 9.

Proposed Condition

See Figure 10 - Proposed Conditions HEC-RAS X-Section Map and Figure 11 - CLOMR Workmap. In the proposed condition, the portion within the project site will be contained within underground storm drain. The proposed floodplain will tie into the existing floodplain approximately 700 linear feet west of the project site as shown on the CLOMR Workmap. Table 8 summarizes the effective flow rates used through the Main 1 wash to establish the effective water surface elevations through the Main 1 SFHA used to compare to proposed condition water surface elevations.



GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

NORTH

LEGEND

- EFFECTIVE FLOODPLAIN LIMITS
- PROPOSED CONDITION INUNDATION LIMITS
- 2147 CFS Q100 FLOW
- CCON10 HEC-1 CONCENTRATION POINT
- FLOW DIRECTION
- MAIN1 HEC-RAS REACH
- (2200) HEC-RAS STATION LABEL
- HEC-RAS CROSS SECTION

MAIN 1 HEC-RAS STATION SUMMARY TABLE

Sta	Q (cfs)	FL Elevation (ft)	W.S. Elevation (ft)	Depth (ft)	Vel (ft/s)	Top Width (ft)	Froude #	Notes
2700	2128	2756.00	2760.90	4.90	10.45	60.71	1.01	Existing Wash
2600	2128	2752.00	2758.31	6.31	9.89	71.49	1.00	Existing Wash
2500	2128	2748.00	2754.39	6.39	10.14	66.45	1.01	Existing Wash
2400	2128	2739.36	2752.49	13.13	3.16	90.29	0.20	Proposed 20x9 RCB

MAIN 2 HEC-RAS STATION SUMMARY TABLE

Sta	Q (cfs)	FL Elevation (ft)	W.S. Elevation (ft)	Depth (ft)	Vel (ft/s)	Top Width (ft)	Froude #	Notes
5400	1910	2780.00	2783.62	3.62	9.02	85.32	1.01	Existing Wash
5300	1910	2778.00	2781.81	3.81	10.53	67.56	1.13	Existing Wash
5200	1910	2772.00	2774.34	2.34	18.71	54.29	2.40	Existing Wash
5100	1910	2764.00	2771.06	7.06	3.44	129.63	0.29	Existing Wash
5000	1910	2759.39	2771.09	11.70	2.48	127.62	0.18	Proposed 20x9 RCB

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PROPOSED CONDITIONS HEC-RAS X-SECTION MAP

DRAWING

FIG10

OF SHTS

WSPGW MODEL MAINLINE 1 SUMMARY - MAIN1.WSW							
Station	Invert (ft)	Depth (ft)	WSE (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility
-9195.67	2666.750	4.619	2671.37	4177	36.17	2.97	TRANSITION STRUCTURE
-9165.73	2668.537	9.477	2678.01	4177	31.48	1.80	14'X12' RCB
-9119.17	2671.317	10.738	2682.06	4177	27.78	1.49	14'X12' RCB
-9030.84	2672.200	10.624	2682.82	4177	28.08	1.52	14'X12' RCB
-8709.64	2675.412	10.063	2685.48	4177	29.65	1.65	14'X12' RCB
-8668.38	2675.825	9.977	2685.80	4177	29.91	1.67	14'X12' RCB
-8634.80	2676.161	9.904	2686.06	4177	30.13	1.69	14'X12' RCB
-8544.46	2677.064	9.694	2686.76	4177	30.78	1.74	14'X12' RCB
-8492.25	2677.586	9.566	2687.15	4177	31.19	1.78	14'X12' RCB
-7905.64	2683.412	7.828	2691.24	4177	38.11	2.40	14'X12' RCB
-7776.91	2684.766	7.381	2692.15	4177	40.42	2.62	14'X12' RCB
-7745.02	2686.243	7.473	2693.72	4177	39.93	2.57	14'X12' RCB
-7605.95	2692.682	8.017	2700.70	4177	37.22	2.32	14'X12' RCB
-7519.01	2698.724	4.391	2703.12	2476	40.27	3.39	TRANSITION STRUCTURE
-7361.10	2710.678	5.164	2715.84	2476	34.25	2.66	14'X9' RCB
-7235.12	2715.415	5.421	2720.84	2476	32.62	2.47	14'X9' RCB
-7123.51	2719.611	5.794	2725.41	2476	30.52	2.23	14'X9' RCB
-6922.57	2727.166	7.785	2734.95	2476	22.72	1.43	14'X9' RCB
-6835.12	2728.041	7.860	2735.90	2476	22.50	1.41	14'X9' RCB
-6748.98	2728.902	7.961	2736.86	2476	22.22	1.39	14'X9' RCB
-6743.98	2728.952	7.647	2736.60	2450	22.88	1.46	14'X9' RCB
-6435.12	2732.041	7.948	2739.99	2450	22.02	1.38	14'X9' RCB
-6191.62	2734.476	8.862	2743.34	2450	19.75	1.17	14'X9' RCB
-6178.96	2734.602	9.000	2743.60	2450	19.44	1.14	14'X9' RCB
-6173.96	2734.651	11.911	2746.56	2130	15.78	0.93	JUNCTION STRUCTURE
-6148.62	2734.902	11.822	2746.72	2130	15.78	0.93	15'x9' RCB
-6138.29	2735.004	11.786	2746.79	2130	15.78	0.93	15'x9' RCB
-6058.18	2735.797	12.026	2747.82	2130	15.78	0.93	15'x9' RCB
-5813.21	2738.222	11.166	2749.39	2130	15.78	0.93	15'x9' RCB
-5759.19	2738.757	11.408	2750.17	2130	15.78	0.93	15'x9' RCB
-5747.19	2738.876	13.460	2752.34	2130	11.83	0.70	TRANSITION STRUCTURE
-5698.19	2739.361	13.129	2752.49	2130	11.83	0.70	20'x9' RCB

MAIN 1 HEC-RAS STATION SUMMARY TABLE								
Sta	Q (cfs)	R. Elevation (ft)	W.S. Elevation (ft)	Depth (ft)	Vel (ft/s)	Top Width (ft)	Froude #	Notes
2700	2128	2758.00	2760.90	4.90	10.45	60.71	1.01	Existing Wash
2600	2128	2752.00	2758.31	6.31	9.89	71.49	1.00	Existing Wash
2500	2128	2748.00	2754.39	6.39	10.14	66.45	1.01	Existing Wash
2400	2128	2739.36	2752.49	13.13	3.16	90.29	0.20	Proposed 20x9 RCB

LEGEND

- 2500 — HEC-RAS RIVER STATION
- 91+95.6 — WSPGW STATION
- ZONE A SFHA FLOODPLAIN
- REMOVED FROM SFHA FLOODPLAIN
- WSPGW FLOWLINE
- HEC-RAS FLOWLINE

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CLOMR WORKMAP

DRAWING
FIG 11
OF SHTS

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TABLE 8 EFFECTIVE FLOW RATES – MAIN 1 WASH AND RCB		
HEC-RAS River Station*	WSPGW Station**	Effective Flow Rate (cfs)
2700	-	2,128
-	-5698.19	2,132
-	-6194.12	2,452
-	-6702.00	2,478
-	-7588.63	4,179

*See Figure 10.
**See Figure 11

Hydraulic Modeling

Hydraulic modeling for the proposed channel improvements were performed within the U.S. Army Corps of Engineers HEC-RAS River Analysis System computer program version 4.1.0 (Reference 9). The HEC-RAS model outputs have been provided in Appendix B. Electronic copies of the models have been included on CD.

Existing Condition

The limits of the hydraulic modeling of Main 1 begins approximately 700 feet upstream of the western property line at Station 2700 and extend approximately 3,900 linear feet, east through an unnamed wash through an existing golf course, and terminating at the existing dual (2) - 12-foot wide by 12-foot high RCBCs at the intersection of Rampart Boulevard and Alta Drive at Station 200. This project re-evaluates the existing hydraulic analysis of the unnamed wash. The base cross section geometry used in the hydraulic modeling was determined from existing topography with 1-foot contour intervals. A "sub-critical" flow regime was analyzed for the wash. The starting water surface elevation of 2684.83 feet at Station 200 was determined based on a culvert inlet control calculation at the existing dual (2) - 12-foot wide by 12-foot high RCBCs at the intersection of Rampart Boulevard and Alta Drive (WSE = Invert of pipe + headwater depth = 2666.75 feet + 18.08 feet = 2684.83 feet). A copy of the inlet control calculation has been included in Appendix B.

Proposed Condition

The proposed improvements along the unnamed wash extend between Main 1 Stations 200 and 2400. The improvements consist of reinforced concrete box storm drain through the length of the project and tie into the existing dual (2) - 12-foot wide by 12-foot high RCB at the intersection of Rampart Boulevard and Alta Drive.

HEC-RAS was utilized for open channel and wash portions of the analysis. WSPGW was utilized to evaluate the water surface profile through proposed storm drain. The WSPGW computer program was selected to evaluate the storm sewer system in lieu of HEC-RAS due to its more relevant modeling approach for storm drain systems. Supporting WSPGW hydraulic models are included in Appendix B.

The resulting comparison between existing and proposed condition water surface elevations through the project are summarized in Table 9.

TABLE 9
MAIN 1 WASH - WATER SURFACE ELEVATION COMPARISON TABLE

Existing Condition				Proposed Condition			
Sta*	Q (cfs)	FL Elevation (ft)	W.S. Elevation (ft)	Q (cfs)	FL Elevation (ft)	W.S. Elevation (ft)	Rise in Water Surface Elevation Due to Development (ft)
2700	2,128	2756.00	2760.89	2,128	2756.00	2760.90	0.01
2600	2,128	2752.00	2758.31	2,128	2752.00	2758.31	0.00
2500	2,128	2748.00	2754.37	2,128	2748.00	2754.39	0.02
2400	2,128	2747.00	2751.80	2,128	2739.36	2752.49	0.69
2300	2,128	2744.00	2749.36	1% Annual Chance Flood Discharge Contained in Storm Drain			
2200	2,128	2740.00	2745.49				
2100	2,128	2736.00	2742.08				
2000	2,128	2729.00	2735.65				
1900	2,128	2724.00	2733.14				
1800	2,128	2719.00	2732.45				
1700	2,227	2716.00	2728.08				
1600	2,227	2711.00	2725.34				
1500	2,472	2707.00	2720.77				
1400	2,472	2702.00	2713.84				
1300	2,472	2699.00	2704.43				
1200	2,472	2695.00	2700.84				
1100	2,472	2691.00	2697.30				
1000	2,472	2687.00	2692.52				
900	2,472	2683.00	2689.15				
800	2,493	2679.00	2685.65				
700	2,493	2676.00	2685.62				
600	2,493	2674.00	2685.89				

TABLE 9 MAIN 1 WASH - WATER SURFACE ELEVATION COMPARISON TABLE							
Existing Condition				Proposed Condition			
Sta*	Q (cfs)	FL Elevation (ft)	W.S. Elevation (ft)	Q (cfs)	FL Elevation (ft)	W.S. Elevation (ft)	Rise in Water Surface Elevation Due to Development (ft)
500	4,209	2672.00	2685.74				
400	4,209	2671.00	2685.77				
300	4,209	2669.00	2685.77				
200	4,209	2668.00	2684.83				

*See Figures 9 and 10.

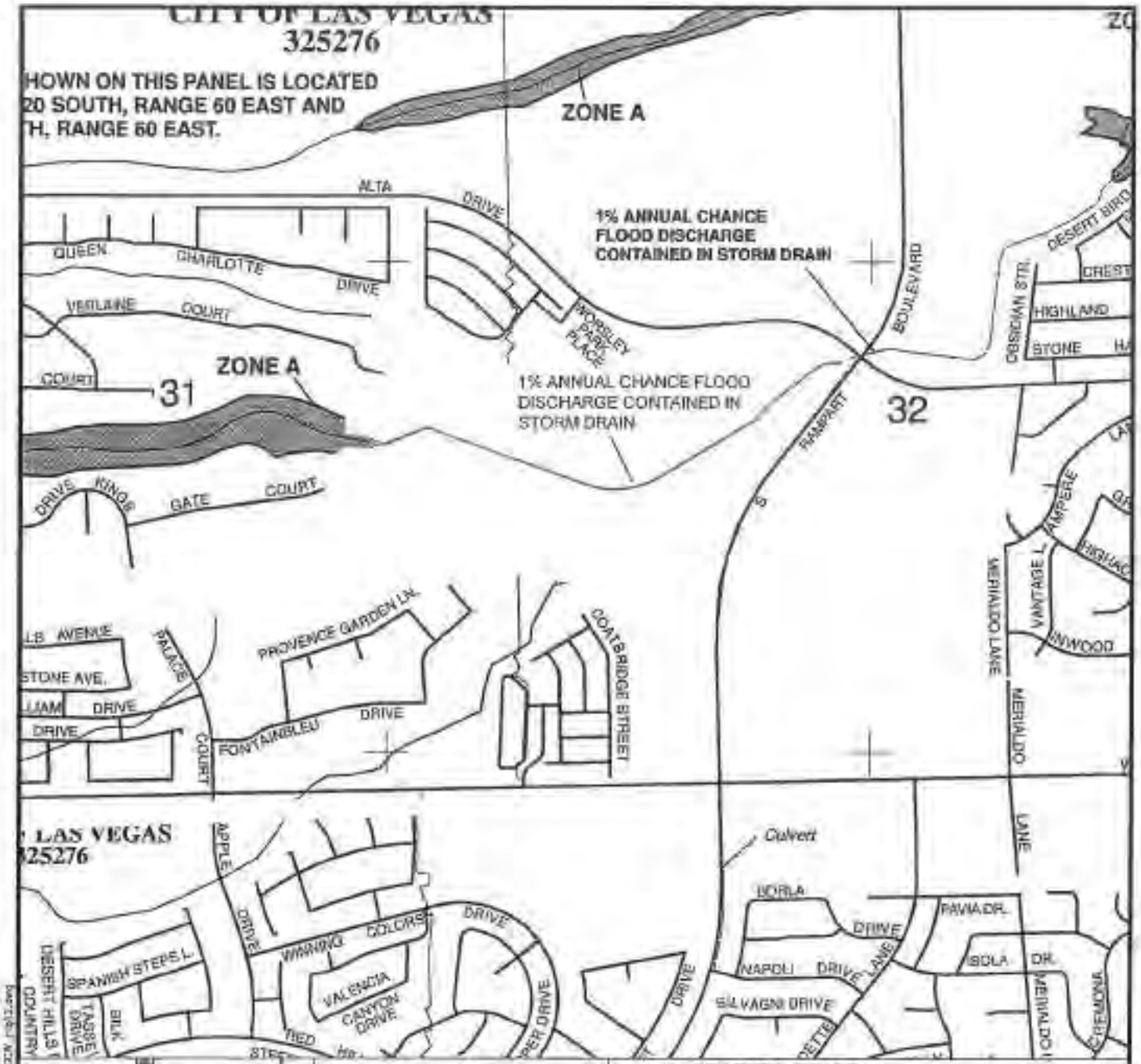
As shown in the table, the proposed improvements tie into the existing water surface elevation at the upstream end and tie into the existing storm drain facility at the downstream end that contains the 1% chance annual flood. The proposed water surface elevations do not exceed the existing water surface elevations by more than 1-foot, or are entirely contained within the proposed storm drain facility.

Mapping

The Effective FIRM is shown on Figure 3. The proposed revisions to the Effective FIRM take into account the proposed improvements along the unnamed wash and within the project. The improvements affect the Zone A area.

The upstream tie-in to the Effective FIRM Zone A is located at Station 2700. The upstream tie-in was based on a smooth transition from the proposed floodplain width to the effective floodplain width. The downstream tie-in to the Effective FIRM Zone A is located at the existing dual (2) - 12-foot wide by 12-foot high RCBCs at the intersection of Rampart Boulevard and Alta Drive at Station 200 where the 1% annual chance flood discharge is contained in storm drain downstream of the project site. The proposed FIRM revisions and tie-in locations are shown on Figure 11 - CLOMR Workmap and Figure 12 - Annotated FIRM.

In general, the proposed site grading and storm drain improvements are in conformance with existing drainage patterns and flow values presented in the 2013 MPU and Queens Borough Culvert Study. Therefore, the proposed project will not adversely impact any downstream properties or facilities.


CITY OF LAS VEGAS
325276
HOWN ON THIS PANEL IS LOCATED
20 SOUTH, RANGE 60 EAST AND
TH, RANGE 60 EAST.
ZONE A
ALTA
DRIVE
QUEEN
CHARLOTTE
DRIVE
VERLAINE
COURT
COURT
31
ZONE A
1% ANNUAL CHANCE
FLOOD DISCHARGE
CONTAINED IN STORM DRAIN
WORSLEY PARK PLACE
1% ANNUAL CHANCE FLOOD
DISCHARGE CONTAINED IN
STORM DRAIN
BOULEVARD
RAMPART
32
DESERT BIRD
OBSIDIAN STR.
HIGHLAND
STONE
DRIVE
KINGS
GATE
COURT
PROVENCE GARDEN LN.
PALACE
COURT
FONTAINBLEU
DRIVE
COATSBRIDGE STREET
VANTAGE L.
AMPERE
MERIDIAN LANE
MERIDIAN
LAS VEGAS
325276
APPLE
DRIVE
WINNING
COLORS
DRIVE
SPANISH STEPS L.
VALENCIA
CANYON DRIVE
Culvert
BORLA
DRIVE
PAVIA DR.
NAPOLI
DRIVE
LANE
SOLA
DR.
SALVAGNI DRIVE
EFREMONA
PANEL 2145F
FIRM
FLOOD INSURANCE RATE MAP
CLARK COUNTY,
NEVADA
GRAPHIC SCALE
1000
0
500
1000
(IN FEET)
1 inch = 1000 ft.
NORTH
THE SEVENTY
SEVENTY ACRES LLC, FORE STARS
LTD. AND 180 LAND CO LLC
FIGURE 12
ANNOTATED F.I.R.M.
GCW
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XI. CONCLUSIONS AND RECOMMENDATIONS

1. Methodology used in this report is in compliance with Clark County Regional Flood Control District (CCRFCD) criteria.

2. The project site is located within a FEMA-designated Special Flood Hazard Area (SFHA) Zone A. However, the 100-year flow (1% annual chance flood discharge) is contained within the proposed RCBs (Mainline 1 and Mainline 2) that transverse the site. Since the flows will be contained within the proposed RCBs, a CLOMR will be obtained from FEMA and a LOMR will be obtained from FEMA once construction of the facilities are substantially complete and functional.

3. CCRFCD Facilities to be constructed with this project include: APSO 0050, APSO 0067 and APP2 0000.

4. The proposed improvements connect to existing CCRFCD Facility APSO 0020.

5. Recommended storm drain facilities proposed with the project are shown on the attached grading plans.

6. The proposed storm drain will vary in size ranging from 18-inch RCP to 72-inch RCP and 10-foot wide by 8-foot high RCB to 14-foot wide by 12-foot high RCB connecting to the existing Rampart Boulevard dual (2) – 12-foot wide by 12-foot high RCB culverts.

7. Methods used to calculate storm runoff and size facilities are in compliance with the Manual.

8. Proposed facilities have been sized based on proposed conditions flow rates.

9. Detailed hydraulic modeling of the proposed Mainline 1 and Mainline 2 from the western boundary of the project site to the existing culverts in Rampart Boulevard shows that the design flows will be contained within the proposed RCBs. The design flows are based on the Proposed Conditions HEC-1 Model flow of 4,673 cfs. The proposed RCB will convey the Proposed Conditions flow with freeboard.

10. Flows conveyed within the onsite Mainline 1 RCB will be discharged into the existing dual (2) – 12-foot wide by 12-foot high RCBs in Rampart Boulevard located at the northeast corner of the project site.

11. Onsite storm drain laterals have been provided as part of this package to provide for future development of The Seventy and The Two Fifty.

12. Proposed onsite ditches/berms will convey onsite flows to be collected and conveyed by the proposed storm drain laterals.

13. Onsite area drains will be connected to the proposed onsite storm drain system that connects into the dual (2) - 12-foot wide by 12-foot high RCBCs.

14. All future onsite finished floors will be designed as required by CLV Criteria.

15. The emergency overflow path for the project will be Rampart Boulevard.

16. The general drainage patterns and flow rates are in general agreement with those specified in the 2013 MPU and the previous Queens Borough Culvert Study.

17. Runoff generated from, or conveyed by, the project will not adversely impact any downstream properties and facilities.

XII. REFERENCES

1. G. C. Wallace, *Technical Drainage Study for Queens Borough Culvert*, August 2005.
2. G. C. Wallace, *Update to the Technical Drainage Study for Queens Borough Culvert*, December 2005.
3. G. C. Wallace, *Update #2 to the Technical Drainage Study for Queens Borough Culvert*, April 2006.
4. *CCRFCD 2013 Las Vegas Valley Flood Control Master Plan Update*, 2013.
5. Clark County Regional Flood Control District (CCRFCD) *Hydrologic Criteria and Drainage Design Manual*. August 1999.
6. U.S. Army Corps of Engineers, *HEC-1 Flood Hydrograph Package*. June 1998.
7. U. S. Department of Agriculture & National Resource Conservation Service, *Soil Survey of Las Vegas Valley Area, Nevada, Part of Clark County*. August 2014. Version 10.
8. U. S. Army Corps of Engineers, WSPGW *Water Surface Pressure Gradient Package*. Version 12.99. 1991-2000.
9. U.S. Army Corps of Engineers. *HEC-RAS River Analysis System*. January 2010. Version 4.1.0