DS #: 4783

APN: 137-14-501-005 & 137-14-601-002

PROJECT: Summerlin Village 26 - Reverence_Phase 1

SUBMITTAL: 2nd

SCANNED BY/DATE: _____

CHECKED BY/DATE: _____

CITY OF LAS VEGAS NEVADA

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: April 14, 2016
TO: **Land Development Services** Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: **Summerlin Village 26 – Reverence – Phase 1**			**COPIES TO:** GCW Engineers / Surveyors
Cross Streets:	West of I-215 between Lake Mead & Cheyenne			Pulte Homes
File Number:	F:\Depot\DSMemos\DS4783B.doc			Bart Anderson, P.E., DevCo
Parcel Number:	137-14-501-005 & 137-14-601-002			CCRFCD
Zoning Action:	TMP-60968			CCPW
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	2/24/2016	3/7/2016	Not Approved	$400.00	434198: $400
2nd Submittal	4/4/2016	4/13/2016	See Comments Below	$400.00	438942: $400
			TOTAL FEES (LDDRS):	**$800.00**	**----**

REMARKS:

The Drainage Study for the subject project has been reviewed and:

	is approved subject to conformance to all City standards and the following conditions:
X	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

1. The subject technical drainage study will not be conditionally approved prior to the conditional approval of the following preceding studies: "*Summerlin Village 26 – Reverence Offsite Improvements* (DS4772)" and "*Summerlin Village 26 – Reverence – Desert Hope Drive Access Road* (DS4060-3)".

2. No building permits will be issued prior to or concurrent with the substantial completion of the offsite flood control facilities such as but not limited to Gowan Lone Mountain System 3 Beltway (GOB3 0000-0035 in Lake Mead Boulevard), the Debris Basin and the associated RCB, the regional RCBs and concrete channels along the Beltway 215, the Modified Village 26 Detention Basin and the concrete channels along the west boundary of the overall *Village 26.*

3. **Second Request: Sheet G1 and all pertinent plans**:

   "No pad grading is allowed in the adjacent Phase 2 area. Otherwise, obtain approval from City of Las Vegas Land Development Section prior to the final approval of the subject drainage study."

   The revised plans still show "Rough Pad Grading" in the adjacent Future Phase 2 area. Either remove the rough pad grading or obtain *City of Las Vegas Land Development Section* approval prior to the final acceptance of the drainage study.

4. **Second Request: Sheet G15**:

   The proposed access shows a portion of the ramp as steep as 33% which is not drivable for maintenance vehicles. Provide a copy of the plans to *City of Las Vegas Street & Maintenance* for review and approval prior to the final approval of the subject study.

5. **Second Request: Sheet D4**:

   Section A and Section H: Clearly label "PUBLIC" and "COMMON LOT" in the drainage easement. The surface material in the drainage easement must be all concrete. Review and revise accordingly.

   In the previous submittal, Section A was shown as a public drainage easement (privately maintained) but in the last submittal, it didn't specify at all. Is Section A still a PDE privately maintained? If yes, label accordingly. If there is a 100-year storm drain underneath, identify as such, otherwise, provide all concrete for the surface.

6. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
ays

T/R/S: T20S/R59E/14
AREA K-14

****
*** FAX TX REPORT ***
****

TRANSMISSION OK

JOB NO.	4524
DESTINATION ADDRESS	7028042299
PSWD/SUBADDRESS	
DESTINATION ID	
ST. TIME	04/14 10:26
USAGE T	00'38
PGS.	2
RESULT	OK

CITY OF LAS VEGAS
INTER-OFFICE MEMORANDUM

DATE: April 14, 2016

TO:
Land Development Services
Department of Building & Safety

FROM:
Albert Sung, P.E.
Flood Control Project Engineer
Department of Public Works

SUBJECT:	Drainage Study for: **Summerlin Village 26 – Reverence – Phase 1**		
Cross Streets:	West of I-215 between Lake Mead & Cheyenne		
File Number:	F:\Depot\DSMemos\DS4783B.doc		
Parcel Number:	137-14-501-005 & 137-14-601-002		
Zoning Action:	TMP-60968		
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES	NO X	

COPIES TO:
GCW Engineers / Surveyors
Pulte Homes
Bart Anderson, P.E., DevCo
CCRFCD
CCPW

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	2/24/2016	3/7/2016	Not Approved	$400.00	434198: $400
2nd Submittal	4/4/2016	4/13/2016	See Comments Below	$400.00	438942: $400
			TOTAL FEES (LDDRS):	**$800.00**	----

REMARKS:

The Drainage Study for the subject project has been reviewed and:

	is approved subject to conformance to all City standards and the following conditions:
X	must be resubmitted or supplemented including the following:
	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
	is conditionally approved subject to Clark County Public Works Department concurrence.

1. The subject technical drainage study will not be conditionally approved prior to the conditional approval of the following preceding studies: "*Summerlin Village 26 – Reverence Offsite Improvements* (DS4772)" and "*Summerlin Village 26 – Reverence – Desert Hope Drive Access Road* (DS4060-3)".

2. No building permits will be issued prior to or concurrent with the substantial completion of the offsite flood control facilities such as but not limited to Gowan Lone Mountain System 3 Beltway (GOB3 0000-0035 in Lake Mead Boulevard), the Debris Basin and the associated RCB, the regional RCBs and concrete channels along the Beltway 215, the Modified Village 26 Detention Basin and the

RESPONSE TO COMMENTS
ON THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 26
REVERENCE - PHASE 1

764-204-013

April 2016

Prepared For:

Pulte Homes
7255 S. Tenaya Way, #200
Las Vegas, NV 89113
(702) 914-4800

GCW
ENGINEERS \ SURVEYORS

HYDROLOGIC CRITERIA AND DRAINAGE MANUAL

DRAINAGE STUDY INFORMATION FORM

Name of Development: Summerlin Village 26 - Reverence Phase 1 Date: April 2016

Location of Development: a) Descriptive (Cross Streets) North/South: CC 215

East/West: Cheyenne Road

b) Section: 14 Township: 20 Range: 59E

c) APN : 137-14-601-002; 137-14-501-005

Name of Owner: Pulte Homes

Telephone No.: (702) 914-4800 Fax No.: (702) 914-3100 E-Mail Address: Not Available

Address: 7255 S Tenaya Way Las Vegas, NV 89113

Contact Person-Name: James A. Monroe Jr. **Telephone No.:** (702)804-2000

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

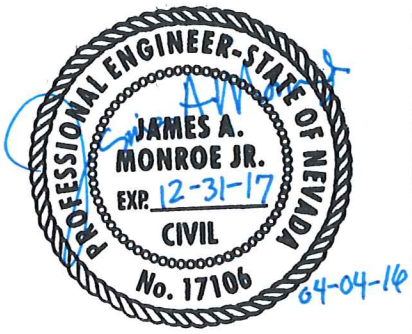
Firm: GCW, Inc.

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

Type of Land Development/Land Disturbance Process:

	Rezoning		Subdivision Map		Clearing and Grading Only
	Parcel Map	X	Planned Unit Development		Other (Please specify below)
	Large Parcel Map		Building Permit		

1. Total Owned Land Area: At Site: +/- 300 acres Being Developed/Disturbed: +/- 100 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.): Residential
5. Approximate upstream land area which drains to the subject site: +/- 120 acres
6. Has the site drainage been evaluated in the past? ☒ **YES** ☐ **NO** If yes, please identify documentation:
   GCW Inc.; Technical Drainage Study for Village 26 at Summerlin West Offsite Improvements, GCW Inc.; 2006 Summerlin West Planning Area Flood Control Master Plan Update, Master Drainage Study for Summerlin Village 26 Reverence (November 2015), Summerlin Village 26 Reverence Offsite Improvements (December 2015)
7. If known, please briefly identify the proposed discharge point(s) of runoff from the site:
   CCRFCD MPU Facilites GOL3 0128 (Reverence Detention Basin) and the exisitng wash north of the project site.
8. Briefly describe your proposed schedule for the subject project: ASAP



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.

Revision	Date

Local Entity File No.

REFERENCE:

STANDARD FORM 1

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM				DATE: March 9, 2016
TO: Land Development Services Department of Building & Safety				FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: Summerlin Village 26 – Reverence – Phase 1			COPIES TO: GCW Engineers / Surveyors
Cross Streets:	West of I-215 between Lake Mead & Cheyenne			Pulte Homes
File Number:	F:\Depot\DSMemos\DS4783A.doc			Bart Anderson, P.E., DevCo
Parcel Number:	137-14-501-005 & 137-14-601-002			CCRFCD
Zoning Action:	TMP-60968			CCPW
FEMA Flood Zone	YES	NO	X	
Proposed Storm Drain	YES	NO	X	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	2/24/2016	3/7/2016	See Comments Below	$400.00	434198: $400
			TOTAL FEES (LDDRS):	$400.00	----

REMARKS:

The Drainage Study for the subject project has been reviewed and:

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1. The subject technical drainage study will not be approved prior to the conditional approval of the following preceding studies: "*Summerlin Village 26 – Reverence Offsite Improvements* (DS4772)" and "*Summerlin Village 26 – Reverence – Desert Hope Drive Access Road* (DS4060-3)".

2. No building permits will be issued prior to or concurrent with the substantial completion of the offsite flood control facilities such as but not limited to Gowan Lone Mountain System 3 Beltway (GOB3 0000-0035 in Lake Mead Boulevard), the Debris Basin and the associated RCB, the regional RCBs and concrete channels along the Beltway 215, the Modified Village 26 Detention Basin and the concrete channels along the west boundary of the overall *Village 26*.

3. **FIG-7 (Facilities Map):**

   Facilities Delta 1-13, 1-14 etc. are not to be found in the plan despite appearing in the tables. Quality control the plans and show all facilities in the plan view in the next submittal.

4. **Sheet G1 and all pertinent plans:**

   No pad grading is allowed in the adjacent Phase 2 area. Otherwise, obtain approval from *City of Las Vegas Land Development Section* prior to the final approval of the subject drainage study.

A public drainage easement (privately maintained) downstream of *Evolutionary Lane* is required for emergency overflow. Address the timing of the dedication of this drainage easement in the next submittal.

5. **Sheet G2 & Sheet G4:**

   Provide 18"-storm drain in *Reverence Parkway* for nuisance flow. Extend from SDMH #4 an 18"-RCP with nominal drop inlets at a maximum spacing of 600' and storm drain manholes at a maximum spacing of 400'. Review and revise accordingly.

6. **Sheet G3:**

   In *Asian Pear Lane* at the interface between Phase 1 and Future Phase 2, provide erosion protection measures for the newly paved asphaltic concrete street.

7. **Sheet G4 & Sheet G8:**

   Lot 576: the highest adjacent curb elevation is 68.95TC in *Emory Oak Drive*. Raise the finished floor elevation of Lot 576 to a minimum of six inches above 68.95.

8. **Sheet G5:**

   Label the slope at the knuckles in *Orange Sky Lane* and *Red Yucca Drive*. Allowable slope in knuckles or cul-de-sacs is 1% minimum.

9. **Sheet G6:**

   Section J/D2 shown on the plan does not match the detail shown on Sheet D2. The plan shows rock walls in the offsite are while the detail shows retaining block walls onsite. Review and revise accordingly.

   Label the slope in the knuckle of *Lifelike Court*.

10. **Sheet G7 & G8:**

    Lot 597: The highest adjacent curb elevation is 69.26TC in *Red Yucca Drive*. Raise the finished floor elevation of Lot 597 to a minimum of six inches above 69.26.

11. **Sheet G8:**

    Clearly label the lot between Lot 601 and Lot 602 as a common lot and public drainage easement to be privately maintained by the HOA on the grading plan and dedicate as such in the Final Map.

12. **Sheet G11:**

    Revise the slope in the knuckle of *Emory Oak Drive* (with *Pearlshell Lane*) to 1% minimum.

13. **Sheet G12:**

    Section D/D3 shows a flow line behind the property wall of Lot 448. Show the proposed flow line clearly on plan and label with FL elevations at regular intervals.

14. **Sheet G14**:

In *Oceanic Bliss Drive* at the interface between Phase 1 and Future Phase 3, provide erosion protection measures for the newly paved asphaltic concrete street.

15. **Sheet G15**:

Per *Hydraulic Section 6* - 6**, the 100-year flow velocity in the rough graded channel upstream of the 66"-RCP sump pit is 6.13 ft/s which is erosive. Provide erosion protection in the rough graded channel.

Provide access path to the 50'x60' riprap pad for private maintenance by the developer and the future *Homeowners Association*.

16. **Sheet G18**:

Revise the slope in the knuckle of *Luna Blanca Drive* to 1% minimum.

Revise a proposed flow line elevation behind Lot 407 at 3059.86 FL which appears to be at a low point.

17. **Sheet G17 & Sheet G19**:

Show flow line and elevations at regular intervals in the scarp behind the houses.

18. **Sheet G20**:

Provide a minimum 20'-wide common lot and public drainage easement (privately maintained by the HOA) centering the 30"-RCP between Lot 370 and Lot 371. Same between Lot 194 and Lot 402.

Provide flow line and elevations at regular intervals behind Lots 402, 403 and 404.

Anotate the contour lines in the scarp behind the houses.

19. **Sheet G21**:

Show and label flow line with elevations in the scarp between the houses.

20. **Sheet G22**:

Show flow line with elevations in the scarp between the houses.

21. **Sheet G23**:

Provide FL in the scarp behind the houses.

22. **Sheet G24**:

Provide FL in the scarp between the houses.

Label clearly the lot between Lot 181 and Lot 182 as common lot and public drainage easement to be privately maintained by the HOA.

23. **Sheet G26**:

    Provide nominal drop inlets at SDMH #9 in *Desert Hope Drive* for nuisance flow.

    Provide FL in the scarp adjacent to Lots 336, 346 and 347.

24. **Sheet G27**:

    Provide nominal drop inlets at Sta. 95+50 (approx.) in *Desert Hope Drive* for nuisance flow.

25. **Sheet G28**:

    Provide erosion protection at the end of *Organic Drive*. Show flow line behind Lots 154, 155 and 156.

26. **Sheet G30**:

    Provide a 20'-wide common lot and public drainage easement (privately maintained by the HOA) downstream of DI #4.

27. **Sheet G31**:

    Label the top of grate elevation of a proposed NDOT Type 2B inlet at the northwest corner of *Desert Hope Drive* and *Raywood Ash Lane* on the plan. Address the maximum ponding depth and emergency overflow path when the inlet is completely clogged in the next submittal.

28. **Sheet D1**:

    Section P and Section U show finished pads below the adjacent street. The solid grout portion must be at least 2-course above the finished grade. The block must be 8"-CMU or approved equivalent.

29. **Sheet D2**:

    Same for Section N and Section Q.

30. **Sheet D3**:

    Section B: the solid grout portion must be 8"-CMU or equivalent.

31. **Sheet D4**:

    Section A and Section H: Clearly label "PUBLIC" and "COMMON LOT" in the drainage easement. The surface material in the drainage easement must be all concrete. Review and revise accordingly.

32. **Sheet P57 and Sheet P61**:

    Lateral 8 in P57 refers to Lateral 20 in P61. However, the grate type inlets in the two laterals do not correlate to each other. Clarify in the next submittal.

33. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 (*Stormwater Quality Management Stamp and Sign Detail*).

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS
ays

T/R/S: T20S/R59E/14
AREA K-14

RESPONSE TO COMMENTS
ON THE
TECHNICAL DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 26
REVERENCE - PHASE 1

764-204-013

April 2016

Prepared For:

Pulte Homes
7255 S. Tenaya Way, #200
Las Vegas, NV 89113
(702) 914-4800

Prepared by:

GCW, Inc.
1555 S. Rainbow Blvd.
Las Vegas, Nevada 89146
Phone: (702) 804-2000
Fax: (702) 804-2299

GCW
ENGINEERS \ SURVEYORS

764-204-013

April 4, 2016

Albert Sung, PE
Flood Control Project Engineer
City of Las Vegas Department of Public Works
333 N. Rancho Drive
Las Vegas, NV 89106

Re: Response to Comments on the Technical Drainage Study for Summerlin Village 26 – Reverence – Phase 1 DS 4783A

Dear Mr. Sung:

The purpose of this letter is to address your comments dated March 9, 2016, regarding the above-referenced project. The comments are individually addressed as follows:

Comment: "1. The subject technical drainage study will not be approved prior to the conditional approval of the following preceding studies: " *Summerlin Village 26 – Reverence Offsite improvements* (DS4772)" and *"Summerlin Village 26 – Reverence – Desert Hope Drive Access Road* (084060-3)"."

Response: GCW requests that the Reverence Phase 1 Technical Drainage Study receive conditional approval pending conditional approval of the Reverence Offsite Improvements and Desert Hope Drive – Access Road drainage studies.

Comment: "2. No building permits will be issued prior to or concurrent with the substantial completion of the offsite flood control facilities such as but not limited to Gowan Lone Mountain System 3 Beltway (GOB3 0000-0035 in Lake Mead Boulevard}, the Debris Basin and the associated RCB, the regional RCBs and concrete channels along the Beltway 215, the Modified Village 26 Detention Basin and the concrete channels along the west boundary of the overall *Village 26.*"

Response: Noted. Vertical construction will occur after construction of the mentioned offsite flood control facilities have been substantially completed.

Comment: "3. **FIG-7 (Facilities Map):** Facilities Delta 1-13, 1-14 etc. are not to be found in the plan despite appearing in the tables. Quality control the plans and show all facilities in the plan view in the next submittal."

Response: The labels for Facilities 1-13 and 1-14 etc. have been added to Figure 7R. A copy of Figure 7R has been included in Appendix A.

1555 South Rainbow Boulevard
Las Vegas, Nevada 89146
O 702.804.2000
F 702.804.2299
info@gcwengineering.com
gcwengineering.com

Comment: "4. **Sheet G1 and all pertinent plans:** No pad grading is allowed in the adjacent Phase 2 area. Otherwise, obtain approval from *City of Las Vegas Land Development Section* prior to the final approval of the subject drainage study.

"A public drainage easement (privately maintained) downstream of *Evolutionary Lane* is required for emergency overflow. Address the timing of the dedication of this drainage easement in the next submittal."

Response: Noted. The area outside of Phase 1 will be rough graded with the Offsites Improvements and is considered to be existing for the purposes of this report.

A 20-foot wide public drainage easement has been added to Sheet G1 downstream of Evolutionary Lane.

Comment: "5. **Sheet G2 & Sheet G4:** Provide 18"-storm drain in *Reverence Parkway* for nuisance flow. Extend from SDMH #4 an 18"-RCP with nominal drop inlets at a maximum spacing of 600' and storm drain manholes at a maximum spacing of 400'. Review and revise accordingly."

Response: Noted. A capped 18" RCP has been extended from SDMH#4 to collect nuisance flows from future development. Nuisance drop inlets have not been added to Reverence Parkway for Phase 1 because Phase 1 project limits do not extend more than 600' past SDMH#4.

Comment: "6. **Sheet G3:** In *Asian Pear Lane* at the interface between Phase 1 and Future Phase 2, provide erosion protection measures for the newly paved asphaltic concrete street."

Response: A 10-foot long AC pad has been added to the end of Asian Pear Lane to maintain drivable access and provide erosion protection.

Comment: "7. **Sheet G4 & Sheet G5:** Lot 576: the highest adjacent curb elevation is 68.95TC in *Emory Oak Drive.* Raise the finished floor elevation of Lot 576 to a minimum of six inches *above* 68.95."

Response: Per Detail F/D5, a wall solid grouted two courses above adjacent grade has been provided at this location.

Comment: "8. **Sheet G5:** Label the slope at the knuckles in *Orange Sky Lane* and *Red Yucca Drive.* Allowable slope in knuckles or cul-de-sacs is 1% minimum."

Response: Per a phone conference with CLV on March 17, 2016, the minimum allowable slopes in the knuckles have been revised to a minimum of 0.7%.

Comment: "9. **Sheet G6:** Section J/D2 shown on the plan does not match the detail shown on Sheet D2. The plan shows rock walls in the offsite are while the detail shows retaining block walls onsite. Review and revise accordingly.

"Label the slope in the knuckle of *Lifelike Court.*"

Response: Section J/D2 and M/D5 have been revised to match Sheet G6.

The plans have been updated to include the slope of 1.64% in the knuckle of Lifelike Court.

Comment: "10. **Sheet G7 & G8:** Lot 597: The highest adjacent curb elevation is 69.26TC in *Red Yucca Drive.* Raise the finished floor elevation of Lot 597 to a minimum of six inches above 69.26."

Response: On Sheets G7 and G8 a wall solid grouted three (3) courses (18-inches) above adjacent grade has been provided at this location.

Comment: "11. **Sheet G8:** Clearly label the lot between Lot 601 and Lot 602 as a 40' wide common lot and a 30' wide public drainage/water district easement to be privately maintained by the HOA on the grading plan and dedicate as such in the Final Map."

Response: The lot between lot 601 and lot 602 has been labeled as a common lot and a Public Drainage Easement to be privately maintained by the HOA.

Comment: "12. **Sheet G11:** Revise the slope in the knuckle of *Emory Oak Drive* (with *Pear/shell Lane)* to 1% minimum."

Response: Per phone conference with CLV on March 17, 2016, the minimum allowable slopes in the knuckles have been revised to a minimum of 0.7%.

Comment: "13. **Sheet G12:** Section D/D3 shows a flow line behind the property wall of Lot 448. Show the proposed flow line clearly on plan and label with FL elevations at regular intervals."

Response: The proposed flow line behind Lot 448 is clearly shown on the plans and the flow line elevations have been added at regular intervals.

Comment: "14. **Sheet G14:** In *Oceanic Bliss Drive* at the interface between Phase 1 and Future Phase 3, provide erosion protection measures for the newly paved asphaltic concrete street."

Response: A 10-foot long AC pad has been added to the end of Ocean Bliss Drive to maintain drivable access and provide erosion protection.

Comment: "15. **Sheet G15:** Per *Hydraulic Section 6* - 6*,* the 100-year flow velocity in the rough graded channel upstream of the 66"-RCP sump pit is 6.13 ft/s which is erosive. Provide erosion protection in the rough graded channel.

"Provide access path to the 50'x60' riprap pad for private maintenance by the developer and the future *Homeowners Association."*

Response: Per the Technical Drainage Study for Summerlin Village 23 – Reverence Offsite Improvements, hereafter referred to as the Offsite Study, Riprap D50 = 18" was provided for the rough grade channel corresponding to Section 6*-6*. The riprap is now shown on the improvement plans and on Figure 5R and 6R.

The 50'x60' riprap pad has been revised to a 60-foot long pad that includes a bottom width of 8-feet wide to 50-feet wide with a 20 degree expansion between the 8-foot wide by 7-foot tall RCB outlet and BLM property. The outlet channel will include a 20-foot long concrete pad immediately downstream at the RCB outlet, and 40-foot solid grouted riprap pad. An 18-foot tall head wall at the RCB outlet gradually reduces to a 3-foot tall wing wall. Normal depth calculations have been included in the Appendix. See Figures 5R and 6R for a summary of normal depth calculations and section locations. Section 6B**, located at the BLM property boundary, shows a velocity of 4.87 ft/s which is considered nonerosive. Access has been provided to the outlet channel.

Comment: "16. **Sheet G18:** Revise the slope in the knuckle of *Luna Blanca Drive* to **1**% minimum.

"Revise a proposed flow line elevation behind Lot 407 at 3059.86 FL which appears to be at a low point."

Response: The proposed knuckle has been revised to a normal bend.

The proposed flow line located behind Lot 407 has been added to the plans and elevations are labeled at regular intervals to show positive drainage has been provided.

Comment: "17. **Sheet G17 & Sheet G19:** Show flow line and elevations at regular intervals in the scarp behind the houses."

Response: The proposed flow lines behind Lots 392 to 401, Lots 308 to 319. Lots 323 to 336, Lot 246, and Lots 178 to 193 are clearly shown on the plans and the flow line elevations have been added at regular intervals.

Comment: "18. **Sheet G20:** Provide a minimum 20'wide common lot and public drainage easement (privately maintained by the HOA) centering the 30"-RCP between Lot 370 and Lot 371. Same between Lot 194 and Lot 402.

"Provide flow line and elevations at regular intervals behind Lots 402, 403 and 404.

"Annotate the contour lines in the scarp behind the houses."

Response: A 20-foot wide public drainage easement labeled to be privately maintained by HOA has been added between Lots 370 and 371 and between Lot 194 and Lot 402.

The proposed flow line behind Lots 402, 403, and 404 are clearly shown on the plans and the flow line elevations have been added at regular intervals.

Additional contour labels have been added to the scarp behind lots 402 to 404.

Comment: "19. **Sheet G21:** Show and label flow line with elevations in the scarp between the houses."

Response: The proposed flow line behind Lot 448 is clearly shown on the plans and the flow line elevations have been added at regular intervals.

Comment: "20. **Sheet G22:** Show flow line with elevations in the scarp between the houses."

Response: The proposed flow line behind the houses is clearly shown on the plans and the flow line elevations have been added at regular intervals.

Comment: "21. **Sheet G23:** Provide FL in the scarp behind the houses."

Response: The proposed flow line behind the houses is clearly shown on the plans and the flow line elevations have been added at regular intervals.

Comment: "22. **Sheet G24:** Provide FL in the scarp between the houses.

"Label clearly the lot between Lot 181 and Lot 182 as common lot and public drainage easement to be privately maintained by the HOA."

Response: The proposed flow line behind the houses is clearly shown on the plans and the flow line elevations have been added at regular intervals.

The lot between lot 181 and lot 182 has been labeled as a common lot.

Comment: "23. **Sheet G26:** Provide nominal drop inlets at SDMH #9 in *Desert Hope Drive* for nuisance flow.

"Provide FL in the scarp adjacent to Lots 336, 346 and 347."

Response: Two (2) 5-foot Type CM2 Modified Drop Inlets have been added at SDMH#9 to collect nuisance flow. Normal Depth, Drop Inlet, and Standard Form 6 calculations have been added to account for the added drop inlets in Desert Hope Drive. See the Appendix for pertinent calculations and Figure 5R and 6R for updated Drop Inlet Summary information.

The proposed flow line behind Lots 336, 346, and 347 is clearly shown on the plans and the flow line elevations have been added at regular intervals

Comment: "24. **Sheet G27:** Provide nominal drop inlets at Sta. 95+50 {approx.) in *Desert Hope Drive* for nuisance flow."

Response: Two (2) 5-foot CM2 Modified Drop Inlets have been added at approximately Sta. 95+50 to collect nuisance flow. Normal Depth, Drop Inlet, and Standard Form 6 calculations have been added to account for the added drop inlets in Desert Hope Drive. See the Appendix for pertinent calculations and Figure 5R and 6R for updated Drop Inlet Summary information.

Comment: "25. **Sheet G28:** Provide erosion protection at the end of *Organic Drive.* Show flow line behind Lots 154, 155 and 156."

Response: A 10-foot long AC pad has been added to the end Organic to maintain drivable access and provide erosion protection.

The proposed flow line behind Lots 154, 155, and 156 is clearly shown on the plans and the flow line elevations have been added at regular intervals.

Comment: "26. **Sheet G30:** Provide a 20'-wide common lot and public drainage easement (privately maintained by the HOA) downstream of DI #4."

Response: A 20-foot wide common lot and public drainage easement to be privately maintained by the HOA has been added downstream of DI#4 to Sheet G30.

Comment: "27. **Sheet G31:** Label the top of grate elevation of a proposed NDOT Type 2B inlet at the northwest corner of *Desert Hope Drive* and *Raywood Ash Lane* on the plan. Address the maximum ponding depth and emergency overflow path when the inlet is completely clogged in the next submittal."

Response: The top of grate elevation of 3159.00 feet has been labeled on Sheet G31 for the NDOT Type 2 drop inlet at the northwest corner of Desert Hope Drive and Raywood Ash Lane. In the unlikely event the NDOT Type 2 inlet is clogged, flows will pond to an elevation of 3160 and a maximum depth of 1 foot discharge northeast into Raywood Ash Lane and then into Desert Hope Drive. The

emergency overflow flowrates will impact Cross Sections 16 and 17. Emergency overflow normal depth and weir calculations have been included in the Appendix.

Comment: "28. **Sheet D1:** Section P and Section U show finished pads below the adjacent street. The solid grout portion must be at least 2-course above the finished grade. The block must be 8"-CMU or approved equivalent."

Response: Noted. A wall solid grouted two (2) courses (12-inches) above the adjacent finished grade is shown in Sections P and U.

Comment: "29. **Sheet D2:** Same for Section N and Section Q."

Response: Noted. A wall solid grouted two (2) course (12-inches) above the adjacent finished grade is shown in Sections N and Q..

Comment: "30. **Sheet D3:** Section B: the solid grout portion must be 8"-CMU or equivalent."

Response: Noted. A wall solid grouted three (3) course (18-inches) above the adjacent finished grade is shown in Section B.

Comment: "31. **Sheet D4:** Section A and Section H: clearly label "PUBLIC" and "COMMON LOT" in the drainage easement. The surface material in the drainage easement must be all concrete. Review and revise accordingly."

Response: Section A has been clearly labeled "20' Common Lot" and Section H has been labeled "40' LVVWD Easement to be Privately Maintained by HOA". Per a phone conference with CLV on March 17, 2016, the easement includes a 100-year storm drain and will not require a concrete surface.

Comment: "32. **Sheet P57 and Sheet P61:** Lateral 8 in P57 refers to Lateral 20 in P61. However, the grate type inlets in the two laterals do not correlate to each other. Clarify in the next submittal."

Response: The profiles have been revised to more clearly callout proposed facilities shown in plan view.

Comment: "33. Add a note in all pertinent sheets for the construction of all storm drain drop inlets per a newly adopted USDCCA Drawing No. 421 *(Stormwater Quality Management Stamp and Sign Detail).*"

Response: The note was previously provided on construction callouts 7-11.

Additional Items

The finished floor elevations for Lots 598-601, 619-624, and 625-627 have been raised since the original submittal. The proposed site will still meet CCRFCD criteria for finished floor elevations. The City of Las Vegas requires finished floor elevations be set at a minimum of 6-inches above the top of curb and above twice the depth of flow. The finished floor elevation for the proposed buildings have been set at a minimum of 6-inches above the top of curb and twice the depth of flow above the water surface elevation measured from the high side of the building for flows generated onsite.

If you have any questions or require additional information, please contact our office at 702-804-2133.

Cordially,

GCW, INC.

James A Monroe Jr, PE LEED AP
Project Manager
Flood Control Division

JAM/vlr
Enclosures

c: Brian Schmidt, GCW
Ryan Belsick, GCW
Wes Petty, GCW
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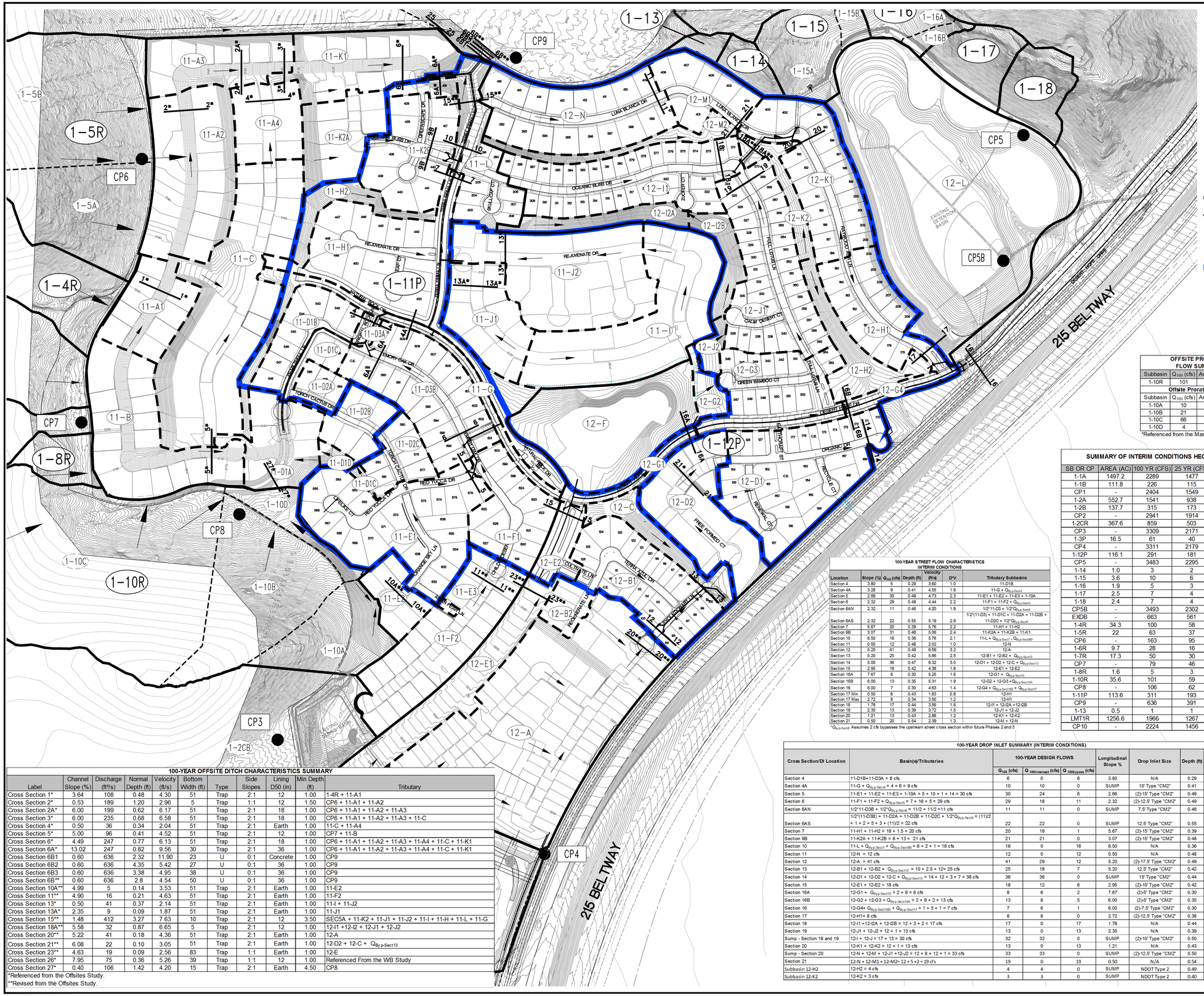
Hao Nguyen, GCW

REVERENCE – PHASE 1
RESPONSE TO COMMENTS
APPENDIX LAYOUT

1. Figure 5R – Interim Conditions Drainage Map
2. Figure 6R – Ultimate Conditions Drainage Map
3. Figure 7R – Facilities Map
4. Standard Form 6 Calculations
   a. Interim Conditions
      i. Mainline 1 and Laterals
      ii. Mainline 2 and Laterals
5. Street Cross Section Calculations
   a. Interim Conditions
   b. Ultimate Conditions
6. Drop inlet Calculations
   a. Interim Conditions
7. Ditch Calculations
8. Emergency Overflow Normal Depth Calculations
9. Emergency Overflow Weir Calculations
10. Master Drainage Study for Village 26 Reverence
    a. City of Las Vegas Conditional Approval Letter
    b. CCRFCD Concurrence letter
11. Technical Drainage Study for Summerlin Village 26 – Reverence Offsite Improvements
    a. Figure 5R – Interim Conditions Drainage Map
    b. Figure 5AUR – Hydraulic Cross Section Map
    c. Figure 6R – Facilities Map

APPENDIX



LEGEND

- 1-3P — DRAINAGE BASIN
- 3-E — ⊠RORATED DRAINAGE BASIN
- CP3 ● — ⊠ON⊠ENTRATION ⊠OINT
- BASIN BO⊠NDAR⊠
- ⊠RORATE BASIN BO⊠NDAR⊠
- FLOW DIRE⊠TION
- 1 1 — STREET ⊠ROSS SE⊠TION
- ⊠⊠ASE 1 BO⊠NDAR⊠

OFFSITE PRORATED* FLOW SUMMARY

Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-10R	101	35.6	2.84
Offsite Prorated Basins			
Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-10A	10	3.5	2.84
1-10B	21	7.4	2.84
1-10C	66	23.2	2.84
1-10D	4	1.5	2.84

*Referenced from the Master Study

SUMMARY OF INTERIM CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	25 YR (CFS)	10 YR (CFS)
1-1A	1497.2	2289	1477	942
1-1B	111.8	226	115	63
CP1	-	2404	1549	986
1-2A	552.7	1541	938	608
1-2B	137.7	315	173	103
CP2	-	2941	1914	1209
1-2CR	367.6	859	503	313
CP3	-	3309	2171	1365
1-3P	16.5	61	40	29
CP4	-	3311	2179	1368
1-12P	116.1	291	181	124
CP5	-	3483	2295	1443
1-14	1.0	3	2	1
1-15	3.6	10	6	4
1-16	1.9	5	3	2
1-17	2.5	7	4	2
1-18	2.4	7	4	2
CP5B	-	3493	2302	1448
EXDB	-	663	561	461
1-4R	34.3	100	58	37
1-5R	22	63	37	24
CP6	-	163	95	61
1-6R	9.7	28	16	11
1-7R	17.3	50	30	19
CP7	-	79	46	29
1-8R	1.6	5	3	2
1-10R	35.6	101	59	38
CP8	-	106	62	39
1-11P	113.6	311	193	132
CP9	-	636	391	261
1-13	0.5	1	1	1
LMT1R	1256.6	1966	1267	821
CP10	-	2224	1456	945

INTERIM CONDITIONS PRORATED FLOW SUMMARY

Offsite

Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-11P*	311	113.6	2.74
1-12P*	291	116.1	2.51
Offsite Prorated Basins			
Subbasin	Q_{100} (cfs)	New Area (acres)	cfs/acre
11-A1	8	3.0	2.74
11-A2	18	6.5	2.74
11-A3	10	3.5	2.74
11-A4	7	2.5	2.74
11-B	17	6.3	2.74
11-C	29	10.7	2.74
11-D1A	9	3.4	2.74
11-D1D	2	0.8	2.74
11-D2B	5	1.8	2.74
11-E2	5	1.6	2.74
11-E3	<1	0.1	2.74
11-F2	16	5.8	2.74
11-I	20	7.4	2.74
11-J1	9	3.3	2.74
11-J2	21	7.5	2.74
11-K1	13	4.6	2.74
11-K2A	9	3.4	2.74
12-A	41	16.5	2.51
12-B2	3	0.9	2.51
12-D2	12	4.8	2.51
12-E1	16	6.2	2.51
12-F	17	7.0	2.51
12-G2	2	0.7	2.51
12-L	54	21.5	2.51

*Referenced from the Offsites Study

INTERIM CONDITIONS PRORATED FLOW SUMMARY

Onsite

Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-11P*	219	113.6	1.93
1-12P*	230	116.1	1.98
Onsite Prorated Basins			
Subbasin	Q_{100} (cfs)	New Area (acres)	cfs/acre
11-A	30	15.6	1.93
11-B	12	6.3	1.93
11-C	21	10.7	1.93
11-D1B	5	2.5	1.93
11-D1C	<1	0.1	1.93
11-D1D	2	0.8	1.93
11-D2A	2	0.9	1.93
11-D2C	3	1.7	1.93
11-D3A	1	0.3	1.93
11-D3B	12	6.0	1.93
11-E1	14	7.4	1.93
11-F1	7	3.4	1.93
11-G	4	2.3	1.93
11-H1	16	8.4	1.93
11-H2	3	1.4	1.93
11-J1	6	3.3	1.93
11-J2	15	7.5	1.93
11-K2B	8	4.2	1.93
11-L	7	3.4	1.93
12-A	33	16.5	1.98
12-B1	10	4.9	1.98
12-C	3	1.7*	1.98
12-D1	14	7.2	1.98
12-E2	2	1.2	1.98
12-F	14	7.0	1.98
12-G1	2	0.9	1.98
12-G3	9	4.3	1.98
12-G4	1	0.7	1.98
12-H1	7	3.8	1.98
12-H2	4	2.2	1.98
12-I1	12	6.2	1.98
12-I2A	3	1.4	1.98
12-I2B	2	1.2	1.98
12-J1	12	6.2	1.98
12-J2	1	0.5	1.98
12-K1	10	5.2	1.98
12-K2	2	1.2	1.98
12-L	43	21.5	1.98
12-M2	2	1.2	1.98
12-M1	5	2.6	1.98
12-N	12	6.0	1.98

*Referenced Subbasins from Master Study

100-YEAR STREET FLOW CHARACTERISTICS
INTERIM CONDITIONS

Location	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (ft/s)	D*V	Tributary Subbasins
Section 4	3.80	6	0.29	3.60	1.0	11-D1B
Section 4A	3.28	9	0.41	4.55	1.9	11-G + $Q_{By\text{-}Sect4}$
Section 5	2.66	30	0.49	4.73	2.3	11-E1 + 11-E2 + 11-E3 + 1-10A
Section 6	2.32	29	0.49	4.44	2.2	11-F1 + 11-F2 + $Q_{By\text{-}Sect5}$
Section 6AN	2.32	11	0.46	4.20	1.9	1/2*(11-D3 + 1/2*$Q_{By\text{-}Sect6}$
Section 6AS	2.32	22	0.55	5.19	2.9	1/2*(11-D3) + 11-D1C + 11-D2A + 11-D2B + 11-D2C + 1/2*$Q_{By\text{-}Sect6}$
Section 7	5.67	20	0.39	5.76	2.2	11-H1 + 11-H2
Section 9B	3.07	31	0.48	5.06	2.4	11-K2A + 11-K2B + 11-K1
Section 10	6.50	16	0.36	5.76	2.1	11-L + $Q_{By\text{-}Sect7}$ + $Q_{By\text{-}Sect9B}$*
Section 11	0.50	12	0.48	2.02	1.0	12-N
Section 12	5.20	41	0.49	6.59	3.2	12-A
Section 13	5.20	25	0.42	5.86	2.5	12-B1 + 12-B2 + $Q_{By\text{-}Sect12}$
Section 14	6.00	36	0.47	6.32	3.0	12-D1 + 12-D2 + 12-C + $Q_{By\text{-}Sect13}$
Section 15	2.56	18	0.42	4.38	1.8	12-E1 + 12-E2
Section 16A	7.67	8	0.30	5.25	1.6	12-G1 + $Q_{By\text{-}Sect15}$
Section 16B	6.00	13	0.35	5.31	1.9	12-G2 + 12-G3 + $Q_{By\text{-}Sect16A}$
Section 16	6.00	7	0.30	4.63	1.4	12-G4 + $Q_{By\text{-}Sect16B}$ + $Q_{By\text{-}Sect17}$
Section 17 Min	0.50	8	0.43	1.83	0.8	12-H1
Section 17 Max	2.72	8	0.34	3.50	1.2	12-H1
Section 18	1.78	17	0.44	3.56	1.6	12-I1 + 12-I2A + 12-I2B
Section 19	2.35	13	0.39	3.72	1.5	12-J1 + 12-J2
Section 20	1.21	13	0.43	2.88	1.2	12-K1 + 12-K2
Section 21	0.50	20	0.54	2.39	1.3	12-M1 + 12-N

*$Q_{By\text{-}Sect9}$: Assumes 2 cfs bypasses the upstream street cross section within future Phases 2 and 3

100-YEAR DROP INLET SUMMARY (INTERIM CONDITIONS)

Cross Section/DI Location	Basin(s)/Tributaries	100-YEAR DESIGN FLOWS: 2>11 Q_{100} (cfs)	100-YEAR DESIGN FLOWS: $Q_{100intercept}$ (cfs)	100-YEAR DESIGN FLOWS: $Q_{100bypass}$ (cfs)	Longitudinal Slope %	Drop Inlet Size	Depth (ft)	Velocity (ft/s)	DXV
Section 4	11-D1B+11-D3A = 6 cfs	6	0	6	3.80	N/A	0.29	3.60	1.04
Section 4A	11-G + $Q_{By\text{-}Sect4}$ = 4 + 6 = 9 cfs	10	10	0	SUMP	10' Type "CM2"	0.41	4.55	1.87
Section 5	11-E1 + 11-E2 + 11-E3 + 1-10A = 5 + 10 + 1 + 14 = 30 cfs	30	24	6	2.66	(2)-15' Type "CM2"	0.49	4.73	2.32
Section 6	11-F1 + 11-F2 + $Q_{By\text{-}Sect5}$ = 7 + 16 + 5 = 29 cfs	29	18	11	2.32	(2)-12.5' Type "CM2"	0.49	4.44	2.18
Section 6AN	1/2*11-D3B + 1/2*$Q_{By\text{-}Sect6}$ = 11/2 + 11/2 =11 cfs	11	11	0	SUMP	7.5' Type "CM2"	0.46	4.20	1.93
Section 6AS	1/2*(11-D3B) + 11-D2A + 11-D2B + 11-D2C + 1/2*$Q_{By\text{-}Sect6}$ = (11)/2 + 1 + 2 + 5 + 3 + (11)/2 = 22 cfs	22	22	0	SUMP	12.5' Type "CM2"	0.55	5.19	2.85
Section 7	11-H1 + 11-H2 = 18 + 1.5 = 20 cfs	20	19	1	5.67	(2)-15' Type "CM2"	0.39	5.76	2.25
Section 9B	11-K2A + 11-K2B = 8 + 13 = 21 cfs	21	21	0	3.07	(2)-15' Type "CM2"	0.48	5.06	2.43
Section 10	11-L + $Q_{By\text{-}Sect7}$ + $Q_{By\text{-}Sect9B}$ = 6 + 2 + 1 = 16 cfs	16	0	16	6.50	N/A	0.36	5.76	2.07
Section 11	12-N = 12 cfs	12	0	12	0.50	N/A	0.48	2.02	0.97
Section 12	12-A = 41 cfs	41	29	12	5.20	(2)-17.5' Type "CM2"	0.49	6.59	3.23
Section 13	12-B1 + 12-B2 + $Q_{By\text{-}Sect12}$ = 10 + 2.5 + 12= 25 cfs	25	18	7	5.20	12.5' Type "CM2"	0.42	5.86	2.46
Section 14	12-D1 + 12-D2 + 12-C + $Q_{By\text{-}Sect13}$ = 14 + 12 + 3 + 7 = 36 cfs	36	36	0	SUMP	15' Type "CM2"	0.44	5.98	2.63
Section 15	12-E1 + 12-E2 = 18 cfs	18	12	6	2.95	(2)-10' Type "CM2"	0.42	4.38	1.84
Section 16A	12-G1 + $Q_{By\text{-}Sect15}$ = 2 + 6 = 8 cfs	8	6	2	7.67	(2)-5' Type "CM2"	0.30	5.25	1.58
Section 16B	12-G2 + 12-G3 + $Q_{By\text{-}Sect16A}$ = 2 + 9 + 2 = 13 cfs	13	8	5	6.00	(2)-5' Type "CM2"	0.35	5.31	1.86
Section 16	12-G4+ $Q_{By\text{-}Sect16B}$ + $Q_{By\text{-}Sect17}$ = 1 + 5 + 1 = 7 cfs	7	6	1	6.00	(2)-7.5' Type "CM2"	0.30	4.63	1.4
Section 17	12-H1= 8 cfs	8	8	0	2.72	(2)-12.5' Type "CM2"	0.38	3.85	1.46
Section 18	12-I1 +12-I2A + 12-I2B = 12 + 3 + 2 = 17 cfs	17	0	17	1.78	N/A	0.44	3.56	1.57
Section 19	12-J1 + 12-J2 = 12 + 1 = 13 cfs	13	0	13	2.35	N/A	0.39	3.72	1.45
Sump - Section 18 and 19	12-I + 12-J = 17 + 13 = 30 cfs	32	32	0	SUMP	(2)-10' Type "CM2"	0.50	-	-
Section 20	12-K1 + 12-K2 = 12 + 1 = 13 cfs	13	0	13	1.21	N/A	0.43	2.88	1.24
Sump - Section 20	12-N + 12-M + 12-I1 +12-J2 = 12 + 8 + 12 + 1 = 33 cfs	33	33	0	SUMP	(2)-12.5' Type "CM2"	0.50	-	-
Section 21	12-N + 12-M1 + 12-M2= 12 + 5 +2 = 19 cfs	19	0	19	0.50	N/A	0.54	2.39	1.29
Subbasin 12-H2	12-H2 = 4 cfs	4	4	0	SUMP	NDOT Type 2	0.49	-	-
Subbasin 12-K2	12-K2 = 3 cfs	3	3	0	SUMP	NDOT Type 2	0.40	-	-

100-YEAR OFFSITE DITCH CHARACTERISTICS SUMMARY

Label	Channel Slope (%)	Discharge (ft³/s)	Normal Depth (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Cross Section 1*	3.64	108	0.48	4.30	51	Trap	2:1	12	1.00	1-4R + 11-A1
Cross Section 2*	0.53	189	1.20	2.96	5	Trap	1:1	12	1.50	CP6 + 11-A1 + 11-A2
Cross Section 2A*	6.00	199	0.62	6.17	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3
Cross Section 3*	6.00	235	0.68	6.58	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-C
Cross Section 4*	0.50	36	0.34	2.04	51	Trap	2:1	Earth	1.00	11-C + 11-A4
Cross Section 5*	5.00	96	0.41	4.52	51	Trap	2:1	12	1.00	CP7 + 11-B
Cross Section 6*	4.49	247	0.77	6.13	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-A4 + 11-C + 11-K1
Cross Section 6A*	13.02	247	0.82	9.56	30	Trap	2:1	36	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-A4 + 11-C + 11-K1
Cross Section 6B1	0.60	636	2.32	11.90	23	U	0:1	Concrete	1.00	CP9
Cross Section 6B2	0.60	636	4.35	5.42	27	U	0:1	36	1.00	CP9
Cross Section 6B3	0.60	636	3.38	4.95	38	U	0:1	36	1.00	CP9
Cross Section 6B**	0.60	636	2.8	4.54	50	U	0:1	36	1.00	CP9
Cross Section 10A**	4.99	5	0.14	3.53	51	Trap	2:1	Earth	1.00	11-E2
Cross Section 11**	4.90	16	0.21	4.63	51	Trap	2:1	Earth	1.00	11-F2
Cross Section 13*	0.50	41	0.37	2.14	51	Trap	2:1	Earth	1.00	11-I + 11-J2
Cross Section 13A*	2.35	9	0.09	1.87	51	Trap	2:1	Earth	1.00	11-I1
Cross Section 15**	1.48	412	3.27	7.63	10	Trap	2:1	12	3.50	SEC5A + 11-K2 + 11-J1 + 11-J2 + 11-I + 11-H + 11-L + 11-G
Cross Section 18A**	5.58	32	0.87	6.65	5	Trap	2:1	12	1.00	12-I1 +12-I2 + 12-J1 + 12-J2
Cross Section 20**	5.22	41	0.18	4.36	51	Trap	2:1	Earth	1.00	12-A
Cross Section 21**	6.08	22	0.10	3.05	51	Trap	2:1	Earth	1.00	12-D2 + 12-C + $Q_{By\text{-}Sect13}$
Cross Section 23**	4.63	19	0.09	2.56	83	Trap	1:1	Earth	1.00	12-E
Cross Section 26*	7.95	75	0.36	5.26	39	Trap	1:1	12	1.00	Referenced From the WB Study
Cross Section 27*	0.40	106	1.42	4.20	15	Trap	2:1	Earth	4.50	CP8

*Referenced from the Offsites Study.
**Revised from the Offsites Study.

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David Clark

% COMPLETE

DATE:	DESCRIPTION	DATE	ASSN. APP	DATE	CGW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-16-16
PLOT TIME: 10:53:42

PULTE HOMES

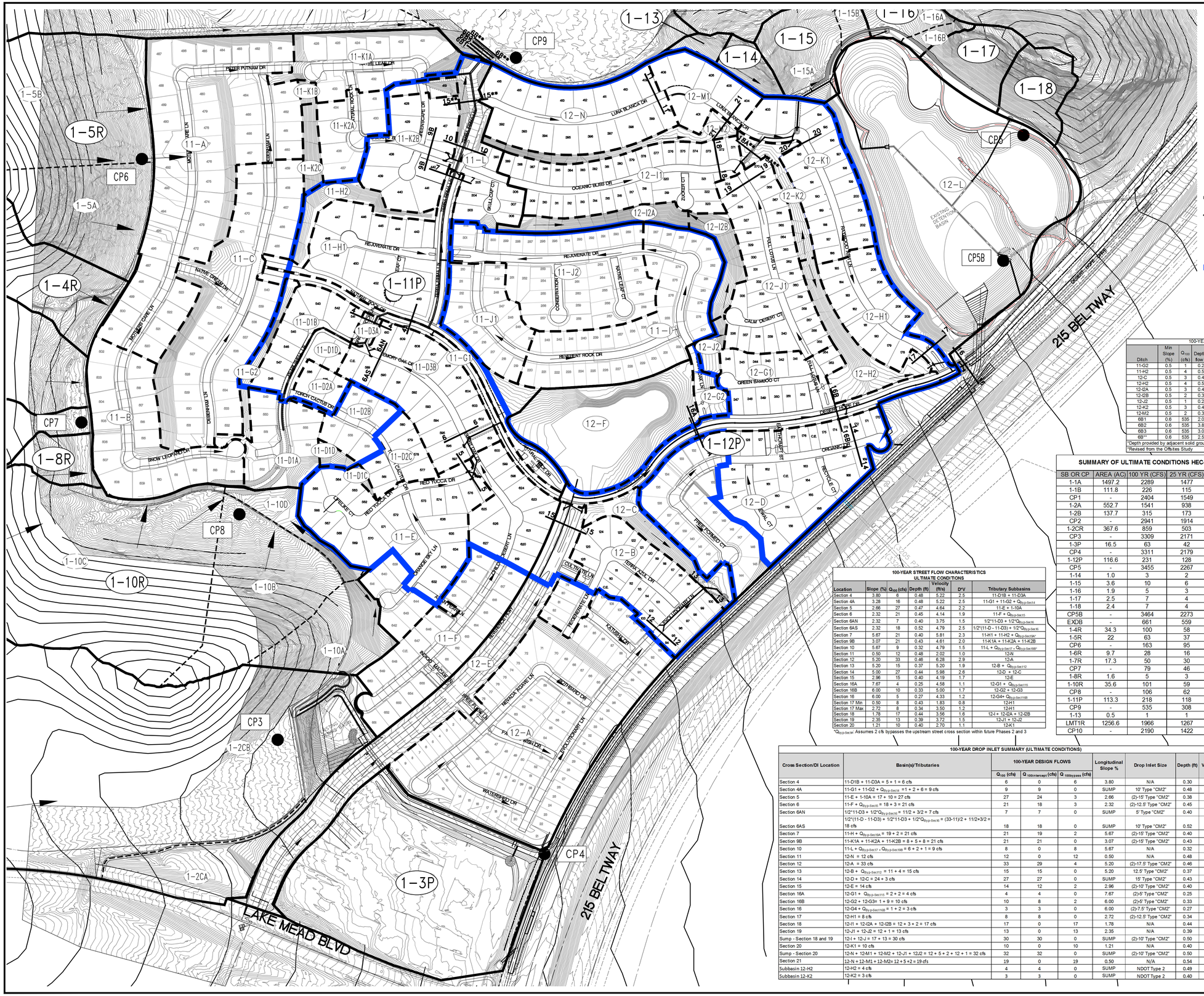
SUMMERLIN VILLAGE 26 – REVERENCE
PHASE 1

INTERIM CONDITIONS DRAINAGE MAP

DRAWING
FIG-5R
OF SHTS

LID#:

HTE: 00-00000



GRAPHIC SCALE
300 0 150 300
(IN FEET)
1 inch = 300 ft.

NORTH
SCALE 1" = 300'

LEGEND

- 1-3P DRAINAGE BASIN
- 3-E ⊠RORATED DRAINAGE BASIN
- CP3 ● ⊠ON⊠ENTRATION ⊠OINT
- BASIN BO⊠NDAR⊠
- ⊠RORATE BASIN BO⊠NDAR⊠
- FLOW DIRE⊠TION
- 1 1 STREET ⊠ROSS SE⊠TION
- ⊠⊠ASE 1 BO⊠NDAR⊠

100-YEAR ONSITE DITCH CHARACTERISTICS SUMMARY TABLE

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 Subbasin
11-G2	0.5	1	0.22	1.37	0	V	50:1	Earth	2.00	11-G2
11-H2	0.5	4	0.52	2.26	0	V	50:1	Earth	2.00	11-K2C+11-H2
12-C	0.5	3	0.44	2.04	0	V	50:1	Earth	2.00	12-C
12-H2	0.5	4	0.52	2.26	0	V	50:1	Earth	2.00	12-H2
12-I2A	0.5	3	0.44	2.04	0	V	50:1	Earth	2.00	12-I2A
12-I2B	0.5	2	0.34	1.77	0	V	50:1	Earth	2.00	12-I2B
12-J2	0.5	1	0.22	1.37	0	V	50:1	Earth	2.00	12-J2
12-K2	0.5	3	0.44	2.04	0	V	50:1	Earth	2.00	12-K2
12-M2	0.5	2	0.34	1.77	0	V	50:1	Earth	2.00	12-M2
6B1	0.6	535	2.08	11.19	23	U	0:1	Concrete	2.50	CP9
6B2	0.6	535	3.88	5.11	27	U	0:1	36	4.00	CP9
6B3	0.6	535	3.03	4.65	38	U	0:1	36	4.00	CP9
6B**	0.6	535	2.52	4.29	50	U	0:1	36	2.50	CP9

*Depth provided by adjacent solid grouted flood walls
*Revised from the Offsites Study

SUMMARY OF ULTIMATE CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	25 YR (CFS)	10 YR (CFS)
1-1A	1497.2	2289	1477	942
1-1B	111.8	226	115	63
CP1	-	2404	1549	986
1-2A	552.7	1541	938	608
1-2B	137.7	315	173	103
CP2	-	2941	1914	1209
1-2CR	367.6	859	503	313
CP3	-	3309	2171	1365
1-3P	16.5	63	42	31
CP4	-	3311	2179	1368
1-12P	116.6	231	128	78
CP5	-	3455	2267	1417
1-14	1.0	3	2	1
1-15	3.6	10	6	4
1-16	1.9	5	3	2
1-17	2.5	7	4	2
1-18	2.4	7	4	2
CP5B	-	3464	2273	1421
EXDB	-	661	559	457
1-4R	34.3	100	58	37
1-5R	22	63	37	24
CP6	-	163	95	61
1-6R	9.7	28	16	11
1-7R	17.3	50	30	19
CP7	-	79	46	29
1-8R	1.6	5	3	2
1-10R	35.6	101	59	38
CP8	-	106	62	39
1-11P	113.3	218	118	69
CP9	-	535	308	192
1-13	0.5	1	1	1
LMT1R	1256.6	1966	1267	821
CP10	-	2190	1422	913

OFFSITE PRORATED* FLOW SUMMARY

Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-10R	101	35.6	2.84
Offsite Prorated Basins			
Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-10A	10	3.5	2.84
1-10B	21	7.4	2.84
1-10C	66	23.2	2.84
1-10D	4	1.5	2.84

*Referenced from the Master Study

100-YEAR STREET FLOW CHARACTERISTICS ULTIMATE CONDITIONS

Location	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (ft/s)	DVI	Tributary Subbasins
Section 4	3.80	6	0.48	5.22	2.5	11-D1B + 11-D3A
Section 4A	3.28	16	0.48	5.22	2.5	11-G1 + 11-G2 + $Q_{by\text{-}Sec14}$
Section 5	2.66	27	0.47	4.64	2.2	11-E + 1-10A
Section 6	2.32	21	0.45	4.14	1.9	11-F + $Q_{by\text{-}Sec15}$
Section 6AN	2.32	7	0.40	3.75	1.5	1/2*11-D3 + 1/2*$Q_{by\text{-}Sec16}$
Section 6AS	2.32	18	0.52	4.79	2.5	1/2*(11-D - 11-D3) + 1/2*$Q_{by\text{-}Sec16}$
Section 7	5.67	21	0.40	5.81	2.3	11-H1 + 11-H2 + $Q_{by\text{-}Sec18A}$*
Section 9B	3.07	21	0.43	4.61	2.0	11-K1A + 11-K2A + 11-K2B
Section 10	5.67	9	0.32	4.79	1.5	11-L + $Q_{by\text{-}Sec17}$ - $Q_{by\text{-}Sec18B}$*
Section 11	0.50	12	0.48	2.02	1.0	12-N
Section 12	5.20	33	0.46	6.28	2.9	12-A
Section 13	5.20	15	0.37	5.20	1.9	12-B + $Q_{by\text{-}Sec112}$
Section 14	5.00	27	0.44	5.98	2.6	12-D + 12-C
Section 15	2.96	15	0.40	4.19	1.7	12-E
Section 16A	7.67	4	0.25	4.58	1.1	12-G1 + $Q_{by\text{-}Sec115}$
Section 16B	6.00	10	0.33	5.00	1.7	12-G2 + 12-G3
Section 16	6.00	5	0.27	4.33	1.2	12-G4+ $Q_{by\text{-}Sec116B}$
Section 17 Min	0.50	8	0.43	1.83	0.8	12-H1
Section 17 Max	2.72	8	0.34	3.50	1.2	12-H1
Section 18	1.78	17	0.44	3.56	1.6	12-I + 12-I2A + 12-I2B
Section 19	2.35	13	0.39	3.72	1.5	12-J1 + 12-J2
Section 20	1.21	10	0.40	2.72	1.1	12-K1

*$Q_{by\text{-}Sec18A}$: Assumes 2 cfs bypasses the upstream street cross section within fiture Phases 2 and 3

ULTIMATE CONDITIONS PRORATED FLOW SUMMARY

Onsite			
Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-11P*	219	113.6	1.93
1-12P*	230	116.1	1.98
Onsite Prorated Basins			
Subbasin	Q_{100} (cfs)	New Area (acres)	cfs/acre
11-A	30	15.6	1.93
11-B	12	6.3	1.93
11-C	21	10.7	1.93
11-D1A	7	3.4	1.93
11-D1B	5	2.5	1.93
11-D1C	<1	0.1	1.93
11-D1D	2	0.8	1.93
11-D2A	2	0.9	1.93
11-D2B	3	1.8	1.93
11-D2C	3	1.7	1.93
11-D3A	<1	0.3	1.93
11-D3B	11	5.6	1.93
11-E	17	9.0	1.93
11-F	18	9.2	1.93
11-G1	3	1.6	1.93
11-G2	2	0.7	1.93
11-H1	16	8.3	1.93
11-H2	3	1.4	1.93
11-I	14	7.4	1.93
11-J1	6	3.3	1.93
11-J2	15	7.5	1.93
11-K1A	8	4.4	1.93
11-K1B	<1	0.1	1.93
11-K2A	5	2.8	1.93
11-K2B	8	4.1	1.93
11-K2C	1	0.7	1.93
11-L	6	3.4	1.93
Total	**219**	**113.6**	**N/A**
12-A	33	16.5	1.98
12-B	11	5.8	1.98
12-C	3	1.7	1.98
12-D	24	12.0	1.98
12-E	15	7.4	1.98
12-F	14	7.0	1.98
12-G1	12	5.9	1.98
12-G2	1	0.7	1.98
12-H1	8	3.7	1.98
12-H2	4	2.2	1.98
12-I1	12	6.2	1.98
12-I2A	3	1.4	1.98
12-I2B	2	1.2	1.98
12-J1	12	6.2	1.98
12-J2	1	0.5	1.98
12-K1	10	5.2	1.98
12-K2	3	1.2	1.98
12-L	43	21.5	1.98
12-M1	5	2.6	1.98
12-M2	2	1.2	1.98
12-N	12	6.0	1.98
Total	**230**	**116.1**	**N/A**

*Referenced Subbasins from Master Study

100-YEAR DROP INLET SUMMARY (ULTIMATE CONDITIONS)

Cross Section/DI Location	Basin(s)/Tributaries	100-YEAR DESIGN FLOWS			Longitudinal Slope %	Drop Inlet Size	Depth (ft)	Velocity (ft/s)	DXV
		Q_{100} (cfs)	$Q_{100intercept}$ (cfs)	$Q_{100bypass}$ (cfs)					
Section 4	11-D1B + 11-D3A = 5 + 1 = 6 cfs	6	0	6	3.80	N/A	0.30	3.75	1.13
Section 4A	11-G1 + 11-G2 + $Q_{by\text{-}Sec14}$ =1 + 2 + 6 = 9 cfs	9	9	0	SUMP	10' Type "CM2"	0.48	5.22	2.51
Section 5	11-E + 1-10A = 17 + 10 = 27 cfs	27	24	3	2.66	(2)-15' Type "CM2"	0.38	3.81	1.45
Section 6	11-F + $Q_{by\text{-}Sec15}$ = 18 + 3 = 21 cfs	21	18	3	2.32	(2)-12.5' Type "CM2"	0.45	4.14	1.86
Section 6AN	1/2*11-D3 + 1/2*$Q_{by\text{-}Sec16}$ = 11/2 + 3/2 = 7 cfs	7	7	0	SUMP	5' Type "CM2"	0.40	3.75	1.50
Section 6AS	1/2*(11-D - 11-D3) + 1/2*11-D3 + 1/2*$Q_{by\text{-}Sec16}$ = (33-11)/2 + 11/2+3/2 = 18 cfs	18	18	0	SUMP	10' Type "CM2"	0.52	4.79	2.49
Section 7	11-H + $Q_{by\text{-}Sec18A}$ * 19 + 2 = 21 cfs	21	19	2	5.67	(2)-15' Type "CM2"	0.40	5.81	2.32
Section 9B	11-K1A + 11-K2A + 11-K2B = 8 + 5 + 8 = 21 cfs	21	21	0	3.07	(2)-15' Type "CM2"	0.43	4.61	1.98
Section 10	11-L + $Q_{by\text{-}Sec17}$ - $Q_{by\text{-}Sec18B}$ = 6 + 2 + 1 = 9 cfs	8	0	8	5.67	N/A	0.32	4.79	1.53
Section 11	12-N = 12 cfs	12	0	12	0.50	N/A	0.48	2.02	0.97
Section 12	12-A = 33 cfs	33	29	4	5.20	(2)-17.5' Type "CM2"	0.46	6.28	2.89
Section 13	12-B + $Q_{by\text{-}Sec112}$ = 11 + 4 = 15 cfs	15	15	0	5.20	12.5' Type "CM2"	0.37	5.20	1.92
Section 14	12-D + 12-C = 24 + 3 cfs	27	27	0	SUMP	15' Type "CM2"	0.43	5.90	2.54
Section 15	12-E = 14 cfs	14	12	2	2.96	(2)-10' Type "CM2"	0.40	4.19	1.68
Section 16A	12-G1 + $Q_{by\text{-}Sec115}$ = 2 + 2 = 4 cfs	4	4	0	7.67	(2)-5' Type "CM2"	0.25	4.58	1.15
Section 16B	12-G2 + 12-G3= 1 + 9 = 10 cfs	10	8	2	6.00	(2)-5' Type "CM2"	0.33	5.00	1.65
Section 16	12-G4 + $Q_{by\text{-}Sec116B}$ = 1 + 2 = 3 cfs	3	3	0	6.00	(2)-7.5' Type "CM2"	0.27	4.33	1.2
Section 17	12-H1 = 8 cfs	8	8	0	2.72	(2)-12.5' Type "CM2"	0.34	3.50	1.19
Section 18	12-I1 + 12-I2A + 12-I2B = 12 + 3 + 2 = 17 cfs	17	0	17	1.78	N/A	0.44	3.56	1.57
Section 19	12-J1 + 12-J2 = 12 + 1 = 13 cfs	13	0	13	2.35	N/A	0.39	3.72	1.45
Sump - Section 18 and 19	12-I + 12-J = 17 + 13 = 30 cfs	30	30	0	SUMP	(2)-10' Type "CM2"	0.50	-	-
Section 20	12-K1 = 10 cfs	10	0	10	1.21	N/A	0.40	2.70	1.08
Sump - Section 20	12-N + 12-M1 + 12-M2 + 12-J1 + 12J2 = 12 + 5 + 2 + 12 + 1 = 32 cfs	32	32	0	SUMP	(2)-10' Type "CM2"	0.50	-	-
Section 21	12-N + 12-M1 + 12-M2= 12 + 5 +2 = 19 cfs	19	0	19	0.50	N/A	0.54	2.39	1.29
Subbasin 12-H2	12-H2 = 4 cfs	4	4	0	SUMP	NDOT Type 2	0.49	-	-
Subbasin 12-K2	12-K2 = 3 cfs	3	3	0	SUMP	NDOT Type 2	0.40	-	-

% COMPLETE

DATE:
CDW APP
DATE
ACEN APP
DATE
DESCRIPTION
REV DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:59:22

GCW
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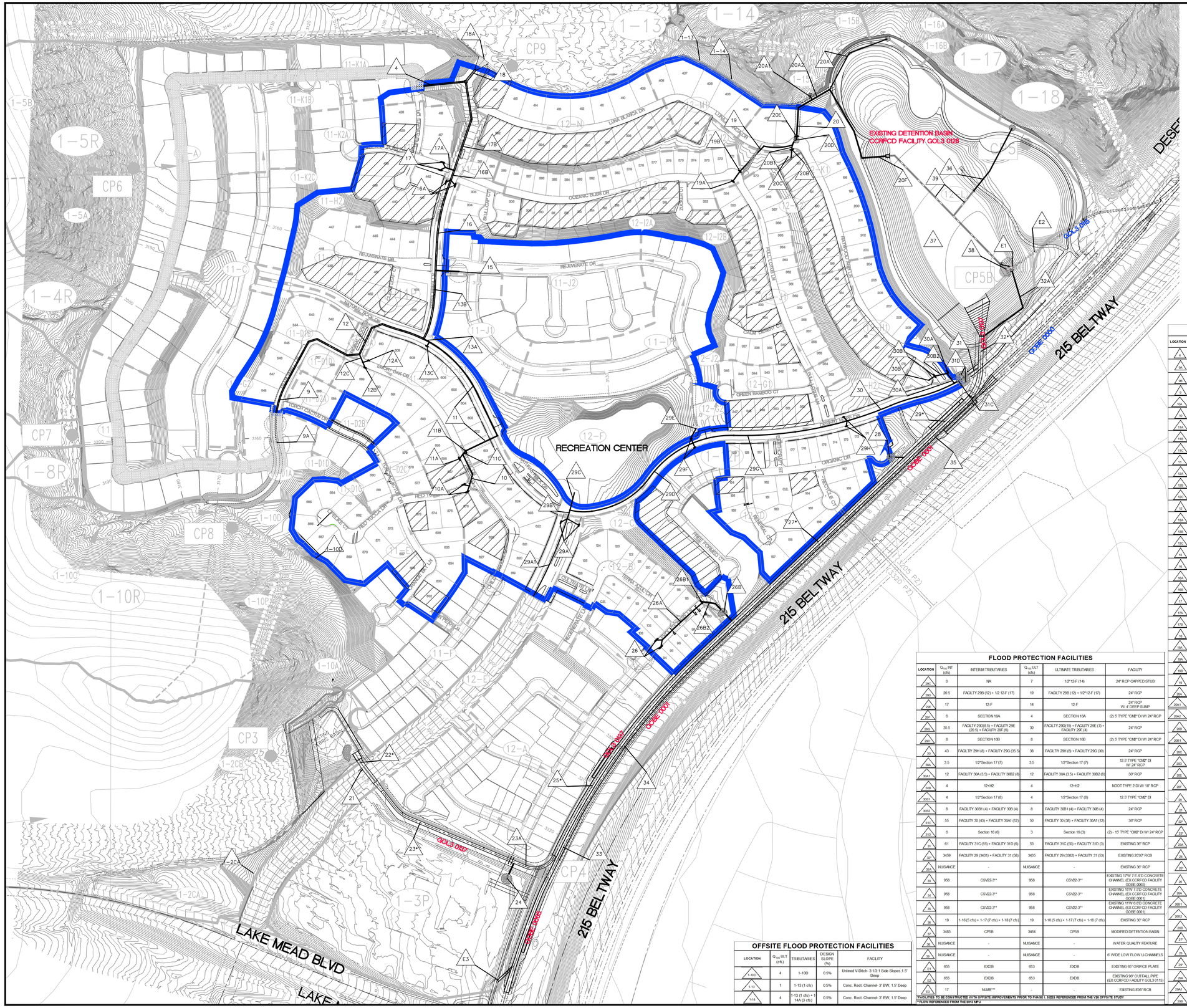
F:\Projects\700\764-204-013\Division\Exh\Figures\RTC-PHASE 1\Fig 6R-ULTIMATE CONDITIONS DRAINAGE MAP.dwg
David Dork

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

ULTIMATE CONDITIONS DRAINAGE MAP

DRAWING
FIG-6R
OF SHTS

LD#:
HTE: 00-00000



GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

NORTH

SCALE 1" = 200'

LEGEND

- DRAINAGE BASIN
- ⊠RORATED DRAINAGE BASIN
- ⊠ON⊠ ENTRATION ⊠OINT
- BASIN BO⊠ NDAR⊠
- ⊠RORATE BASIN BO⊠ NDAR⊠
- FLOW DIRE⊠ TION
- STREET ⊠ ROSS SE⊠ TION
- FA⊠ ILIT⊠ IDENTIFIER
- ⊠⊠ ASE BO⊠ NDAR⊠
- FLOOD ⊠ ROTE⊠ TED W⊠SOLID GRO⊠ TED ⊠NEEWALL

FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} INT (cfs)	INTERMTRIBUTARIES	Q_{100} ULT (cfs)	ULTIMATE TRIBUTARIES	FACILITY
4	227	FACILITY 1* (163) + FACILITY 2* (21 (5)) + 11-A (30) + 11-K1 (13)	214	FACILITY 1* (163) + FACILITY 2* (21 (5)) + 11-A (30) + 11-K1 (13)	66" RCP W/ SUMP
18	214	CP7 (79) + CP9 (106) + 11-B (17) + 11-DA (9) + 11-DD (2) + 11-D1C (1)	195	CP7 (79) + 1-8R (5) + 1-10C (66) + 1-10B (21) + 1-10D (4) + 11-D1A(4) + 11-DSC(1)	66" RCP W/ SUMP
19	214	FACILITY 9A* (214)	195	FACILITY 9A (195)	66" RCP
20	214	FACILITY 9A* (214)	195	FACILITY 9A (195)	66" RCP
20A	24	SECTION 5 (24)	24	SECTION 5 (24)	(2) - 15' TYPE "CMP, DI WITH 24" RCP
20A2	24	FACILITY 10A (24)	24	11-E (17 cfs) + 1-10A (10)	30" RCP
11A	9	1/2*SECTION 6 (18)	9	1/2*SECTION 6 (18)	12.5' TYPE "CMP, DI W/ 24" RCP
11B	9	1/2*SECTION 6 (18)	9	1/2*SECTION 6 (18)	12.5' TYPE "CMP, DI W/ 30" RCP
11	33	FACILITY 10 (26) + FACILITY 11A (9)	33	FACILITY 10 (26) + FACILITY 11A (9)	36" RCP
11	42	FACILITY 10 (33) + 11-F (9)	42	FACILITY 10 (27) + 11-F (18)	36" RCP
11A	11	SECTION 6/A	7	SECTION 6/A	7.5' TYPE "CMP, DI W/ 24" RCP
11C	21	SECTION 6/A5	18	SECTION 6A5	12.5' TYPE "CMP, DI W/ 24" RCP
12A	32	FACILITY 12A (11) + FACILITY 12B (21)	29	FACILITY 12A (11) + FACILITY 12B (18)	24" RCP
12	246	FACILITY 9 (214) + FACILITY 12C (32)	224	FACILITY 9 (195) + FACILITY 12C (29)	66" RCP
13	52	SECTION 4A (10) + FACILITY 11 (42)	52	SECTION 5A (9) + FACILITY 11 (42)	30" RCP
13A	298	FACILITY 13A (52) + FACILITY 12 (246)	276	FACILITY 13A (52) + FACILITY 12 (224)	72" RCP
13B	10	SECTION 4A (10)	10	SECTION 4A (10)	10' TYPE "CMP, DI W/ 24" RCP
13C	50	11-I (20) + 11-J1 (9) + 11-J2 (21)	35	11-I (14) + 11-J1 (6) + 11-J2 (15 cfs)	42" RCP W/ 5' DEEP SUMP
15	348	FACILITY 13B (296) + FACILITY 15 (50)	311	FACILITY 13B (276) + FACILITY 15 (35)	72" RCP
16A	19	SECTION 7 (19)	19	SECTION 7 (19)	(2) - 15' TYPE "CMP, DI WITH 24" RCP
16B	367	FACILITY 16A (19) + FACILITY 16 (348)	330	FACILITY 16A (19) + FACILITY 16 (311)	72" RCP
17	21	SECTION 9B (21)	15	SECTION 9B (15)	(2) - 15' TYPE "CMP, DI WITH 24" RCP
17A	21	FACILITY 17 (21)	15	FACILITY 17 (15)	30" RCP
17B	388	FACILITY 16B (367) + FACILITY 17A (21)	345	FACILITY 16B (330 + FACILITY 17A (15)	72" RCP
9	636**	CP9	536	CP9	8'X6' RCB
19A	636**	CP9	536	CP9	60' LONG OUTLET CHANNEL
19B	15	1/2*SECTION 18 (17) + 1/2 SECTION 19 (13)	15	1/2 SECTION 18 (17) + 1/2 SECTION 19 (13)	10' TYPE "CMP, DI W/ 24" RCP
19B	15	1/2*SECTION 18 (17) + 1/2*SECTION 19 (13)	15	1/2*SECTION 18 (17) + 1/2*SECTION 19 (13)	10' TYPE "CMP, DI W/ 30" RCP
19A	30	FACILITY 19A (15) + FACILITY 19B (15)	30	FACILITY 19A (15) + FACILITY 19B (15)	36" RCP
20A	10	1-15 (10)	10	1-15 (10)	EXISTING 18" RCP
20A1	3	1-14 (3)	3	1-14 (3)	NDOT TYPE 2 DI W/ 18" RCP
20A2	65	FACILITY 20 (62) + FACILITY 20A1 (3)	63.5	FACILITY 20 (60.5) + FACILITY 20A1 (3)	EXISTING 42" RCP
20B	15	1/2*12-K1 (10) + 1/2*SECTION 21 (20)	14.5	1/2*12-K1 (10) + 1/2*SECTION 21 (19)	10' TYPE "CMP, DI W/ 24" RCP
20B1	17	FACILITY 20B (15) + FACILITY 20C (2)	16.5	FACILITY 20B (14.5) + FACILITY 20C (2)	24" RCP
20C	2	12-K2	2	12-K2	NDOT TYPE 2 DI W/ 24" RCP
20D	47	FACILITY 19 (30) + FACILITY 20B1 (17)	46	FACILITY 19 (29.5) + FACILITY 20B1 (16.5)	42" RCP
20E	15	1/2*12-K1 (10) + 1/2*SECTION 21 (20)	14.5	1/2*12-K1 (10) + 1/2*SECTION 21 (19)	10' TYPE "CMP, DI W/ 42" RCP
20F	75	FACILITY 20AZ (65) + FACILITY 20A (10)	73.5	FACILITY 20 (63.5) + FACILITY 20A (10)	EXISTING 42" RCP
21	62	FACILITY 20D (47) + FACILITY 20E (15)	60.5	FACILITY 20D (45) + FACILITY 20E (14.5)	EXISTING 42" RCP
21	9	1-2CA	9	1-2CA	EXISTING 24" RCP
22*	3309	CP3	3309	CP3	EXISTING 20'X5'4" RCB
23	3311	CP4	3311	CP4	EXISTING 14'X5'4" RCB (EX.CCRFCD FACILITY GOL3 0137)
23A	3311	CP4	3311	CP4	EXISTING 14'X5'4" RCB (EX.CCRFCD FACILITY GOL3 0137)
24	61	1-3P	63	1-3P	EXISTING 48" RCP W/ 6' DEEP SUMP, 12" RIPRAP 4' HIGH
25	3311	CP4	3311	CP4	EXISTING 20' X 7.5' CONCRETE CHANNEL (EX.CCRFCD FACILITY GOL3 0137)
26	29	SECTION 12	29	SECTION 12	(2) - 17.5' TYPE "CMP, DI W/ 24" RCP
26A	29	FACILITY 26	29	FACILITY 26A (33 cfs) + 12-B (11 cfs) + 12-C (3 cfs)	24" RCP
26B1	25	SECTION 13	15	SECTION 13	12.5' TYPE "CMP, DI W/ 24" RCP
26B2	54	FACILITY 26A (29) + FACILITY 26B1 (15)	44	FACILITY 26A (29) + FACILITY 26B1 (15)	30" RCP
26B	57	FACILITY 26B2 (54) + 12-C (3)	47	FACILITY 26B2 (44) + 12-C (3)	EXISTING 42" RCP
27	3371	FACILITY 25 (3311 cfs) + FACILITY 26B (60 cfs)	3358	FACILITY 25 (3311 cfs) + FACILITY 26B (47 cfs)	EXISTING 20' X 7.5' CONCRETE CHANNEL (EX.CCRFCD FACILITY GOL3 0137)
28	29	SECTION 14 (26) + 12-C (3)	26	SECTION 14 (23) + 12-C (3)	12.5' TYPE "CMP, DI W/ 36" RCP
29	3397	FACILITY 27 (3371 cfs) + FACILITY 28 (26 cfs)	3381	FACILITY 27 (3358 cfs) + FACILITY 28 (23 cfs)	EXISTING 20' X 7.5' CONCRETE CHANNEL (CCRFCD FACILITY GOL3 0137)
29A	12	SECTION 15 (12)	12	SECTION 15 (12)	(2) - 10' TYPE "CMP, DI W/ 24" RCP
29B1	NUISANCE	-	NUISANCE	-	CAPPED 18" STUB
29B	12	FACILITY 29A (12)	12	FACILITY 29A (12)	24" RCP

OFFSITE FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} ULT (cfs)	TRIBUTARIES	DESIGN SLOPE (%)	FACILITY
1-10D	4	1-10D	0.5%	Unlined V-Ditch- 3:1/3:1 Side Slopes,1.5' Deep
1-13	1	1-13 (1 cfs)	0.5%	Conc. Rect. Channel- 3' BW, 1.5' Deep
1-14	4	1-13 (1 cfs) + 1-14A (3 cfs)	0.5%	Conc. Rect. Channel- 3' BW, 1.5' Deep

FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} INT (cfs)	INTERM TRIBUTARIES	Q_{100} ULT (cfs)	ULTIMATE TRIBUTARIES	FACILITY
20C	0	NA	7	1/2*12-F (14)	24" RCP CAPPED STUB
20D	20.5	FACILITY 29B (12) + 1/2 12-F (17)	19	FACILITY 29B (12) + 1/2*12-F (17)	24" RCP
29B	17	12-F	14	12-F	24" RCP W/ 4' DEEP SUMP
29F	6	SECTION 19A	4	SECTION 19A	(2) 5' TYPE "CMP, DI W/ 24" RCP
29G	35.5	FACILITY 29D(5.5) + FACILITY 29E (29.5) + FACILITY 29F (6)	30	FACILITY 29D(19) + FACILITY 29E (7) + FACILITY 29F (4)	24" RCP
29H1	8	SECTION 19B	8	SECTION 19B	(2) 5' TYPE "CMP, DI W/ 24" RCP
30	43	FACILITY 29H (8) + FACILITY 29G (35.5)	38	FACILITY 29H (8) + FACILITY 29G (30)	24" RCP
30A	3.5	1/2*Section 17 (7)	3.5	1/2*Section 17 (7)	12.5' TYPE "CMP, DI W/ 24" RCP
30A1	12	FACILITY 30A (3.5) + FACILITY 30B2 (8)	12	FACILITY 30A (3.5) + FACILITY 30B2 (8)	30" RCP
30B	4	12-H2	4	12-H2	NDOT TYPE 2 DI W/ 18" RCP
30B1	4	1/2*Section 17 (8)	4	1/2*Section 17 (8)	12.5' TYPE "CMP, DI
30B2	8	FACILITY 30B1 (4) + FACILITY 30B (4)	8	FACILITY 30B1 (4) + FACILITY 30B (4)	24" RCP
31C	55	FACILITY 30 (43) + FACILITY 30A1 (12)	50	FACILITY 30 (38) + FACILITY 30A1 (12)	36" RCP
31D	6	Section 16 (6)	3	Section 16 (3)	(2) - 15' TYPE "CMP, DI W/ 24" RCP
31E	61	FACILITY 31C (55) + FACILITY 31D (6)	53	FACILITY 31C (50) + FACILITY 31D (3)	EXISTING 36" RCP
32*	3459	FACILITY 29 (3401) + FACILITY 31 (58)	3435	FACILITY 29 (3382) + FACILITY 31 (53)	EXISTING 20'X7' RCB
E1	NUISANCE	-	NUISANCE	-	EXISTING 36" RCP
E2	958	CSV22-3**	958	CSV22-3**	EXISTING 17'W 7.5'-9'D CONCRETE CHANNEL (EX.CCRFCD FACILITY GOBE 0005)
E2	958	CSV22-3**	958	CSV22-3**	EXISTING 15'W 7.5'D CONCRETE CHANNEL (EX.CCRFCD FACILITY GOBE 0001)
E2	958	CSV22-3**	958	CSV22-3**	EXISTING 11'W 6.5'D CONCRETE CHANNEL (EX.CCRFCD FACILITY GOBE 0001)
E2	19	1-16 (5 cfs) + 1-17 (7 cfs) + 1-18 (7 cfs)	19	1-16 (5 cfs) + 1-17 (7 cfs) + 1-18 (7 cfs)	EXISTING 30" RCP
E3	3483	CPSB	3464	CPSB	MODIFIED DETENTION BASIN
E3	NUISANCE	-	NUISANCE	-	WATER QUALITY FEATURE
E3	NUISANCE	-	NUISANCE	-	6' WIDE LOW FLOW U-CHANNELS
E3	655	EXDB	653	EXDB	EXISTING 65" ORIFICE PLATE
E3	655	EXDB	653	EXDB	EXISTING 96" OUTFALL PIPE (EX.CCRFCD FACILITY GOL3 0115)
E3	17	NLMB***	-	-	EXISTING 8'X5' RCB

*FACILITIES TO BE CONSTRUCTED WITH OFFSITE IMPROVEMENTS PRIOR TO PHASE 1. SIZES REFERENCED FROM THE V36 OFFSITE STUDY.
**FLOW REFERENCED FROM THE 2015 MFU

% COMPLETE

REV	DATE	DESCRIPTION	DATE	ACEN. APP	DATE	CCW APP	DATE:

PROJECT NO. 764-204-013

DESIGN:
DRAWN:
CHECK:

PLOT DATE: 04-04-16
PLOT TIME: 11:26:01

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\Division\Exh\Figures\RTC-PHASE 1\Fig 7R-FACILITIES MAP.dwg
David Clark

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

FACILITIES MAP

DRAWING
FIG-7R
OF SHTS

HTE: 00-00000

Storm Drain Hydraulics Calculations

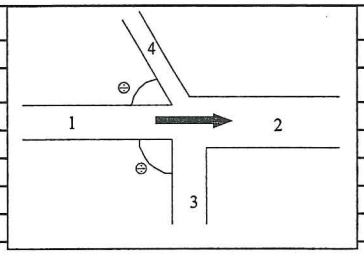
GCW, Inc. | Mainline 1 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																					EGL & HGL				COMMENTS		
																				PIPE	TRANSITION																											
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc		CONDUIT		TRANSITION		FULL/		
	FROM (ft)	TO (ft)	T/R	D (in)	SPAN (ft)	RISE (ft)	AREA (ft^2)	HYD RAD (ft)		D/S (ft)	U/S (ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft_f/ft)	(ft_f/ft)	H_f (ft)	H_f (ft)	Θ (deg)	K_{mh}	H_{mh} (ft)	Θ (deg)	K_j	H_j (ft)	Inlet/ Cont	K_i	H_c (ft)	Θ (deg)	K_o	H_o (ft)	R_{bend} (ft)	Θ (deg)	K_b	H_b (ft)	H_m (ft)	Total (ft)	U/S EGL	U/S HGL	U/S EGL	U/S HGL	PART FLOW	CRTL	MH
1		1000.00			8	7					3060.42																															3069.42	3067.42				
																															Outlet K_o=	1.0															
2	1000.00	1067.30	R		8	7			1	3060.42	3060.83	67.3	0.60%	56.00	0.0049	636	11.36	2.00	0.0043	0.0043	0.29																		0.00	3069.83	3067.83			FULL	D/S	
3	1067.30	1072.30	T	72					1	3060.83	3061.85	5.0	20.55%	28.27	0.0049	388	13.72	2.92	0.0084	0.0084		0.04	48	0.46	1.35	45	0.50	0.54												1.93			3071.76	3068.83	FULL	U/S	SDMH35
4	1072.30	1238.33	R	72					1	3061.85	3067.35	166.0	3.31%	28.27	0.0049	388	13.72	2.92	0.0084	0.0084	1.39																		0.00	3076.27	3073.35			PART	D/S	
5	1238.33	1243.33	T	72					1	3067.35	3067.66	5.0	6.25%	28.27	0.0049	388	13.72	2.92	0.0084	0.0084		0.04	28	0.22	0.64														0.69			3076.96	3074.03	FULL	U/S	SDMH34
6	1243.33	1481.18	R	72					1	3067.66	3082.84	237.9	6.38%	28.27	0.0049	388	13.72	2.92	0.0084	0.0084	2.00																		0.00	3091.76	3088.84			PART	D/S	
7	1481.18	1486.18	T	72					1	3082.84	3083.14	5.0	6.04%	28.27	0.0049	357	12.98	2.62	0.0075	0.0075		0.04	0	0.02	0.05	90	0.25	2.27												2.36			3094.12	3091.51	FULL	U/S	SDMH33
8	1486.18	1526.88	R	72					1	3083.14	3085.46	40.7	5.69%	28.27	0.0049	357	12.98	2.62	0.0075	0.0075	0.31																		0.00	3094.43	3091.81			FULL	U/S	
9	1526.88	1531.88	T	72					1	3085.46	3085.74	5.0	5.72%	28.27	0.0049	348	12.31	2.35	0.0068	0.0068		0.03	0	0.02	0.05													0.49	0.57			3095.00	3092.65	FULL	U/S	SDMH32
10	1531.88	1587.74	R	72					1	3085.74	3088.96	55.9	5.75%	28.27	0.0049	348	12.31	2.35	0.0068	0.0068	0.38																		0.00	3097.31	3094.96			PART	D/S	
11	1587.74	1592.74	T	72					1	3088.96	3089.23	5.0	5.41%	28.27	0.0049	348	12.31	2.35	0.0068	0.0068		0.03	0	0.02	0.05														0.08			3097.58	3095.23	FULL	D/S	SDMH31
12	1592.74	1813.03	R	72					1	3089.23	3100.37	220.3	5.06%	28.27	0.0049	348	12.31	2.35	0.0068	0.0068	1.49															805	16	0.11	0.25		0.25	3108.73	3106.37	3108.73	3106.37	PART	D/S	
13	1813.03	1818.03	T	72					1	3100.37	3100.57	5.0	4.03%	28.27	0.0049	348	12.31	2.35	0.0068	0.0068		0.03	0	0.02	0.05														0.08			3108.93	3106.57	FULL	D/S	SDMH30
14	1818.03	1939.92	R	72					1	3100.57	3104.23	121.9	2.99%	28.27	0.0049	348	12.31	2.35	0.0068	0.0068	0.82																		0.00	3112.58	3110.23			PART	D/S	
15	1939.92	1944.92	T	72					1	3104.23	3104.46	5.0	4.66%	28.27	0.0049	298	10.54	1.72	0.0050	0.0050		0.02	0	0.02	0.03	90	0.25	1.92												1.98			3114.56	3112.83	FULL	U/S	SDMH29
16	1944.92	2048.88	R	72					1	3104.46	3111.04	104.0	6.33%	28.27	0.0049	298	10.54	1.72	0.0050	0.0050	0.52																		0.00	3118.77	3117.04			PART	D/S	
17	2048.88	2053.88	T	72					1	3111.04	3111.34	5.0	5.99%	28.27	0.0049	298	10.54	1.72	0.0050	0.0050		0.02	0	0.02	0.03														0.06			3119.07	3117.34	FULL	D/S	SDMH28
18	2053.88	2217.04	R	72					1	3111.34	3120.56	163.2	5.65%	28.27	0.0049	298	10.54	1.72	0.0050	0.0050	0.81															595	16	0.11	0.18		0.18	3128.28	3126.56	3128.28	3126.56	PART	D/S	
19	2217.04	2222.04	T	72					1	3120.56	3120.79	5.0	4.67%	28.27	0.0049	298	10.54	1.72	0.0050	0.0050		0.02	0	0.02	0.03														0.06			3128.52	3126.79	FULL	D/S	SDMH27
20	2222.04	2254.96	R	72					1	3120.79	3121.01	32.9	0.65%	28.27	0.0049	298	10.54	1.72	0.0050	0.0050	0.16																		0.00	3128.73	3127.01			FULL	D/S	
21	2254.96	2259.96	T	66					1	3121.01	3121.67	5.0	13.33%	23.76	0.0049	246	10.35	1.66	0.0054	0.0054		0.03	90	1.33	2.21	88	0.27	1.28												3.52			3132.25	3130.58	FULL	U/S	SDMH26
22	2259.96	2359.34	R	66					1	3121.67	3124.63	99.4	2.97%	23.76	0.0049	246	10.35	1.66	0.0054	0.0054	0.53															530	11	0.09	0.15		0.15	3132.78	3131.12	3132.93	3131.26	FULL	U/S	
23	2359.34	2364.34	T	66					1	3124.63	3124.78	5.0	3.16%	23.76	0.0049	246	10.35	1.66	0.0054	0.0054		0.03	0	0.02	0.03														0.06			3132.99	3131.32	FULL	U/S	SDMH25
24	2364.34	2452.24	R	66					1	3124.78	3127.72	87.9	3.34%	23.76	0.0049	246	10.35	1.66	0.0054	0.0054	0.47															850	6	0.06	0.11		0.11	3134.88	3133.22	3134.88	3133.22	PART	D/S	
25	2452.24	2457.24	T	66					1	3127.72	3127.84	5.0	2.38%	23.76	0.0049	246	10.35	1.66	0.0054	0.0054		0.03	41	0.32	0.53														0.56			3135.44	3133.78	FULL	U/S	SDMH24
26	2457.24	2501.54	R	66					1	3127.84	3128.46	44.3	1.42%	23.76	0.0049	246	10.35	1.66	0.0054	0.0054	0.24																		0.00	3135.68	3134.01			FULL	U/S	
27	2501.54	2506.54	T	66					1	3128.46	3128.60	5.0	2.78%	23.76	0.0049	246	10.35	1.66	0.0054	0.0054		0.03	45	0.46	0.77														0.79			3136.47	3134.81	FULL	U/S	SDMH23
28	2506.54	2632.41	R	66					1	3128.60	3133.80	125.9	4.13%	23.76	0.0049	246	10.35	1.66	0.0054	0.0054	0.68																		0.00	3140.96	3139.30			PART	D/S	
29	2632.41	2637.41	T	66					1	3133.80	3133.95	5.0	3.15%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041		0.02	60	0.63	0.79	48	0.50	1.03												1.85			3142.81	3141.55	FULL	U/S	SDMH22
30	2637.41	2687.60	R	66					1	3133.95	3135.05	50.2	2.17%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041	0.20																		0.00	3143.01	3141.75			FULL	U/S	
31	2687.60	2692.60	T	66					1	3135.05	3135.12	5.0	1.58%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041		0.02	33	0.22	0.28														0.30			3143.31	3142.05	FULL	U/S	SDMH21
32	2692.60	2840.84	R	66					1	3135.12	3136.58	148.2	0.98%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041	0.60																		0.00	3143.91	3142.65			FULL	U/S	
33	2840.84	2845.84	T	66					1	3136.58	3136.63	5.0	0.99%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041		0.02	45	0.46	0.58														0.60			3144.51	3143.25	FULL	U/S	SDMH20
34	2845.84	2881.02	R	66					1	3136.63	3136.97	35.2	0.99%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041	0.14																		0.00	3144.66	3143.40			FULL	U/S	
35	2881.02	2886.02	T	66					1	3136.97	3137.02	5.0	1.00%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041		0.02	45	0.46	0.58														0.60			3145.26	3144.00	FULL	U/S	SDMH19
36	2886.02	3094.70	R	66					1	3137.02	3139.08	208.7	0.98%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041	0.85																		0.00	3146.10	3144.84			FULL	U/S	
37	3094.70	3099.70	T	66					1	3139.08	3139.13	5.0	1.14%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041		0.02	0	0.02	0.03														0.05			3146.15	3144.89	FULL	U/S	SDMH18
38	3099.70	3370.08	R	66					1	3139.13	3142.65	270.4	1.30%	23.76	0.0049	214	9.01	1.26	0.0041	0.0041	1.10															397	42	0.17	0.22		0.22	3149.41	3148.15	3149.41	3148.15	PART	D/S	
39	3370.08	3370.08	R	66					1	3142.65	3142.65	0.0		23.76	0.0049	214	9.01	1.26	0.0041	0.0041	0.00										Ki=	0.4	0.50								0.50			3149.91	3149.91	FULL	U/S	
40																																													
41																																													
42																																													
43																																													
44																																													
45																																													

Junction Head Loss Calculation

Known	
Diameter of Pipe 1 (in)	72.0
Diameter of Pipe 2 (in)	72.0
Diameter of Pipe 3 (in)	24.0
Diameter of Pipe 4 (in)*	24.0
Flow in Pipe 1 (cfs)	348
Flow in Pipe 2 (cfs)	367
Flow in Pipe 3 (cfs)	10
Flow in Pipe 4 (cfs)*	10
Angle of Pipe 3	48
Angle of Pipe 4*	60



*Optional

Headloss is applied at Entrance to Junction

Insert Loss in Misc. Loss Column and leave Junction Loss Column Blank

Solve For	
Area of Pipe 1 (ft^2)	28.27
Area of Pipe 2 (ft^2)	28.27
Area of Pipe 3 (ft^2)	3.14
Area of Pipe 4 (ft^2)	3.14
Head Loss at Junction (ft)	**0.49**

Equation Used:

Incorporates Pressure plus Momentum Laws

$$Hj=((Q_2^2/A_{2*g}-Q_1^2/A_{1*g}-Q_3^{2*}\cos(Ang3)/A_{3*g}-Q_4^{2*}\cos(Ang4)/A_{4*g})*2/(A_1+A_2)-D_1+D_2)$$

Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3060.42	3067.42	3069.42	3067.42	3090.00			22.58	22.58	OK	NO
2	1067.30	3060.825	3067.83	3069.83	3067.83	3089.50	SDMH35		21.67	21.67	OK	NO
3	1072.30	3061.853	3067.85	3071.76	3068.83	3089.50	SDMH35		20.67	21.65	OK	NO
4	1238.33	3067.347	3073.35	3076.27	3073.35	3081.50	SDMH34		8.15	8.15	OK	NO
5	1243.33	3067.66	3073.66	3076.96	3074.03	3081.50	SDMH34		7.47	7.84	OK	NO
6	1481.18	3082.841	3088.84	3091.76	3088.84	3097.00	SDMH33		8.16	8.16	OK	NO
7	1486.18	3083.142	3089.14	3094.12	3091.51	3097.00	SDMH33		5.49	7.86	OK	NO
8	1526.88	3085.458	3091.46	3094.43	3091.81	3099.60	SDMH32		7.79	8.14	OK	NO
9	1531.88	3085.744	3091.74	3095.00	3092.65	3099.60	SDMH32		6.95	7.86	OK	NO
10	1587.74	3088.956	3094.96	3097.31	3094.96	3103.10	SDMH31		8.14	8.14	OK	NO
11	1592.74	3089.227	3095.23	3097.58	3095.23	3103.10	SDMH31		7.87	7.87	OK	NO
12	1813.03	3100.374	3106.37	3108.73	3106.37	3114.50	SDMH30		8.13	8.13	OK	NO
13	1818.03	3100.575	3106.57	3108.93	3106.57	3114.50	SDMH30		7.93	7.93	OK	NO
14	1939.92	3104.225	3110.23	3112.58	3110.23	3119.30	SDMH29		9.07	9.07	OK	NO
15	1944.92	3104.458	3110.46	3114.56	3112.83	3119.30	SDMH29		6.47	8.84	OK	NO
16	2048.88	3111.042	3117.04	3118.77	3117.04	3125.20	SDMH28		8.16	8.16	OK	NO
17	2053.88	3111.341	3117.34	3119.07	3117.34	3125.20	SDMH28		7.86	7.86	OK	NO
18	2217.04	3120.559	3126.56	3128.28	3126.56	3134.70	SDMH27		8.14	8.14	OK	NO
19	2222.04	3120.792	3126.79	3128.52	3126.79	3134.70	SDMH27		7.91	7.91	OK	NO
20	2254.96	3121.008	3127.01	3128.73	3127.01	3136.10	SDMH26		9.09	9.09	OK	NO
21	2259.96	3121.674	3127.17	3132.25	3130.58	3136.10	SDMH26		5.52	8.93	OK	NO
22	2359.34	3124.626	3130.13	3132.93	3131.26	3138.70	SDMH25		7.44	8.57	OK	NO
23	2364.34	3124.784	3130.28	3132.99	3131.32	3138.70	SDMH25		7.38	8.42	OK	NO
24	2452.24	3127.717	3133.22	3134.88	3133.22	3141.80	SDMH24		8.58	8.58	OK	NO
25	2457.24	3127.836	3133.34	3135.44	3133.78	3141.80	SDMH24		8.02	8.46	OK	NO
26	2501.54	3128.465	3133.96	3135.68	3134.01	3142.50	SDMH23		8.49	8.54	OK	NO
27	2506.54	3128.603	3134.10	3136.47	3134.81	3142.50	SDMH23		7.69	8.40	OK	NO
28	2632.41	3133.797	3139.30	3140.96	3139.30	3147.90	SDMH22		8.60	8.60	OK	NO
29	2637.41	3133.954	3139.45	3142.81	3141.55	3147.90	SDMH22		6.35	8.45	OK	NO
30	2687.60	3135.046	3140.55	3143.01	3141.75	3149.10	SDMH21		7.35	8.55	OK	NO
31	2692.60	3135.125	3140.62	3143.31	3142.05	3149.10	SDMH21		7.05	8.48	OK	NO
32	2840.84	3136.576	3142.08	3143.91	3142.65	3150.60	SDMH20		7.95	8.52	OK	NO
33	2845.84	3136.625	3142.13	3144.51	3143.25	3150.60	SDMH20		7.35	8.47	OK	NO
34	2881.02	3136.974	3142.47	3144.66	3143.40	3151.00	SDMH19		7.60	8.53	OK	NO
35	2886.02	3137.025	3142.52	3145.26	3144.00	3151.00	SDMH19		7.00	8.48	OK	NO
36	3094.70	3139.076	3144.58	3146.10	3144.84	3153.10	SDMH18		8.26	8.52	OK	NO
37	3099.70	3139.133	3144.63	3146.15	3144.89	3153.10	SDMH18		8.21	8.47	OK	NO
38	3370.08	3142.65	3148.15	3149.41	3148.15	3157.00	FAC 9A		8.85	8.85	OK	NO
39	3370.08	3142.65	3148.15	3149.91	3149.91	3157.00	FAC 9A		7.09	8.85	OK	NO
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41												
42												
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45												
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Storm Drain Hydraulics Calculations

GCW, Inc. | Natural Rock Drive to DI#16 Lateral - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																								EGL & HGL				COMMENTS		
																					TRANSITION																														
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	PIPE		Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc					CONDUIT		TRANSITION		FULL/		
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD		D/S	U/S								S_f	Frict	Frict	Θ	K_{mh}	H_{mh}	Θ	K_t	H_t	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total					U/S	U/S	U/S	U/S	PART	CRTL	
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/s)	H_f (ft)	H_f (ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW		MH
1		1000.00		42							3123.60																			Outlet K_o=	1.0																		SDMH26
2	1000.00	1026.81	R	42					1	3123.60	3124.65	26.8	3.91%	9.62	0.0049	52	5.40	0.45	0.0027	0.0027	0.07																				0.00	3131.11	3130.65			FULL	U/S	
3	1026.81	1031.81	T	36					1	3124.65	3125.29	5.0	12.88%	7.07	0.0049	42	5.94	0.55	0.0040	0.0040		0.02	2	0.02	0.01	90	0.25	0.32												0.35			3131.45	3130.90	FULL	U/S	SDMH41
4	1031.81	1348.66	R	36					1	3125.29	3130.76	316.9	1.72%	7.07	0.0049	42	5.94	0.55	0.0040	0.0040	1.25														530	35	0.16	0.09		0.09	3134.31	3133.76	3134.31	3133.76	PART	D/S	
5	1348.66	1353.66	T	36					1	3130.76	3130.92	5.0	3.19%	7.07	0.0049	42	5.94	0.55	0.0040	0.0040		0.02	0	0.02	0.01														0.03			3134.46	3133.92	FULL	D/S	SDMH40
6	1353.66	1557.03	R	36					1	3130.92	3140.38	203.4	4.66%	7.07	0.0049	42	5.94	0.55	0.0040	0.0040	0.81																		0.00	3143.93	3143.38			PART	D/S	
7	1557.03	1562.03	T	36					1	3140.38	3140.68	5.0	6.00%	7.07	0.0049	42	5.94	0.55	0.0040	0.0040		0.02	90	1.33	0.73														0.75			3144.68	3144.13	FULL	U/S	SDMH39
8	1562.03	1715.03	R	36					1	3140.68	3151.92	153.0	7.34%	7.07	0.0049	42	5.94	0.55	0.0040	0.0040	0.61																		0.00	3155.46	3154.92			PART	D/S	
9	1715.03	1720.03	T	36					1	3151.92	3152.13	5.0	4.23%	7.07	0.0049	33	4.67	0.34	0.0024	0.0024		0.01	36	0.32	0.11	45	0.50	0.38												0.50			3155.96	3155.63	FULL	U/S	DI18
10	1720.03	1735.43	R	36					1	3152.13	3152.30	15.4	1.13%	7.07	0.0049	33	4.67	0.34	0.0024	0.0024	0.04																		0.00	3156.00	3155.66			FULL	U/S	
11	1735.43	1740.43	T	30					1	3152.30	3152.85	5.0	11.00%	4.91	0.0049	24	4.89	0.37	0.0034	0.0034		0.02	55	0.63	0.23	9	0.85	0.02												0.27			3156.28	3155.90	FULL	U/S	SDMH38
12	1740.43	1834.90	R	30					1	3152.85	3153.68	94.5	0.87%	4.91	0.0049	24	4.89	0.37	0.0034	0.0034	0.32																		0.00	3156.60	3156.23			FULL	U/S	
13	1834.90	1839.90	T	30					1	3153.68	3153.74	5.0	1.17%	4.91	0.0049	24	4.89	0.37	0.0034	0.0034		0.02	42	0.32	0.12														0.14			3156.73	3156.36	FULL	U/S	SDMH37
14	1839.90	1889.26	R	30					1	3153.74	3154.46	49.4	1.47%	4.91	0.0049	24	4.89	0.37	0.0034	0.0034	0.17																		0.00	3157.33	3156.96			FULL	D/S	
15	1889.26	1894.26	T	24					1	3154.46	3155.51	5.0	20.99%	3.14	0.0049	12	3.82	0.23	0.0028	0.0028		0.01	4	0.02	0.00	87	0.27	0.31												0.33			3157.74	3157.51	FULL	D/S	SDMH36
16	1894.26	1920.05	R	24					1	3155.51	3160.80	25.8	20.50%	3.14	0.0049	12	3.82	0.23	0.0028	0.0028	0.07																		0.00	3163.03	3162.80			PART	D/S	
17	1920.05	1920.05	R	24					1	3160.80	3160.80	0.0		3.14	0.0049	12	3.82	0.23	0.0028	0.0028	0.00		0	0.02	0.00				Ki=	0.4	0.09								0.10			3163.12	3163.12	FULL	U/S	DI16
18																																														

Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3123.6	3127.10	3131.03	3130.58	3136.10	SDMH28		5.52	9.00	OK	NO
2	1026.81	3124.649	3128.15	3131.11	3130.65	3136.00	SDMH41		5.35	7.85	OK	NO
3	1031.81	3125.293	3128.29	3131.45	3130.90	3136.00	SDMH41		5.10	7.71	OK	NO
4	1348.66	3130.757	3133.76	3134.31	3133.76	3141.80	SDMH40		8.04	8.04	OK	NO
5	1353.66	3130.917	3133.92	3134.46	3133.92	3141.80	SDMH40		7.88	7.88	OK	NO
6	1557.03	3140.384	3143.38	3143.93	3143.38	3151.50	SDMH39		8.12	8.12	OK	NO
7	1562.03	3140.684	3143.68	3144.68	3144.13	3151.50	SDMH39		7.37	7.82	OK	NO
8	1715.03	3151.917	3154.92	3155.46	3154.92	3161.10	DI18		6.18	6.18	OK	NO
9	1720.03	3152.128	3155.13	3155.96	3155.63	3161.10	DI18		5.47	5.97	OK	NO
10	1735.43	3152.302	3155.30	3156.00	3155.66	3161.90	SDMH38		6.24	6.60	OK	NO
11	1740.43	3152.852	3155.35	3156.28	3155.90	3161.90	SDMH38		6.00	6.55	OK	NO
12	1834.90	3153.678	3156.18	3156.60	3156.23	3164.20	SDMH37		7.97	8.02	OK	NO
13	1839.90	3153.737	3156.24	3156.73	3156.36	3164.20	SDMH37		7.84	7.96	OK	NO
14	1889.26	3154.463	3156.96	3157.33	3156.96	3165.00	SDMH36		8.04	8.04	OK	NO
15	1894.26	3155.513	3157.51	3157.74	3157.51	3165.00	SDMH36		7.49	7.49	OK	NO
16	1920.05	3160.8	3162.80	3163.03	3162.80	3165.30	DI16		2.50	2.50	OK	NO
17	1920.05	3160.8	3162.80	3163.12	3163.12	3165.30	DI16		2.18	2.50	OK	NO
18												
19												
20												
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Storm Drain Hydraulics Calculations

GCW, Inc. | Mainline 2 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																					EGL & HGL				COMMENTS		
																					PIPE	TRANSITION																											
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc			CONDUIT		TRANSITION		FULL/		
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD		D/S	U/S								S_r	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/ Cont	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S EGL	U/S HGL	U/S EGL	U/S HGL	PART FLOW	CRTL	MH
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)																		
1		1000.00		36							3032.84																		Outlet K_o=	1.0										3036.96	3035.84			
2	1000.00	1073.32	R	36					1	3032.84	3037.24	73.3	6.00%	7.07	0.0049	60	8.49	1.12	0.0081	0.0081	0.59																	0.00	3041.36	3040.24			PART	D/S	
3	1073.32	1078.32	T	24					1	3037.24	3038.42	5.0	23.50%	3.14	0.0049	54	17.19	4.59	0.0568	0.0568		0.28	6	0.05	0.23												1.42	1.93			3045.00	3040.42	PART	D/S	SDMH16
4	1078.32	1125.55	R	24					1	3038.42	3038.89	47.2	1.00%	3.14	0.0049	54	17.19	4.59	0.0568	0.0568	2.68																	0.00	3047.69	3043.10			FULL	U/S	
5	1125.55	1130.55	T	24					1	3038.89	3039.16	5.0	5.50%	3.14	0.0049	43	13.69	2.91	0.0360	0.0360		0.18	0	0.02	0.06	84	0.28	3.77										4.01			3051.70	3048.79	FULL	U/S	SDMH15
6	1130.55	1305.37	R	24					1	3039.16	3056.48	174.8	9.91%	3.14	0.0049	43	13.69	2.91	0.0360	0.0360	6.30															700	8	0.07	0.22		0.22	3061.39	3058.48	3061.39	3058.48	PART	D/S	
7	1305.37	1310.37	T	24					1	3056.48	3056.87	5.0	7.78%	3.14	0.0049	43	13.69	2.91	0.0360	0.0360		0.18	0	0.02	0.06													0.24			3061.78	3058.87	FULL	D/S	SDMH14
8	1310.37	1427.84	R	24					1	3056.87	3063.92	117.5	6.00%	3.14	0.0049	43	13.69	2.91	0.0360	0.0360	4.23															700	10	0.08	0.24		0.24	3068.83	3065.92	3068.83	3065.92	PART	D/S	
9	1427.84	1432.84	T	24					1	3063.92	3064.21	5.0	5.76%	3.14	0.0049	43	13.69	2.91	0.0360	0.0360		0.18	0	0.02	0.06													0.24			3069.12	3066.21	FULL	D/S	SDMH13
10	1432.84	1635.60	R	24					1	3064.21	3075.40	202.8	5.52%	3.14	0.0049	43	13.69	2.91	0.0360	0.0360	7.30															1700	7	0.07	0.20		0.20	3080.31	3077.40	3080.31	3077.40	PART	D/S	
11	1635.60	1640.60	T	24					1	3075.40	3075.70	5.0	5.97%	3.14	0.0049	35	11.14	1.93	0.0239	0.0239		0.12	0														1.92	2.04			3082.35	3080.42	FULL	U/S	SDMH12
12	1640.60	1873.09	R	24					1	3075.70	3090.63	232.5	6.42%	3.14	0.0049	35	11.14	1.93	0.0239	0.0239	5.55															1700	8	0.07	0.14		0.14	3094.56	3092.63	3094.56	3092.63	PART	D/S	
13	1873.09	1878.09	T	24					1	3090.63	3090.92	5.0	5.73%	3.14	0.0049	35	11.14	1.93	0.0239	0.0239		0.12	0	0.02	0.04													0.16			3094.84	3092.92	FULL	D/S	SDMH11
14	1878.09	2149.66	R	24					1	3090.92	3104.67	271.6	5.07%	3.14	0.0049	35	11.14	1.93	0.0239	0.0239	6.48															1700	9	0.08	0.15		0.15	3108.60	3106.67	3108.60	3106.67	PART	D/S	
15	2149.66	2154.66	T	24					1	3104.67	3104.92	5.0	4.86%	3.14	0.0049	35	11.14	1.93	0.0239	0.0239		0.12	0	0.02	0.04	90	0.25	1.45										1.60			3110.20	3108.28	FULL	U/S	SDMH10
16	2154.66	2336.83	R	24					1	3104.92	3113.38	182.2	4.65%	3.14	0.0049	35	11.14	1.93	0.0239	0.0239	4.35															450	24	0.13	0.25		0.25	3117.31	3115.38	3117.31	3115.38	PART	D/S	
17	2336.83	2341.83	T	24					1	3113.38	3113.68	5.0	5.96%	3.14	0.0049	20.5	6.53	0.66	0.0082	0.0082		0.04	0	0.02	0.01													0.05			3117.37	3116.70	FULL	U/S	SDMH9
18	2341.83	2590.18	R	24					1	3113.68	3131.72	248.4	7.26%	3.14	0.0049	20.5	6.53	0.66	0.0082	0.0082	2.03															450	32	0.15	0.10		0.10	3134.38	3133.72	3134.38	3133.72	PART	D/S	
19	2590.18	2595.18	T	24					1	3131.72	3132.09	5.0	7.42%	3.14	0.0049	20.5	6.53	0.66	0.0082	0.0082		0.04	0	0.02	0.01													0.05			3134.75	3134.09	FULL	D/S	SDMH8
20	2595.18	2801.64	R	24					1	3132.09	3147.71	206.5	7.57%	3.14	0.0049	20.5	6.53	0.66	0.0082	0.0082	1.69															350	35	0.16	0.10		0.10	3150.37	3149.71	3150.37	3149.71	PART	D/S	
21	2801.64	2806.64	T	24					1	3147.71	3148.07	5.0	7.27%	3.14	0.0049	20.5	6.53	0.66	0.0082	0.0082		0.04	0	0.02	0.01													0.05			3150.74	3150.07	FULL	D/S	SDMH7
22	2806.64	2897.63	R	24					1	3148.07	3154.43	91.0	6.98%	3.14	0.0049	20.5	6.53	0.66	0.0082	0.0082	0.74															467	12	0.09	0.06		0.06	3157.09	3156.43	3157.09	3156.43	PART	D/S	
23	2897.63	2902.63	T	24					1	3154.43	3154.64	5.0	4.30%	3.14	0.0049	12.0	3.82	0.23	0.0028	0.0028		0.01	0	0.02	0.00	90	0.25	0.60										0.62			3157.71	3157.48	FULL	U/S	SDMH6
24	2902.63	2996.07	R	24					1	3154.64	3156.15	93.4	1.62%	3.14	0.0049	12.0	3.82	0.23	0.0028	0.0028	0.26															250	18	0.11	0.03		0.03	3158.38	3158.15	3158.38	3158.15	FULL	D/S	
25	2996.07	3001.07	T	24					1	3156.15	3156.39	5.0	4.65%	3.14	0.0049	12	3.82	0.23	0.0028	0.0028		0.01	90	1.33	0.30	63	0.35	0.15										0.46			3158.84	3158.62	FULL	U/S	SDMH5
26	3001.07	3036.72	R	24					1	3156.39	3158.36	35.7	5.53%	3.14	0.0049	12	3.82	0.23	0.0028	0.0028	0.10																		0.00	3160.58	3160.36			PART	D/S	
27	3036.72	3041.72	T	18					1	3158.36	3159.05	5.0	13.92%	1.77	0.0049	6	3.40	0.18	0.0032	0.0032		0.02	48	0.46	0.08													0.10			3160.73	3160.55	FULL	D/S	SDMH4
28	3041.72	3072.17	R	18					1	3159.05	3165.80	30.4	22.15%	1.77	0.0049	6	3.40	0.18	0.0032	0.0032	0.10																		0.00	3167.48	3167.30			PART	D/S	
29	3072.17	3072.17	R	18					1	3165.80	3165.80	0.0		1.77	0.0049	6	3.40	0.18	0.0032	0.0032	0.00								Ki=	0.4	0.07								0.07			3167.55	3167.55	FULL	U/S	DI#5
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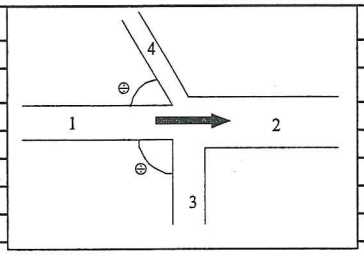
Junction Head Loss Calculation

Known	
Diameter of Pipe 1 (in)	30.0
Diameter of Pipe 2 (in)	36.0
Diameter of Pipe 3 (in)	24.0
Diameter of Pipe 4 (in)*	24.0
Flow in Pipe 1 (cfs)	40
Flow in Pipe 2 (cfs)	61
Flow in Pipe 3 (cfs)	11
Flow in Pipe 4 (cfs)*	11
Angle of Pipe 3	68
Angle of Pipe 4*	77



*Optional

Headloss is applied at Entrance to Junction

Solve For		Insert Loss in Misc. Loss Column and
Area of Pipe 1 (ft^2)	4.91	leave Junction Loss Column Blank
Area of Pipe 2 (ft^2)	7.07	
Area of Pipe 3 (ft^2)	3.14	
Area of Pipe 4 (ft^2)	3.14	
Head Loss at Junction (ft)	**1.42**	

Equation Used:

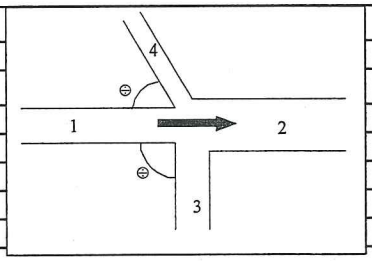
Incorporates Pressure plus Momentum Laws

$$Hj=((Q_2^2/A_{2*g}-Q_1^2/A_{1*g}-Q_3^{2*}\cos(Ang3)/A_{3*g}-Q_4^{2*}\cos(Ang4)/A_{4*g})*2/(A_1+A_2)-D_1+D_2)$$

Junction Head Loss Calculation

Known

Diameter of Pipe 1 (in)	24.0
Diameter of Pipe 2 (in)	24.0
Diameter of Pipe 3 (in)	24.0
Diameter of Pipe 4 (in)*	24.0
Flow in Pipe 1 (cfs)	35
Flow in Pipe 2 (cfs)	43
Flow in Pipe 3 (cfs)	4
Flow in Pipe 4 (cfs)*	4
Angle of Pipe 3	65
Angle of Pipe 4*	66



*Optional

Headloss is applied at Entrance to Junction

Insert Loss in Misc. Loss Column and leave Junction Loss Column Blank

Solve For	
Area of Pipe 1 (ft^2)	3.14
Area of Pipe 2 (ft^2)	3.14
Area of Pipe 3 (ft^2)	3.14
Area of Pipe 4 (ft^2)	3.14

Head Loss at Junction (ft) **1.92**

Equation Used:

Incorporates Pressure plus Momentum Laws

$$Hj=((Q_2^2/A_{2*g}-Q_1^2/A_{1*g}-Q_3^2*\cos(Ang3)/A_{3*g}-Q_4^2*\cos(Ang4)/A_{4*g})*2/(A_1+A_2)-D_1+D_2)$$

Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3032.84	3035.84	3036.96	3035.84	3047.00			11.16	11.16	OK	NO
2	1073.32	3037.24	3040.24	3041.36	3040.24	3052.80	SDMH16		12.56	12.56	OK	NO
3	1078.32	3038.415	3040.42	3045.00	3040.42	3052.80	SDMH16		12.39	12.39	OK	NO
4	1125.55	3038.885	3040.89	3047.69	3043.10	3056.00	SDMH15		12.90	15.12	OK	NO
5	1130.55	3039.16	3041.16	3051.70	3048.79	3056.00	SDMH15		7.21	14.84	OK	YES
6	1305.37	3056.481	3058.48	3061.39	3058.48	3066.80	SDMH14		8.32	8.32	OK	NO
7	1310.37	3056.87	3058.87	3061.78	3058.87	3066.80	SDMH14		7.93	7.93	OK	NO
8	1427.84	3063.92	3065.92	3068.83	3065.92	3074.10	SDMH13		8.18	8.18	OK	NO
9	1432.84	3064.208	3066.21	3069.12	3066.21	3074.10	SDMH13		7.89	7.89	OK	NO
10	1635.60	3075.402	3077.40	3080.31	3077.40	3086.60	SDMH12		9.20	9.20	OK	NO
11	1640.60	3075.701	3077.70	3082.35	3080.42	3086.60	SDMH12		6.18	8.90	OK	NO
12	1873.09	3090.63	3092.63	3094.56	3092.63	3100.80	SDMH11		8.17	8.17	OK	NO
13	1878.09	3090.917	3092.92	3094.84	3092.92	3100.80	SDMH11		7.88	7.88	OK	NO
14	2149.66	3104.673	3106.67	3108.60	3106.67	3114.80	SDMH10		8.13	8.13	OK	NO
15	2154.66	3104.916	3106.92	3110.20	3108.28	3114.80	SDMH10		6.52	7.88	OK	NO
16	2336.83	3113.384	3115.38	3117.31	3115.38	3123.50	SDMH9		8.12	8.12	OK	NO
17	2341.83	3113.682	3115.68	3117.37	3116.70	3123.50	SDMH9		6.80	7.82	OK	NO
18	2590.18	3131.719	3133.72	3134.38	3133.72	3141.90	SDMH8		8.18	8.18	OK	NO
19	2595.18	3132.089	3134.09	3134.75	3134.09	3141.90	SDMH8		7.81	7.81	OK	NO
20	2801.64	3147.711	3149.71	3150.37	3149.71	3157.90	SDMH7		8.19	8.19	OK	NO
21	2806.64	3148.075	3150.07	3150.74	3150.07	3157.90	SDMH7		7.83	7.83	OK	NO
22	2897.63	3154.426	3156.43	3157.09	3156.43	3164.60	SDMH6		8.17	8.17	OK	NO
23	2902.63	3154.641	3156.64	3157.71	3157.48	3164.60	SDMH6		7.12	7.96	OK	NO
24	2996.07	3156.155	3158.15	3158.38	3158.15	3169.20	SDMH5		11.05	11.05	OK	NO
25	3001.07	3156.387	3158.39	3158.84	3158.62	3169.20	SDMH5		10.58	10.81	OK	NO
26	3036.72	3158.358	3160.36	3160.58	3160.36	3169.10	SDMH4		8.74	8.74	OK	NO
27	3041.72	3159.054	3160.55	3160.73	3160.55	3169.10	SDMH4		8.55	8.55	OK	NO
28	3072.17	3165.8	3167.30	3167.48	3167.30	3170.32	DI#5				OK	NO
29	3072.17	3165.8	3167.30	3167.55	3167.55	3170.19	DI#5				OK	NO
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Storm Drain Hydraulics Calculations

G.C. Wallace, Inc. | Desert Hope Drive DI #9 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																				EGL & HGL				COMMENTS		
																				PIPE	TRANSITION																										
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc			CONDUIT		TRANSITION		FULL/		
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD		D/S	U/S										S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL	Design Node(s)
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	H_f (ft)	H_f (ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW		
1		1000.00									3038.39																					Outlet K_o=	1.0													3040.25	3040.24			SDMH #16
2	1000.00	1023.41	R	24					1	3038.39	3043.20	23.4	20.54%	3.14	0.0049	3	0.95	0.01	0.0002	0.0002	0.00																			0.00	3045.21	3045.20			PART	D/S	DI #9
3	1023.41	1023.41	R	24					1	3043.20	3043.20	0.0		3.14	0.0049	3	0.95	0.01	0.0002	0.0002	0.00									Ki=	0.4	0.01								0.01			3045.22	3045.22	FULL	U/S	
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Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3038.39	3038.39	3040.25	3040.24	3052.80	SDMH #16		12.56	14.41	OK	NO
2	1023.41	3043.198	3045.20	3045.21	3045.20	3052.70	DI #9		7.50	7.50	OK	NO
3	1023.41	3043.198	3045.20	3045.22	3045.22	3052.70			7.48	7.50	OK	NO
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Storm Drain Hydraulics Calculations

GCW, Inc. | Desert Hope Drive DI #10 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																					EGL & HGL				COMMENTS	
																				PIPE	TRANSITION																									
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc		CONDUIT		TRANSITION		FULL/		
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD		D/S	U/S								S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL	MH
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW		
1		1000.00									3038.39																			Outlet K_o=	1.0											3040.25	3040.24			SDMH #16
2	1000.00	1022.66	R	24					1	3038.39	3043.20	22.7	21.22%	3.14	0.0049	3	0.95	0.01	0.0002	0.0002	0.00																		0.00	3045.21	3045.20			PART	D/S	
3	1022.66	1022.66	R	24					1	3043.20	3043.20	0.0		3.14	0.0049	3	0.95	0.01	0.0002	0.0002	0.00						Ki=	0.4	0.01									0.01			3045.22	3045.22	FULL	U/S	DI #10
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Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3038.39	3038.39	3040.25	3040.24	3052.80	SDMH #16		12.56	14.41	OK	NO
2	1022.66	3043.198	3045.20	3045.21	3045.20	3052.69	DI #10		7.49	7.49	OK	NO
3	1022.66	3043.198	3045.20	3045.22	3045.22	3052.69			7.47	7.49	OK	NO
4												
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Storm Drain Hydraulics Calculations

GCW, Inc. | Desert Hope Drive DI#30 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																					EGL & HGL				COMMENTS		
																				PIPE	TRANSITION																											
	STATION			PIPE	BOX		IRREG			INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc			CONDUIT		TRANSITION		FULL/		
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD	#	D/S	U/S								S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_t	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL	MH
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	H_f (ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)			(ft)	EGL	HGL	EGL	HGL	FLOW		
1		1000.00									3075.54																				Outlet K_o=	1.0									3080.45	3080.42			SDMH#12
2	1000.00	1024.14	R	24					1	3075.54	3077.20	24.1	6.88%	3.14	0.0049	4	1.27	0.03	0.0003	0.0003	0.01																	0.00	3080.45	3080.43			FULL	U/S	DI#30
3	1024.14	1024.14	R	24					1	3077.20	3077.20	0.0		3.14	0.0049	4	1.27	0.03	0.0003	0.0003	0.00							Ki=	0.4	0.01								0.01			3080.46	3080.46	FULL	U/S	DI#30
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Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3075.54	3075.54	3080.45	3080.42	3086.60	SDMH#12		6.18	11.06	OK	NO
2	1024.14	3077.2	3079.20	3080.45	3080.43	3086.62	DI#30		6.19	7.42	OK	NO
3	1024.14	3077.2	3079.20	3080.46	3080.46	3086.62			6.16	7.42	OK	NO
4												
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Storm Drain Hydraulics Calculations

GCW, Inc. | Desert Hope Drive DI#31 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																					EGL & HGL				COMMENTS		
																				PIPE	TRANSITION																											
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc			CONDUIT		TRANSITION		FULL/		
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD		D/S	U/S									S_r	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_e	H_e	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL	MH
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW		
1		1000.00									3075.54																			Outlet K_e=	1.0												3080.45	3080.42			SDMH#12
2	1000.00	1024.19	R	24					1	3075.54	3082.00	24.2	26.71%	3.14	0.0049	4	1.27	0.03	0.0003	0.0003	0.01																		0.00	3084.03	3084.00			PART	D/S	DI#31
3	1024.19	1024.19	R	24					1	3082.00	3082.00	0.0		3.14	0.0049	4	1.27	0.03	0.0003	0.0003	0.00								Ki=	0.4	0.01									0.01			3084.04	3084.04	FULL	U/S	DI#31
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Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3075.54	3075.54	3080.45	3080.42	3086.60	SDMH#12		6.18	11.06	OK	NO
2	1024.19	3082	3084.00	3084.03	3084.00	3086.62	DI#31		2.62	2.62	OK	NO
3	1024.19	3082	3084.00	3084.04	3084.04	3086.62			2.58	2.62	OK	NO
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Storm Drain Hydraulics Calculations

GCW, Inc. | Desert Hope Drive DI#28 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																								EGL & HGL				COMMENTS		
																				PIPE	TRANSITION																														
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend			Misc			CONDUIT		TRANSITION		FULL/		
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD		D/S	U/S									S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL	
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(deg)		(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW		MH
1		1000.00									3112.63																					Outlet K_o=	1.0											3117.33	3116.70			SDMH9
2	1000.00	1017.00	R	24					1	3112.63	3113.48	17.0	5.04%	3.14	0.0049	20	6.37	0.63	0.0078	0.0078	0.13																	0.00	3117.46	3116.83			FULL	U/S	
3	1017.00	1022.00	T	24					1	3113.48	3113.62	5.0	2.79%	3.14	0.0049	17	5.41	0.45	0.0056	0.0056		0.03															0.03			3117.49	3117.04	FULL	U/S	DI28
4	1022.00	1064.50	R	24					1	3113.62	3113.84	42.5	0.50%	3.14	0.0049	17	5.41	0.45	0.0056	0.0056	0.24																	0.00	3117.73	3117.27			FULL	U/S	
5	1064.50	1062.00	R	24					1	3113.84	3113.84	2.5	0.00%	3.14	0.0049	17	5.41	0.45	0.0056	0.0056	0.01																	0.00	3117.74	3117.29			FULL	U/S	
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Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3112.626	3112.63	3117.33	3116.70	3123.50	SDMH #9		6.80	10.87	OK	NO
2	1017.00	3113.483	3115.48	3117.46	3116.83	3122.97			6.14	7.49	OK	NO
3	1022.00	3113.623	3115.62	3117.49	3117.04	3122.97	DI28		5.93	7.35	OK	NO
4	1064.50	3113.835	3115.84	3117.73	3117.27	3120.50			3.23	4.66	OK	NO
5	1062.00	3113.835	3115.84	3117.74	3117.29	3120.50			3.21	4.66	OK	NO
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Storm Drain Hydraulics Calculations

GCW, Inc. | Desert Hope Drive DI#29 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																			EGL & HGL				COMMENTS		
																				PIPE	TRANSITION																								
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc			CONDUIT		TRANSITION		FULL/	
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD		D/S	U/S									S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total					PART	CRTL
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	H_f (ft)	(ft)	(deg)		(ft)	(ft)	(deg)			Cont		(ft)	(deg)		(ft)	(ft)	(deg)		(ft)	(ft)	(ft)	(ft)	U/S EGL	U/S HGL	U/S EGL	U/S HGL	FLOW		MH
1		1000.00									3112.50																			Outlet K_o=		1.0											3116.71	3116.70			SDHM9
2	1000.00	1022.00	R	24					1	3112.50	3118.50	22.0	27.27%	3.14	0.0049	3	0.95	0.01	0.0002	0.0002	0.00																		0.00	3120.51	3120.50			PART	D/S	DI#29
3	1022.00	1022.00	R	24					1	3118.50	3118.50	0.0		3.14	0.0049	3	0.95	0.01	0.0002	0.0002	0.00								Ki=	0.4	0.01									0.01			3120.52	3120.52	FULL	U/S	DI#29
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Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3112.5	3112.50	3116.71	3116.70	3123.50	SDMH #9		6.80	11.00	OK	NO
2	1022.00	3118.5	3120.50	3120.51	3120.50	3123.50	DI#29		3.00	3.00	OK	NO
3	1022.00	3118.5	3120.50	3120.52	3120.52	3123.50	DI#29		2.98	3.00	OK	NO
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Storm Drain Hydraulics Calculations

GCW, Inc. | Reverence Parkway DI #6 - Interim Conditions | DATE 04/01/16 | FILE: SF6.xls

Storm Drain Manning's n (typ=0.013)= 0.013 | Inlet Structure Type or K_i= d | Headwall:Square Edge (cut concrete and CMP)

	CONDUIT DATA										FLOW DATA									ENERGY LOSS DATA																						EGL & HGL				COMMENTS		
																				PIPE	TRANSITION																												
	STATION			PIPE	BOX		IRREG		#	INVERT ELEV	L	S	A	Φ	Q	V	V2/2g	Sf	Ave.	Frict	Frict	Manhole			Junction			Contraction/ Inlet			Expansion/Outlet			Bend				Misc		CONDUIT		TRANSITION		FULL/		
	FROM	TO	T/R	D	SPAN	RISE	AREA	HYD RAD		D/S	U/S									S_f	H_f	H_f	Θ	K_{mh}	H_{mh}	Θ	K_j	H_j	Inlet/	K_i	H_c	Θ	K_o	H_o	R_{bend}	Θ	K_b	H_b	H_m	Total	U/S	U/S	U/S	U/S	PART	CRTL	MH
	(ft)	(ft)		(in)	(ft)	(ft)	(ft^2)	(ft)		(ft)	(ft)	(ft)	(%)	(ft^2)		(cfs)	(ft/s)	(ft)	(ft/ft)	(ft/ft)	(ft)	(ft)	(deg)		(ft)	(deg)		(ft)	Cont		(ft)	(deg)		(ft)	(deg)		(ft)	(ft)	(ft)	EGL	HGL	EGL	HGL	FLOW		
1		1000.00								3158.50																			Outlet K_o=	1.0												3160.73	3160.55			SDMH#4
2	1000.00	1059.97	R	18					1	3158.50	3158.80	60.0	0.50%	1.77	0.0049	6	3.40	0.18	0.0032	0.0032	0.19																		0.00	3160.92	3160.74			FULL	U/S	DI#6
3	1059.97	1059.97	R	18					1	3158.80	3158.80	0.0		1.77	0.0049	6	3.40	0.18	0.0032	0.0032	0.00								Ki=	0.4	0.07									0.07			3161.00	3161.00	FULL	U/S	DI#6
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Summary of Results

	STATION	INVERT	SOFFIT	EGL	HGL	(Optional) GRADE	(Optional) LOCATION	(Optional) DESCRIPTION	Freeboard	Cover	HGL with respect to FG	Pressure Gasket Required?
1	1000.00	3158.5	3158.50	3160.73	3160.55	3169.60	SDMH#4		9.05	11.10	OK	NO
2	1059.97	3158.8	3160.30	3160.92	3160.74	3168.21	DI#6		7.47	7.91	OK	NO
3	1059.97	3158.8	3160.30	3161.00	3161.00	3168.21			7.21	7.91	OK	NO
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Worksheet for Cross Section 16A -Interim

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	7.67	%
Discharge	8.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.48
0+01	0.00
0+02	0.13
0+02	0.17
0+22	0.57
0+42	0.17
0+42	0.13
0+44	0.00
0+44	0.48
0+44	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+44, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.30	ft
Elevation Range	0.00 to 0.57 ft	

Worksheet for Cross Section 16A -Interim

Results

Flow Area	1.52	ft²
Wetted Perimeter	16.52	ft
Hydraulic Radius	0.09	ft
Top Width	15.83	ft
Normal Depth	0.30	ft
Critical Depth	0.40	ft
Critical Slope	0.00748	ft/ft
Velocity	5.25	ft/s
Velocity Head	0.43	ft
Specific Energy	0.73	ft
Froude Number	2.98	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.30	ft
Critical Depth	0.40	ft
Channel Slope	7.67	%
Critical Slope	0.00748	ft/ft

Cross Section for Cross Section 16A -Interim

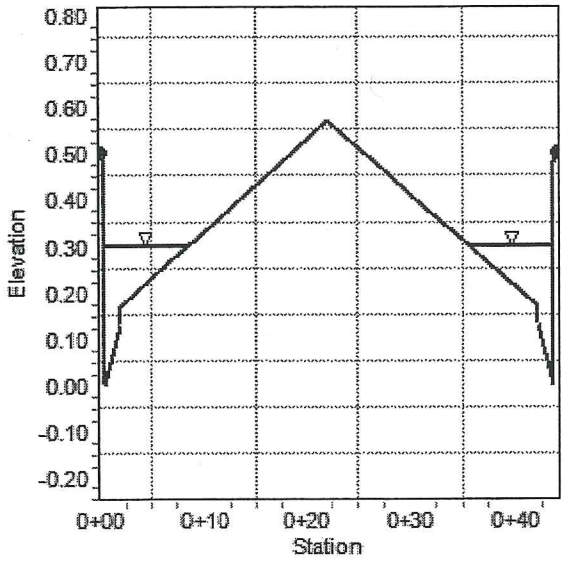
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	7.67	%
Normal Depth	0.30	ft
Discharge	8.00	ft³/s

Cross Section Image



Worksheet for Cross Section 16B -Interim

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Discharge	13.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.48
0+01	0.00
0+02	0.13
0+02	0.17
0+22	0.57
0+42	0.17
0+42	0.13
0+44	0.00
0+44	0.48
0+44	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+44, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.35	ft
Elevation Range	0.00 to 0.57 ft	

Worksheet for Cross Section 16B -Interim

Results

Flow Area	2.45	ft²
Wetted Perimeter	21.67	ft
Hydraulic Radius	0.11	ft
Top Width	20.88	ft
Normal Depth	0.35	ft
Critical Depth	0.46	ft
Critical Slope	0.00701	ft/ft
Velocity	5.31	ft/s
Velocity Head	0.44	ft
Specific Energy	0.79	ft
Froude Number	2.73	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.46	ft
Channel Slope	6.00	%
Critical Slope	0.00701	ft/ft

Cross Section for Cross Section 16B -Interim

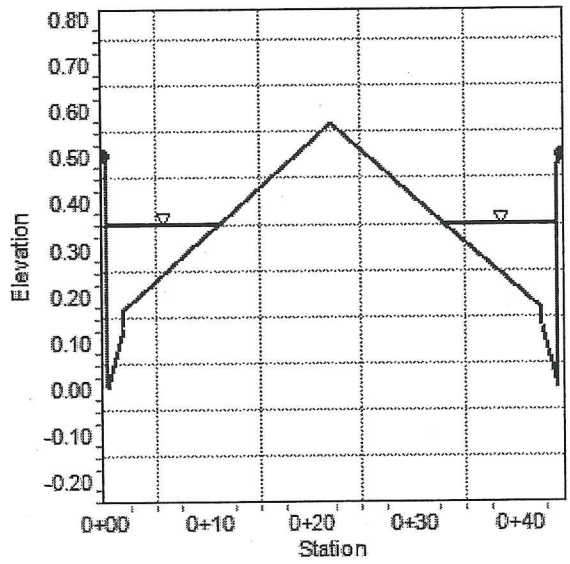
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Normal Depth	0.35	ft
Discharge	13.00	ft³/s

Cross Section Image



Worksheet for Cross Section 16 - Interim

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Discharge	7.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.48
0+01	0.00
0+02	0.13
0+02	0.17
0+22	0.57
0+42	0.17
0+42	0.13
0+44	0.00
0+44	0.48
0+44	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+44, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.30	ft
Elevation Range	0.00 to 0.57 ft	

Worksheet for Cross Section 16 - Interim

Results

Flow Area		1.51	ft²
Wetted Perimeter		16.44	ft
Hydraulic Radius		0.09	ft
Top Width		15.75	ft
Normal Depth		0.30	ft
Critical Depth		0.39	ft
Critical Slope		0.00761	ft/ft
Velocity		4.63	ft/s
Velocity Head		0.33	ft
Specific Energy		0.63	ft
Froude Number		2.64	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.30	ft
Critical Depth	0.39	ft
Channel Slope	6.00	%
Critical Slope	0.00761	ft/ft

Cross Section for Cross Section 16 - Interim

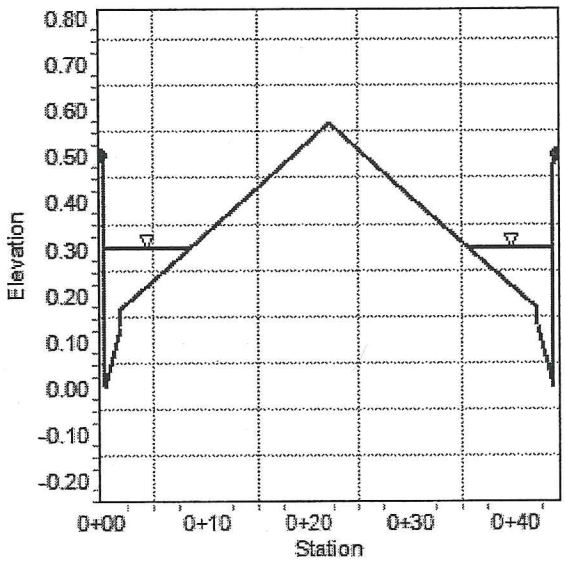
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Normal Depth	0.30	ft
Discharge	7.00	ft³/s

Cross Section Image



Worksheet for Cross Section 16A - Ultimate

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	7.67	%
Discharge	4.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.48
0+01	0.00
0+02	0.13
0+02	0.17
0+22	0.57
0+42	0.17
0+42	0.13
0+44	0.00
0+44	0.48
0+44	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+44, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.25	ft
Elevation Range	0.00 to 0.57 ft	

Worksheet for Cross Section 16A - Ultimate

Results

Flow Area		0.87	ft²
Wetted Perimeter		11.58	ft
Hydraulic Radius		0.08	ft
Top Width		10.98	ft
Normal Depth		0.25	ft
Critical Depth		0.33	ft
Critical Slope		0.00819	ft/ft
Velocity		4.58	ft/s
Velocity Head		0.33	ft
Specific Energy		0.58	ft
Froude Number		2.86	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.33	ft
Channel Slope	7.67	%
Critical Slope	0.00819	ft/ft

Cross Section for Cross Section 16A - Ultimate

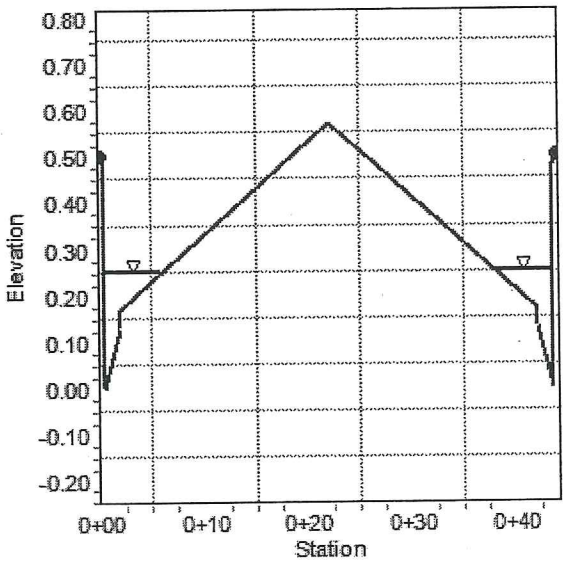
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	7.67	%
Normal Depth	0.25	ft
Discharge	4.00	ft³/s

Cross Section Image



Worksheet for Cross Section 16B - Ultimate

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Discharge	10.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.48
0+01	0.00
0+02	0.13
0+02	0.17
0+22	0.57
0+42	0.17
0+42	0.13
0+44	0.00
0+44	0.48
0+44	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+44, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.33	ft
Elevation Range	0.00 to 0.57 ft	

Worksheet for Cross Section 16B - Ultimate

Results

Flow Area		2.00	ft²
Wetted Perimeter		19.34	ft
Hydraulic Radius		0.10	ft
Top Width		18.60	ft
Normal Depth		0.33	ft
Critical Depth		0.43	ft
Critical Slope		0.00726	ft/ft
Velocity		5.00	ft/s
Velocity Head		0.39	ft
Specific Energy		0.71	ft
Froude Number		2.69	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.43	ft
Channel Slope	6.00	%
Critical Slope	0.00726	ft/ft

Cross Section for Cross Section 16B - Ultimate

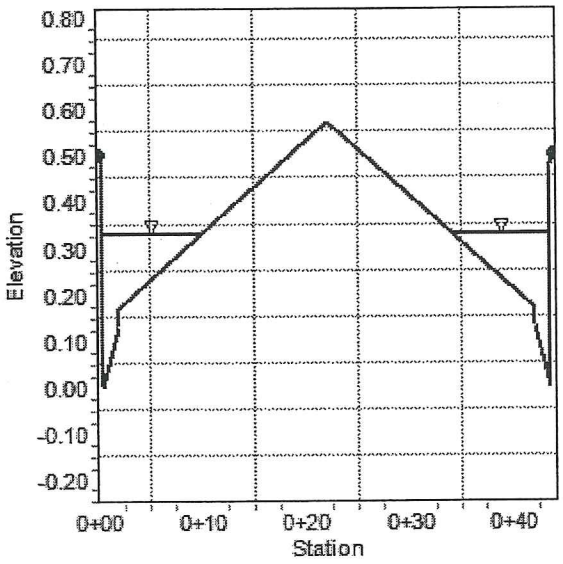
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Normal Depth	0.33	ft
Discharge	10.00	ft³/s

Cross Section Image



Worksheet for Cross Section 16 Ultimate

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Discharge	5.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.48
0+01	0.00
0+02	0.13
0+02	0.17
0+22	0.57
0+42	0.17
0+42	0.13
0+44	0.00
0+44	0.48
0+44	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+44, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.27	ft
Elevation Range	0.00 to 0.57 ft	

Worksheet for Cross Section 16 Ultimate

Results

Flow Area		1.15	ft²
Wetted Perimeter		13.94	ft
Hydraulic Radius		0.08	ft
Top Width		13.30	ft
Normal Depth		0.27	ft
Critical Depth		0.35	ft
Critical Slope		0.00796	ft/ft
Velocity		4.33	ft/s
Velocity Head		0.29	ft
Specific Energy		0.56	ft
Froude Number		2.59	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.27	ft
Critical Depth	0.35	ft
Channel Slope	6.00	%
Critical Slope	0.00796	ft/ft

Cross Section for Cross Section 16 Ultimate

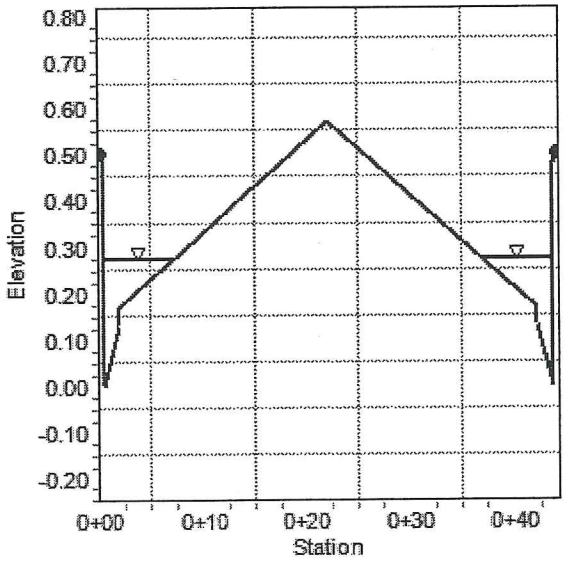
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Normal Depth	0.27	ft
Discharge	5.00	ft³/s

Cross Section Image



Type CM Drop Inlet Sizing on a C. G.

SECTION 16A

Known:

Q_s=	Half Street Flow	4	cfs
S_o=	Longitudinal Slope	0.0767	ft/ft
n=	Manning's Roughness Coefficient	0.016	
V_s=	Flow Velocity	5.25	fps
D=	Flow Depth	0.3	ft
S_x=	Street Transverse Slope	0.02	ft/ft
W=	Gutter Width	2	ft
a=	Gutter Depression	5.0	in
L_g=	Length of Grate	2.5	ft
L_c=	Length of Curb Opening	4.5	ft
C_{fg}=	Clogging Factor for Grate	50	%
C_{fc}=	Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

R_f=	Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	0.98	
	V_o= Splash over velocity=$p+q*(L_g*(1-(C_{fg}/100)))-r*(L_g*(1-(C_{fg}/100)))^2+s*(L_g*(1-(C_{fg}/100)))^3$†	5.02	fps
E_o=	Grate flow ratio = Q_w/Q_s	0.68	
	Q_w= Frontal flow=A_w*V_s	2.71	cfs
	Q_x= Side flow = Q_s-Q_w	1.29	cfs
R_s=	Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*(L_g*(1-C_{fg}/100))^{2.3}))$	0.01	
Q_{ig}=	Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	2.7	cfs
	†p=1.76;q=3.12;r=0.45;s=0.03 (based on Bar P 1-1/8 grate)		

Curb Opening Capacity Calculations

S_e=	Equivalent cross slope = Sx+Sw*Eo	0.165	ft/ft
S_w=	Gutter cross slope = (0.137+afeet)/W	0.214	ft/ft
L_t=	Total interception $L = 0.60*Q_s^{0.42}*So^{0.30}*(1/n*S_e)^{0.6}$	17.51	ft
Q_{ic}=	Flow intercepted = $(1-(1-(L_c*(1-C_{fc}/100))/L_t)^{1.8})*Q_s$	0.9	cfs

Total Inlet Calculations

Q_{ti}=	Total flow intercepted = $Q_{ig}+Q_{ic}$	3.5	cfs
Q_{tq}=	Flow bypass = Q_s-Q_{ti}	0.5	cfs
q=	Interception per unit ratio = Q_{ti}/L_g	0.79	cfs/ft
E_q=	Efficiency = (Qti/Qs)*100	89	%

Type CM Drop Inlet Sizing on a C. G.

SECTION 16B

Known:

Q_s= Half Street Flow	6.5	cfs
S_o= Longitudinal Slope	0.06	ft/ft
n= Manning's Roughness Coefficient	0.016	
V_s= Flow Velocity	5.31	fps
D= Flow Depth	0.35	ft
S_x= Street Transverse Slope	0.02	ft/ft
W= Gutter Width	2	ft
a= Gutter Depression	5.0	in
L_g= Length of Grate	2.5	ft
L_c= Length of Curb Opening	4.5	ft
C_{fg}= Clogging Factor for Grate	50	%
C_{fc}= Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

R_f= Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	0.97
V_o= Splash over velocity=$p+q*(L_g*(1-(C_{fg}/100)))-r*(L_g*(1-(C_{fg}/100)))^2+s*(L_g*(1-(C_{fg}/100)))^3$†	5.02 fps
E_o= Grate flow ratio = Q_w/Q_s	0.50
Q_w= Frontal flow=A_w*V_s	3.27 cfs
Q_x= Side flow = Q_s-Q_w	3.23 cfs
R_s= Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*(L_g*(1-C_{fg}/100))^{2.3}))$	0.01
Q_{ig}= Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	3.2 cfs
†p=1.76;q=3.12;r=0.45;s=0.03 (based on Bar P 1-1/8 grate)	

Curb Opening Capacity Calculations

S_e= Equivalent cross slope = Sx+Sw*Eo	0.128 ft/ft
S_w= Gutter cross slope = (0.137+afeet)/W	0.214 ft/ft
L_t= Total interception L = $0.60*Q_s^{0.42}*So^{0.30}*(1/n*S_e)^{0.6}$	23.26 ft
Q_{ic}= Flow intercepted = $(1-(1-(L_c*(1-C_{fc}/100))/L_t)^{1.8})*Q_s$	1.1 cfs

Total Inlet Calculations

Q_{ti}= Total flow intercepted = $Q_{ig}+Q_{ic}$	4.3 cfs
Q_{tq}= Flow bypass = Q_s-Q_{ti}	2.2 cfs
q= Interception per unit ratio = Q_{ti}/L_g	0.96 cfs/ft
E_q= Efficiency = (Qti/Qs)*100	66 %

Type CM Drop Inlet Sizing on a C. G.

SECTION 16

Known:

Q_s=	Half Street Flow	3.5	cfs
S_o=	Longitudinal Slope	0.06	ft/ft
n=	Manning's Roughness Coefficient	0.016	
V_s=	Flow Velocity	4.33	fps
D=	Flow Depth	0.27	ft
S_x=	Street Transverse Slope	0.02	ft/ft
W=	Gutter Width	2	ft
a=	Gutter Depression	5.0	in
L_g=	Length of Grate	2.5	ft
L_c=	Length of Curb Opening	4.5	ft
C_{fg}=	Clogging Factor for Grate	50	%
C_{fc}=	Clogging Factor for Curb Opening	50	%

Grate Capacity Calculations:

R_f=	Frontal flow factor = $1-0.09*(V_s-V_o)$ if $V_s>V_o$; else $R_f=1$	1.00	
	V_o= Splash over velocity=$p+q*(L_g*(1-(C_{fg}/100)))-r*(L_g*(1-(C_{fg}/100)))^2+s*(L_g*(1-(C_{fg}/100)))^3$†	5.02	fps
E_o=	Grate flow ratio = Q_w/Q_s	0.56	
	Q_w= Frontal flow=A_w*V_s	1.98	cfs
	Q_x= Side flow = Q_s-Q_w	1.52	cfs
R_s=	Side flow factor = $1/(1+(0.15*V_s^{1.8})/(S_x*(L_g*(1-C_{fg}/100))^{2.3}))$	0.02	
Q_{ig}=	Flow intercepted = $[R_f*E_o+R_s*(1-E_o)]*Q_s$	2.0	cfs
	†p=1.76;q=3.12;r=0.45;s=0.03 (based on Bar P 1-1/8 grate)		

Curb Opening Capacity Calculations

S_e=	Equivalent cross slope = Sx+Sw*Eo	0.141	ft/ft
S_w=	Gutter cross slope = (0.137+afeet)/W	0.214	ft/ft
L_t=	Total interception L = $0.60*Q_s^{0.42}*So^{0.30}*(1/n*S_e)^{0.6}$	16.91	ft
Q_{ic}=	Flow intercepted = $(1-(1-(L_c*(1-C_{fc}/100))/L_t)^{1.8})*Q_s$	0.8	cfs

Total Inlet Calculations

Q_{ti}=	Total flow intercepted = $Q_{ig}+Q_{ic}$	2.8	cfs
Q_{tq}=	Flow bypass = Q_s-Q_{ti}	0.7	cfs
q=	Interception per unit ratio = Q_{ti}/L_g	0.62	cfs/ft
E_q=	Efficiency = (Qti/Qs)*100	80	%

TRAPEZOIDAL CHANNEL

Section 6B1 (Interim)

Flow "Q"	636	cfs
Manning's "n"	0.015	
Slope (%)	0.60	
Bottom Width	23.0	ft
Side Slope (Lt)	0.0	H:1V
Side Slope (Rt)	0.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	11.90	ft/sec
Depth	2.32	ft
Freeboard	1.39	ft
Total Depth	3.71	ft
Froude No.	1.38	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

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TRAPEZOIDAL CHANNEL

Section 6B2 (Interim)

Flow "Q"	636	cfs
Manning's "n"	0.047	
Slope (%)	0.60	
Bottom Width	27.0	ft
Side Slope (Lt)	0.0	H:1V
Side Slope (Rt)	0.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	5.42	ft/sec
Depth	4.35	ft
Freeboard	0.96	ft
Total Depth	5.31	ft
Froude No.	0.46	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

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TRAPEZOIDAL CHANNEL

Section 6B3 (Interim)

Flow "Q"	636	cfs
Manning's "n"	0.047	
Slope (%)	0.60	
Bottom Width	38.0	ft
Side Slope (Lt)	0.0	H:1V
Side Slope (Rt)	0.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	4.95	ft/sec
Depth	3.38	ft
Freeboard	0.88	ft
Total Depth	4.26	ft
Froude No.	0.47	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

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TRAPEZOIDAL CHANNEL

Section 6B** (Interim)

Flow "Q"	636	cfs
Manning's "n"	0.047	
Slope (%)	0.60	
Bottom Width	50.0	ft
Side Slope (Lt)	0.0	H:1V
Side Slope (Rt)	0.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	4.54	ft/sec
Depth	2.80	ft
Freeboard	0.82	ft
Total Depth	3.62	ft
Froude No.	0.48	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

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TRAPEZOIDAL CHANNEL

Section 6B1 (Ultimate)

Flow "Q"	535	cfs
Manning's "n"	0.015	
Slope (%)	0.60	
Bottom Width	23.0	ft
Side Slope (Lt)	0.0	H:1V
Side Slope (Rt)	0.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	11.19	ft/sec
Depth	2.08	ft
Freeboard	1.36	ft
Total Depth	3.44	ft
Froude No.	1.37	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

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TRAPEZOIDAL CHANNEL

Section 6B2 (Ultimate)

Flow "Q"	535	cfs
Manning's "n"	0.047	
Slope (%)	0.60	
Bottom Width	27.0	ft
Side Slope (Lt)	0.0	H:1V
Side Slope (Rt)	0.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	5.11	ft/sec
Depth	3.88	ft
Freeboard	0.91	ft
Total Depth	4.79	ft
Froude No.	0.46	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

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TRAPEZOIDAL CHANNEL

Section 6B3 (Ultimate)

Flow "Q"	535	cfs
Manning's "n"	0.047	
Slope (%)	0.60	
Bottom Width	38.0	ft
Side Slope (Lt)	0.0	H:1V
Side Slope (Rt)	0.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	4.65	ft/sec
Depth	3.03	ft
Freeboard	0.84	ft
Total Depth	3.87	ft
Froude No.	0.47	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

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TRAPEZOIDAL CHANNEL

Section 6B** (Ultimate)

Flow "Q"	535	cfs
Manning's "n"	0.047	
Slope (%)	0.60	
Bottom Width	50.0	ft
Side Slope (Lt)	0.0	H:1V
Side Slope (Rt)	0.0	H:1V
Radius	0.0	ft

OUTPUT:

Velocity	4.25	ft/sec
Depth	2.52	ft
Freeboard	0.78	ft
Total Depth	3.30	ft
Froude No.	0.47	ft
Superelevation	0.00	ft

Normal depth calculations using Manning's equation

Fb = 1+0.025Vd^(1/3) Supercritical; 0.5+V^2/2g Subcritical

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Worksheet for Emergency Overflow - 16

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Discharge	10.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.48
0+01	0.00
0+02	0.13
0+02	0.17
0+22	0.57
0+42	0.17
0+42	0.13
0+44	0.00
0+44	0.48
0+44	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+44, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.33	ft
Elevation Range	0.00 to 0.57 ft	

Worksheet for Emergency Overflow - 16

Results

Flow Area		2.00	ft²
Wetted Perimeter		19.34	ft
Hydraulic Radius		0.10	ft
Top Width		18.60	ft
Normal Depth		0.33	ft
Critical Depth		0.43	ft
Critical Slope		0.00726	ft/ft
Velocity		5.00	ft/s
Velocity Head		0.39	ft
Specific Energy		0.71	ft
Froude Number		2.69	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.33	ft
Critical Depth	0.43	ft
Channel Slope	6.00	%
Critical Slope	0.00726	ft/ft

Cross Section for Emergency Overflow - 16

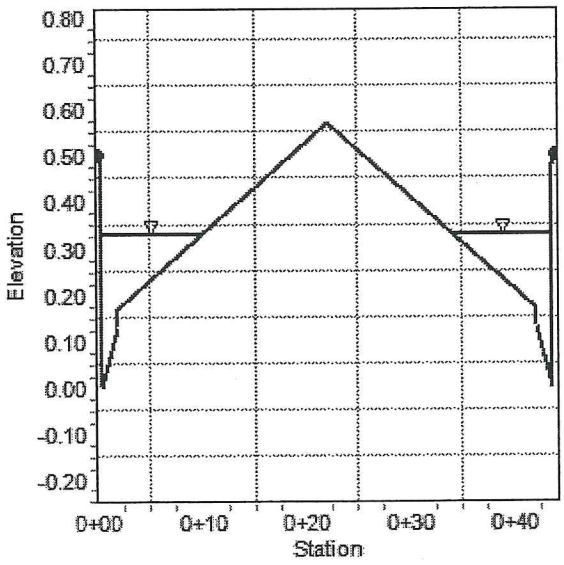
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	6.00	%
Normal Depth	0.33	ft
Discharge	10.00	ft³/s

Cross Section Image



WEIR CALCULATION

EMERGENCY OVERFLOW AT FACILITY 30B

GIVEN			CALCULATED		
Weir Length, L =	10	(ft)	**Flow[1], Q =**	**4.0**	(cfs)
Assumed Head, H1 =	0.26	(ft)	**Minimum FF[2]=**	**3060.26**	(ft)
Weir Coefficient, C=	3.0				
Weir Elev. =	3060.00	(ft)			
Freeboard =	0.00	(ft)			

[1] $Q = CL(H)^{3/2}$ (*HCDDM*)

[2] Minimum FF = Weir Elev. + H1 + Freeboard

RESPONSE TO COMMENTS
ON THE
MASTER DRAINAGE STUDY
FOR
SUMMERLIN VILLAGE 26
REVERENCE

764-204-011

November 2015

GCW
ENGINEERS \ SURVEYORS

Prepared For:

Pulte Homes
7255 S. Tenaya Way, #200
Las Vegas, NV 89113
(702) 914-4800

CITY OF LAS VEGAS INTER-OFFICE MEMORANDUM			DATE: January 27, 2016
TO: Land Development Services Department of Building & Safety			FROM: Albert Sung, P.E. Flood Control Project Engineer Department of Public Works
SUBJECT:	Drainage Study for: Summerlin Village 26 – Reverence (Updated Master Drainage Study)		COPIES TO: GCW Engineers & Surveyors
Cross Streets:	West of I-215 between Lake Mead & Cheyenne		Pulte Homes
File Number:	F:\Depot\DSMemos\DS4752B.doc		Bart Anderson, P.E., DevCo
Parcel Number:	137-14-601-002 & 137-14-501-004		CCRFCD
Zoning Action:	TMP-60968		CCPW
FEMA Flood Zone	YES	NO X	
Proposed Storm Drain	YES X	NO	

HISTORY	DATE RECEIVED	DATE REVIEWED	COMMENTS	REVIEW FEES	FEES PAID Payment Trn #
1st Submittal	9/15/2015 & 10/15/2015	10/22/2015	Not Approved	$400.00	414615: $400
2nd Submittal	11/25/2015 & 12/17/2015	1/27/2016	See Comments Below	$400.00	423916: $400
			TOTAL FEES (LDDRS):	$800.00	

REMARKS:

The Drainage Study for the subject project has been reviewed and:

	is approved subject to conformance to all City standards and the following conditions:
	must be resubmitted or supplemented including the following:
X	is conditionally approved subject to Clark County Regional Flood Control District concurrence.
X	is conditionally approved subject to Clark County Public Works Department concurrence.

1. **This drainage study is acceptable in concept**; however, *City of Las Vegas* will not formally accept the study until the *Clark County Regional Flood Control District* (CCRFCD) has issued a letter of concurrence. The engineer should contact the CCRFCD to confirm that they have begun their review.

2. The site is also adjacent to the *Clark County Western Beltway-215* project to the east. The engineer must coordinate with *Clark County Public Works Department* (CCPW) and incorporate any concerns for boundary conditions. CCPW concurrence is required prior to final acceptance of the study.

3. The final approval of this *Master Drainage Study* is only as a precursor to allow the submittal of technical drainage studies such as but not limited to the Modified Detention Basin, Debris Basin, Infrastructures and Phases of housing subdivisions etc.

4. Technical drainage studies are required for each of the development phases (PODs). The studies for the PODs may not be submitted prior to the conditional approval of the Master Drainage Study. No conditional approval of the PODS studies will be granted prior to the conditional approval of the pertinent infrastructure drainage studies. No building permits will be issued prior to the final approval of the pertinent technical drainage studies and improvement plans.

5. The master drainage study proposes a mixed-use detention basin that may include a park, amphi-theatre, basketball court etc. Design multi-use facilities per *Section 304.8* of the *CCRFCD Hydrologic Criteria and Drainage Design Manual.* The modification of the existing detention basin will require a technical drainage study with *State* and *CCRFCD* approval. Any technical drainage studies for future onsite developments will not be accepted for review prior to the conditional approval of the modified detention basin study.

NOTE: Please be advised that all land surface area disturbances over 1 acre or any area adjacent to a water way must submit to the *Nevada Division of Environmental Protection* a "Notice of Intent" to discharge that certifies a stormwater pollution prevention plan has been developed and is maintained on site; for inclusion in the Stormwater General Permit No. NVR100000. A phased construction unit in a contiguous subdivision is considered under construction until all stripped or disturbed surface areas have been covered by paving, building construction or planting. For more information, including forms and applications see http://ndep.nv.gov/bwpc/storm01.htm or call (775) 687-9429.

END OF REMARKS

ays

T/R/S: T20S/R59E/14
AREA K-14

REGIONAL FLOOD CONTROL DISTRICT

Steven C. Parrish, P.E.
General Manager/Chief Engineer

BOARD OF DIRECTORS

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February 26, 2016

Mr. Oh Sang Kwon, P.E.
City of Las Vegas
333 North Rancho Drive
Las Vegas, NV 89106

DISTRICT CONCURRENCE: MASTER DRAINAGE STUDY FOR SUMMERLIN VILLAGE 26 REVERENCE (DS4752B) (RFCD No. 16-9626)

Dear Mr. Kwon:

Clark County Regional Flood Control District (District) reviewed Technical Drainage Study dated September 15, 2015 for above-mentioned project as submitted by GCW ENGINEERS. In addition, District is in receipt of the Conditional Letter of Acceptance from City of Las Vegas dated January 27, 2016.

District concurs with acceptance of this Technical Drainage Study by City of Las Vegas.

District's review of this project was limited to issues of Regional Flood Control Significance as defined in *Uniform Regulations for the Control of Drainage*.

Please be aware that as additional information becomes available and/or restudies of Flood Insurance Studies are performed, information submitted by GCW ENGINEERS may be superseded. Compliance with regulatory elements and design standards specified in *Uniform Regulations for the Control of Drainage* does not imply a guarantee that properties will be free from flooding or flood damage. The District, its officials, or employees assume no liability for information, data, or conclusions presented by consulting engineers. We, therefore, make no warranties, either expressed or implied, in conducting this review.

STEVEN C. PARRISH, P.E.
General Manager/Chief Engineer

BY: _____
Abigail Mayrena, P.E., CFM
Principal Civil Engineer

AM:fv

c: James A. Monroe, Jr., P.E., GCW Engineers

P:\Letters and Memos\Local Drainage\Land Development & Drainage\2016\L-16-9626.doc

600 S. Grand Central Parkway, Suite 300 • Las Vegas, Nevada 89106-4511
(702) 685-0000 • FAX: (702) 685-0001
Website: *http://www.regionalflood.org*



NORTH

SCALE 1" = 300'

GRAPHIC SCALE

300 0 150 300

(IN FEET)

1 inch = 300 ft.

LEGEND

- 1-3P — DRAINAGE BASIN
- 3-E — ⊠RORATED DRAINAGE BASIN
- CP3 ● — ⊠ON⊠ENTRATION ⊠OINT
- BASIN BO⊠NDAR⊠
- ⊠RORATE BASIN BO⊠NDAR⊠
- FLOW DIRE⊠TION
- 1 1 — STREET ⊠ROSS SE⊠TION

SUMMARY OF INTERIM CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	25 YR (CFS)	10 YR (CFS)
1-1A	1497.2	2289	1477	942
1-1B	111.8	226	115	63
CP1	-	2404	1549	986
1-2A	552.7	1541	938	608
1-2B	137.7	315	173	103
CP2	-	2941	1914	1209
1-2CR	367.6	859	503	313
CP3	-	3309	2171	1365
1-3P	16.5	61	40	29
CP4	-	3311	2179	1368
1-12P	116.1	291	181	124
CP5	-	3483	2295	1443
1-14	1.0	3	2	1
1-15	3.6	10	6	4
1-16	1.9	5	3	2
1-17	2.5	7	4	2
1-18	2.4	7	4	2
CP5B	-	3493	2302	1448
EXDB	-	663	561	461
1-4R	34.3	100	58	37
1-5R	22	63	37	24
CP6	-	163	95	61
1-6R	9.7	28	16	11
1-7R	17.3	50	30	19
CP7	-	79	46	29
1-8R	1.6	5	3	2
1-10R	35.6	101	59	38
CP8	-	106	62	39
1-11P	113.6	311	193	132
CP9	-	636	391	261
1-13	0.5	1	1	1
LMT1R	1256.6	1966	1267	821
CP10	-	2224	1456	945

Label	Channel Slope (%)	Discharge (ft³/s)	Normal Depth (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Cross Section 1	3.64	108	0.48	4.30	51	Trap	2:1	12	1.00	1-4R + 11-A1
Cross Section 2	0.53	189	1.20	2.96	5	Trap	1:1	12	1.50	CP6 + 11-A1 + 11-A2
Cross Section 2A	6.00	199	0.62	6.17	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3
Cross Section 3	6.00	235	0.68	6.58	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-C
Cross Section 4	0.50	36	0.34	2.04	51	Trap	2:1	Earth	1.00	11-C + 11-A4
Cross Section 5	5.00	96	0.41	4.52	51	Trap	2:1	12	1.00	CP7 + 11-B
Cross Section 5A	4.87	299	0.76	6.39	61	Trap	1:1	12	1.00	CP7 + CP8 + 11-B + 11-D1 + 11-D2 +11-D3 11-E + 11-F
Cross Section 6	4.49	247	0.77	6.13	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-A4 + 11-C + 11-K1
Cross Section 6A	21.51	247	0.52	9.32	50	Trap	2:1	36	2.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-A4 + 11-C + 11-K1
Cross Section 6B	0.60	636	2.65	4.35	50	Trap	2:1	36	4.00	CP9
Cross Section 7	3.45	21	0.13	2.77	61	Trap	1:1	Earth	1.00	11-K2
Cross Section 8	4.75	27	0.15	3.59	51	Trap	2:1	Earth	1.00	11-H
Cross Section 9	0.98	233	1.13	3.87	51	Trap	2:1	12	1.50	CP7 + CP8 + 11-B + 11-D1 +11-D2
Cross Section 9A	2.98	12	0.10	2.26	51	Trap	2:1	Earth	1.00	11-D2
Cross Section 10	3.65	25	0.15	3.22	51	Trap	2:1	Earth	1.00	11-E
Cross Section 10A	4.99	25	0.14	3.53	51	Trap	2:1	Earth	1.00	11-E
Cross Section 11	4.90	50	0.21	4.63	51	Trap	2:1	Earth	1.00	11-E + 11F
Cross Section 12	2.35	66	0.31	4.13	51	Trap	2:1	Earth	1.00	11-E + 11F + 11-D3
Cross Section 13	0.50	41	0.37	2.14	51	Trap	2:1	Earth	1.00	11-I + 11-J2
Cross Section 13A	2.35	9	0.09	1.87	51	Trap	2:1	Earth	1.00	11-J1
Cross Section 14	4.29	15	0.11	2.75	51	Trap	2:1	Earth	1.00	12-N
Cross Section 15	12.12	412	0.79	9.21	55	Trap	2:1	36	2.00	SEC5A + 11-K2 + 11-J1 + 11-J2 + 11-I + 11-H + 11-L + 11-G
Cross Section 15A	6.50	412	1.00	7.80	83	Trap	1:1	24	1.00	SEC5A + 11-K2 + 11-J1 + 11-J2 + 11-I + 11-H + 11-L + 11-G
Cross Section 15B	5.67	382	1.05	7.74	51	Trap	2:1	30	1.50	SEC5A + 11-J1 + 11-J2 + 11-I + 11-H + 11-G
Cross Section 15C	3.39	382	1.16	6.99	51	Trap	2:1	24	1.50	SEC5A + 11-J1 + 11-J2 + 11-I + 11-H + 11-G
Cross Section 15D	3.27	305	1.02	6.33	46	Trap	1:1	12	1.50	SEC5A + 11-G
Cross Section 16	0.50	25	0.28	1.76	51	Trap	2:1	Earth	1.00	12-N + 12-M
Cross Section 17	1.22	16	0.16	1.93	51	Trap	2:1	Earth	1.00	12-K
Cross Section 18	5.03	39	0.18	4.23	51	Trap	2:1	Earth	1.00	12-I + 12-J
Cross Section 18A	5.58	39	0.87	6.65	5	Trap	2:1	12	1.00	12-I + 12-J
Cross Section 19	0.55	15	0.20	1.48	51	Trap	2:1	Earth	1.00	12-H
Cross Section 20	5.22	41	0.18	4.36	51	Trap	2:1	Earth	1.00	12-A
Cross Section 20A	5.21	56	0.22	4.93	51	Trap	2:1	Earth	1.00	12-A + 12-B
Cross Section 21	6.08	30	0.14	4.04	51	Trap	2:1	Earth	1.00	12-D
Cross Section 22	4.99	30	0.15	3.80	51	Trap	2:1	Earth	1.00	12-D
Cross Section 23	4.63	19	0.09	2.56	83	Trap	1:1	Earth	1.00	12-E
Cross Section 24	5.97	67	0.25	5.75	46	Trap	1:1	Earth	1.00	12-E + 12-F + 12-G + 12+H
Cross Section 25	22.20	31	0.20	5.90	26	Trap	2:1	12	1.00	LMT1RB
Cross Section 26	7.95	75	0.36	5.26	39	Trap	1:1	12	1.00	Referenced From the WB Study
Cross Section 27	0.40	106	1.42	4.20	15	Trap	2:1	Earth	4.50	CP8

ONSITE PRORATED FLOW SUMMARY

Subbasin	Q_{100} (cfs)	New Area	cfs/acre
1-11P	311	113.6*	2.74
1-12P	291	116.1*	2.51

Onsite Prorated Basins

Subbasin	Q_{100} (cfs)	New Area (acres)	cfs/acre
11-A1	8	3.0	2.74
11-A2	18	6.5	2.74
11-A3	10	3.5	2.74
11-A4	7	2.5	2.74
11-B	17	6.3	2.74
11-C	29	10.7	2.74
11-D1	19	6.9	2.74
11-D2	12	4.3	2.74
11-D3	16	5.9	2.74
11-E	25	9.0	2.74
11-F	25	9.2	2.74
11-G	6	2.3	2.74
11-H	27	9.7	2.74
11-I	20	7.4	2.74
11-J1	9	3.3	2.74
11-J2	21	7.5	2.74
11-K1	13	4.6	2.74
11-K2	21	7.6	2.74
11-L	9	3.4	2.74
Total	**311**	**113.6***	**N/A**
12-A	41	16.5	2.51
12-B	15	5.8	2.51
12-C	4	1.7	2.51
12-D	30	12.0	2.51
12-E	19	7.4	2.51
12-F	17	7.0	2.51
12-G	16	6.6	2.51
12-H	15	5.9	2.51
12-I	22	8.8	2.51
12-J	17	6.7	2.51
12-K	16	6.4	2.51
12-L	54	21.5	2.51
12-M	10	3.8	2.51
12-N	15	6.0	2.51
TOTAL	**291**	**116.1***	**N/A**

*Revised from Previous Submittal

% COMPLETE

REV	DATE	DESCRIPTION	DATE	ACSN APP	DATE	CCW APP	DATE

PROJECT NO. 764-201-013

DESIGN:
DRAWN:
CHECK:

PLOT DATE: 03-17-16
PLOT TIME: 12:14:55

F:\Projects\700\764-201-013\Division\Civil\Figures\RTC-OFFSITES\Fig -5R.dwg
Michelle Castell

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

PULTE HOMES

SUMMERLIN VILLAGE 26 – REVERENCE
OFFSITE DRAINAGE IMPROVEMENTS

INTERIM CONDITIONS DRAINAGE MAP

DRAWING
FIG-5R
OF SHTS

LD #:

HTE: 00-00000

WESTERN BELTWAY CHANNEL HEC-RAS SECTION SUMMARY TABLE

Sta	ULT Q	FL Elevation	Depth	Vel	Top Width	Froude #	Radius	Freeboard	Super-elevation	Total Depth	Interim Depth	
	(cfs)	(ft)	(ft)	(ft/s)	(ft)			(ft)	(ft)	(ft)	(ft)	Notes
03+84.04	1664	3221.97	4.27	14.62	35.87	1.45	0	1.6	0.0	5.9	4.27	
09+56.12	1664	3219.11	8.02	6.02	50.86	0.46	0	1.1	0.0	9.1	8.02	
10+06.12	1664	3218.36	6.72	12.38	20.00	0.84	0	2.9	0.0	9.6	6.72	
14+06.12	1664	3216.36	7.99	10.42	20.00	0.65	4279	2.2	0.0	10.2	7.99	Exit from RCB Structure
14+07.12	1664	3216.35	8.15	9.73	21.00	0.60	4279	2.0	0.0	10.1	8.15	
15+06.12	1664	3215.58	7.11	13.78	17.00	0.91	4279	3.4	0.0	10.6	7.11	Transition to 17' BW Channel
15+31.61	1692	3215.38	6.75	14.75	17.00	1.00	4279	1.7	0.0	8.5	6.75	Junction
19+56.42	1692	3212	5.13	19.42	17.00	1.51	2992	1.8	0.0	7.0	5.13	Grade Break
20+56.42	1692	3208.24	4.09	24.37	17.00	2.12	2993	2.0	0.1	6.1	4.09	Grade Break
22+22.38	1716	3206.97	4.72	21.41	17.00	1.74	2993	1.9	0.0	6.7	4.72	Transition to 15' BW, Grade Break
22+72.38	1716	3205	5.00	22.88	15.00	1.80	2993	2.0	0.0	7.0	5.00	End Transition
23+27.53	1716	3202.84	4.56	25.11	15.00	2.07	2993	2.0	0.0	6.6	4.56	Transition to 11' BW Channel
24+77.53	1716	3196.94	3.95	28.99	15.00	2.57	2993	2.1	0.1	6.2	3.95	End Transition
25+65.46	1716	3193.48	3.77	30.36	15.00	2.76	2993	2.2	0.1	6.0	3.77	Grade Break
26+26.68	1716	3191.07	5.33	29.29	11.00	2.24	2993	2.3	0.0	7.7	5.33	
27+17.76	1716	3187.48	5.06	30.84	11.00	2.42	2993	2.3	0.1	7.4	5.06	
28+00.00	1716	3182.1	4.61	33.88	11.00	2.78	2993	2.4	0.1	7.1	4.61	
29+00.00	1716	3175.56	4.28	36.44	11.00	3.1	2993	2.5	0.1	6.8	4.28	
30+00.00	1716	3169.03	4.08	38.21	11.00	3.33	0	2.5	0.0	6.6	4.08	
31+50.00	1716	3159.22	3.90	39.98	11.00	3.57	0	2.6	0.0	6.5	3.90	
36+00.00	1716	3129.96	3.69	42.24	11.00	3.87	0	2.6	0.0	6.3	3.69	
40+00.00	1716	3103.96	3.67	42.57	11.00	3.92	0	2.6	0.0	6.3	3.67	Grade Break
44+00.00	1716	3077.96	3.66	42.65	11.00	3.93	0	2.6	0.0	6.3	3.66	Beginning of Transition
47+71.98	1769	3053.76	3.76	42.76	11.00	3.89	0	2.7	0.0	6.4	3.76	
48+80.88	1769	3047.57	3.83	42.04	11.00	3.79	0	2.6	0.0	6.5	3.83	
49+31.11	1769	3044.82	2.46	42.52	19.49	5.13	0	2.4	0.0	4.9	2.46	End of Transition/Channel

WSPGW MODEL SUMMARY

14' X 14' RCB

Station	Invert (ft)	Flow Depth (ft)	HGL (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility Description
20+58.06	3208.240	9.91	3218.15	3311.10	23.86	1.34	14' x 14' RCB
19+05.20	3209.410	9.64	3219.05	3311.10	24.52	1.39	14' x 14' RCB
18+52.70	3209.935	9.68	3219.61	3311.10	24.44	1.38	14' x 14' RCB
18+47.70	3209.986	9.66	3219.64	3309.10	24.48	1.39	14' x 14' RCB
13+37.60	3215.170	11.84	3227.01	3309.10	19.96	1.02	14' x 14' RCB
12+61.10	3215.600	11.77	3227.37	3309.10	20.08	1.03	14' x 14' RCB
11+65.71	3216.145	12.02	3228.16	3309.10	19.67	1.00	14' x 14' RCB
11+15.71	3216.430	16.18	3232.61	3309.10	11.82	0.57	DUAL 10' X 14' RCBs
10+42.54	3216.837	16.02	3232.86	3309.10	11.82	0.57	DUAL 10' X 14' RCBs
10+38.41	3216.861	16.01	3232.87	3309.10	11.82	0.57	DUAL 10' X 14' RCBs
10+35.41	3216.878	16.00	3232.88	3309.00	11.82	0.57	DUAL 10' X 14' RCBs
10+05.12	3217.051	16.06	3232.88	3309.00	11.82	0.57	DUAL 10' X 14' RCBs
09+91.35	3217.130	16.02	3233.11	3309.00	11.82	-	WALL ENTRANCE

VILLAGE 26 CHANNEL HEC-RAS SECTION SUMMARY TABLE

Sta	Q	FL Elevation	Depth	Vel	Top Width	Froude #	Radius	Freeboard	Super-elevation	Total Depth	
	(cfs)	(ft)	(ft)	(ft/s)	(ft)			(ft)	(ft)	(ft)	Notes
20+38.06	3311	3208.39	10.52	22.49	14.0	1.22	3000	2.2	0.0	12.8	
20+58.05	3311	3208.25	10.56	22.40	14.0	1.22	3000	2.2	0.0	12.8	Beginning of 20' Wide Rect. Channel
20+58.06	3311	3208.24	10.53	22.46	20.0	1.22	3000	2.2	0.1	12.8	
20+70.06	3311	3208.15	5.95	27.84	20.0	2.01	3000	2.3	0.1	8.3	End of Ineffective Flow
20+83.06	3311	3208.05	5.99	27.64	20.0	1.99	3000	2.3	0.1	8.3	Drop Channel Height to 9 feet
22+25.20	3311	3206.98	6.42	25.79	20.0	1.79	3000	2.2	0.1	8.7	Grade Break
23+61.30	3311	3201.65	5.44	30.41	20.0	2.30	3000	2.3	0.1	7.9	Drop Channel Height to 8 feet
25+69.80	3311	3193.50	4.81	34.42	20.0	2.77	3000	2.5	0.1	7.4	
26+22.97	3311	3191.41	4.29	35.41	21.8	3.01	3000	2.4	0.1	6.9	
26+33.22	3311	3191.03	4.74	34.96	20.0	2.83	0	2.5	0.0	7.2	
27+23.72	3311	3187.48	4.60	35.96	20.0	2.95	0	2.5	0.0	7.1	Drop Channel Height to 6.8 feet, GB
30+00.00	3311	3169.52	3.90	42.49	20.0	3.79	0	2.7	0.0	6.6	
32+00.00	3311	3156.52	3.71	44.63	20.0	4.08	0	2.7	0.0	6.4	
33+85.00	3371	3144.50	3.68	45.79	20.0	4.21	0	2.8	0.0	6.4	
34+00.00	3371	3143.52	3.67	45.88	20.0	4.22	0	2.8	0.0	6.4	
36+00.00	3371	3130.51	3.61	46.69	20.0	4.33	0	2.8	0.0	6.4	
38+00.00	3371	3117.51	3.57	47.16	20.0	4.4	0	2.8	0.0	6.4	
40+00.00	3371	3104.51	3.55	47.44	20.0	4.43	0	2.8	0.0	6.4	
42+00.00	3371	3091.51	3.54	47.6	20.0	4.46	0	2.8	0.0	6.4	
44+00.00	3371	3078.51	3.53	47.69	20.0	4.47	0	2.8	0.0	6.3	
44+49.18	3401	3075.31	3.57	47.7	20.0	4.45	0	2.8	0.0	6.4	
46+00.00	3401	3065.51	3.56	47.78	20.0	4.46	0	2.8	0.0	6.4	
47+80.33	3401	3053.79	3.55	47.85	20	4.47	0	2.8	0.00	6.4	Grade Break
48+25.86	3401	3048.2	3.44	49.43	20	4.7	0	2.9	0.00	6.3	Beginning of 20'x7' RCB

DETENTION BASIN INFLOW HEC-RAS SECTION SUMMARY TABLE

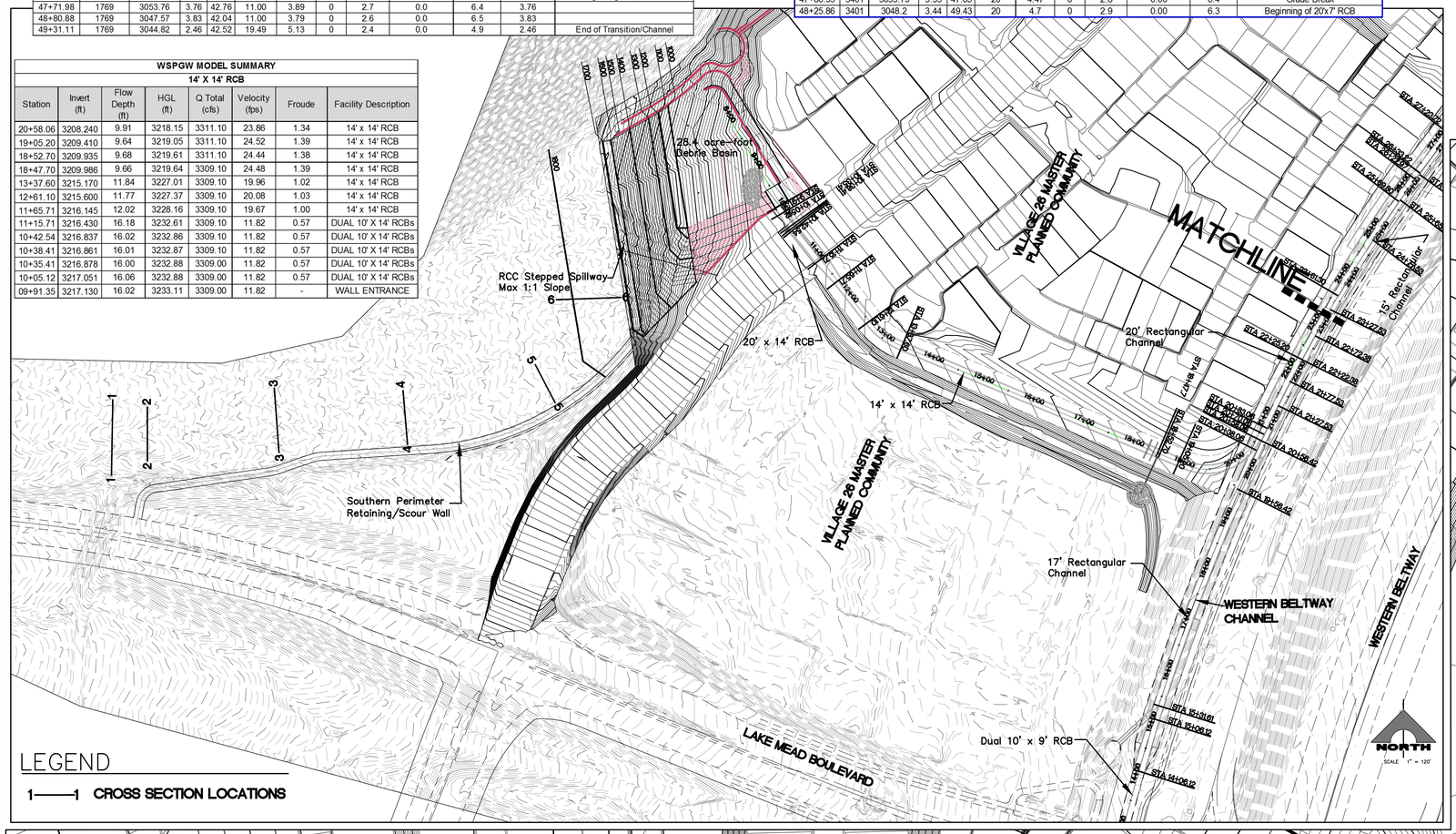
Sta	Q	Min Ch El	W.S. Elev	Depth	Vel	Top Width	Froude #	Freeboard	Total Depth	
	(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)	(ft)	Notes
1600	3493	3023.20	3026.78	3.58	48.78	20.0	4.54	2.9	6.4	Outlet of RCB
1500	3493	3022.70	3024.87	2.17	48.16	33.4	5.76	2.6	4.7	Top of First Step
1400	3493	3012.70	3014.82	2.12	28.94	57.0	3.50	1.9	4.0	Grade Break
1300	3493	2995.20	2997.01	1.81	17.22	112.0	2.26	1.5	3.3	Top of Bottom Step
1200	3493	2992.80	2994.26	1.46	21.32	112.0	3.11	1.6	3.1	Toe of Bottom Step
1100	3493	2992.00	2998.38	6.38	5.13	112.0	0.37	1.0	7.4	End of Stilling Basin
1000	3493	2994.00	2997.11	3.11	10.04	112.0	1.00	1.4	4.5	Top of sill

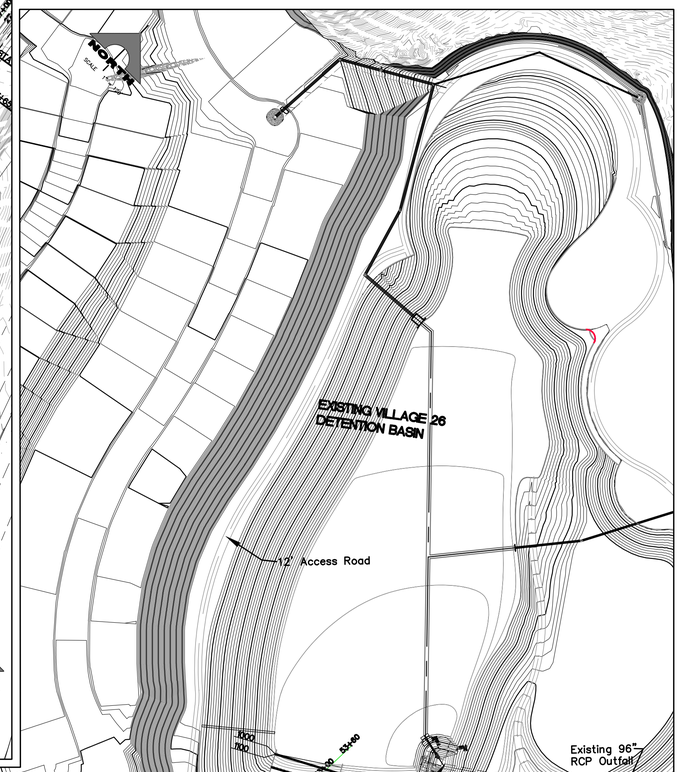
DEBRIS BASIN INFLOW HEC-RAS SECTION SUMMARY TABLE

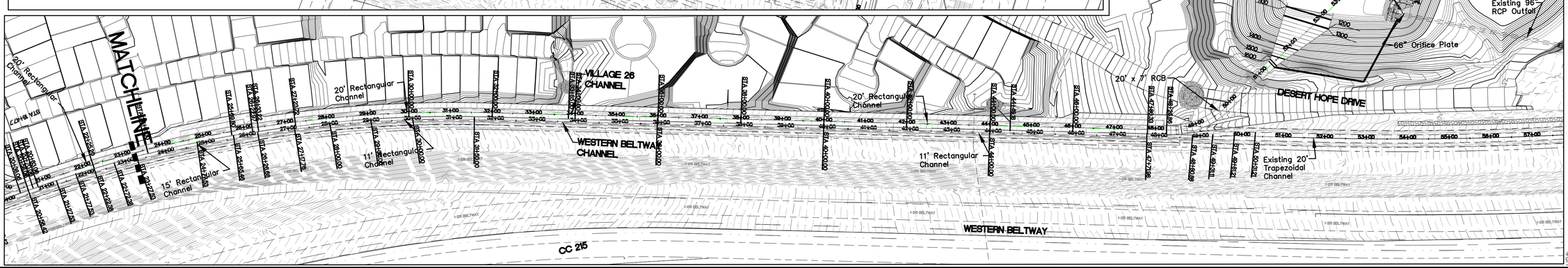
Sta	Q	Min Ch El	W.S. Elev	Depth	Vel	Top Width	Froude #	Freeboard	Total Depth	
	(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)	(ft)	Notes
1800	3503	3290.80	3294.07	3.27	11.79	243.6	1.88	1.4	4.7	Upstream Section
1700	3503	3286.00	3287.85	1.85	18.08	149.7	2.80	1.6	3.4	Top of Wall
1600	3503	3286.30	3286.90	0.60	19.51	300.0	4.45	1.4	2.0	Edge of Access Road
1500	3503	3286.00	3286.80	0.80	12.01	364.0	2.36	1.3	2.1	Top of Spillway
1400	3503	3261.00	3262.47	1.47	6.92	345.0	1.01	1.2	2.7	Stepped Spillway
1300	3503	3236.00	3237.20	1.20	9.88	295.0	1.59	1.3	2.5	Stepped Spillway
1200	3503	3223.50	3225.31	1.81	7.93	244.0	1.04	1.2	3.1	Top of Bottom Step
1100	3503	3221.00	3221.96	0.96	15.72	233.0	2.83	1.4	2.3	Toe of Spillway
1000	3503	3220.90	3221.99	1.09	14.09	228.0	2.38	1.4	2.5	Edge of Concrete Pad

FLO-2D SECTION SUMMARY TABLE

Section	Q	Depth	Vel	Top Width	Froude #	Freeboard	Total Depth	
	(cfs)	(ft)	(ft/s)	(ft)		(ft)	(ft)	Notes
1	318	1.70	8.60	140.0	1.16	1.3	3.0	Use 3.0 feet above grade
2	365	1.80	10.40	100.0	1.37	1.3	3.1	Use 3.0 feet above grade
3	447	1.70	10.00	120.0	1.35	1.3	3.0	Use 3.0 feet above grade
4	447	0.70	5.90	100.0	1.24	1.1	1.8	Use 3.0 feet above grade
5	447	0.80	5.80	80.0	1.14	1.1	1.9	Use 3.0 feet above grade
6	2008	6.60	24.20	120.0	1.66	2.1	8.7	Use 15.0 feet above grade







PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
OFFSITE DRAINAGE IMPROVEMENTS

HYDRAULIC CROSS SECTION MAP

DRAWING FIG-5AUR

OF SHTS

PROJECT NO. 764-201-013

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 03-17-16
PLOT TIME: 09:19:59

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Nelson Boggs

DATE: | GCW APP | DATE | AGEN APP | DATE | DESCRIPTION | REV | DATE

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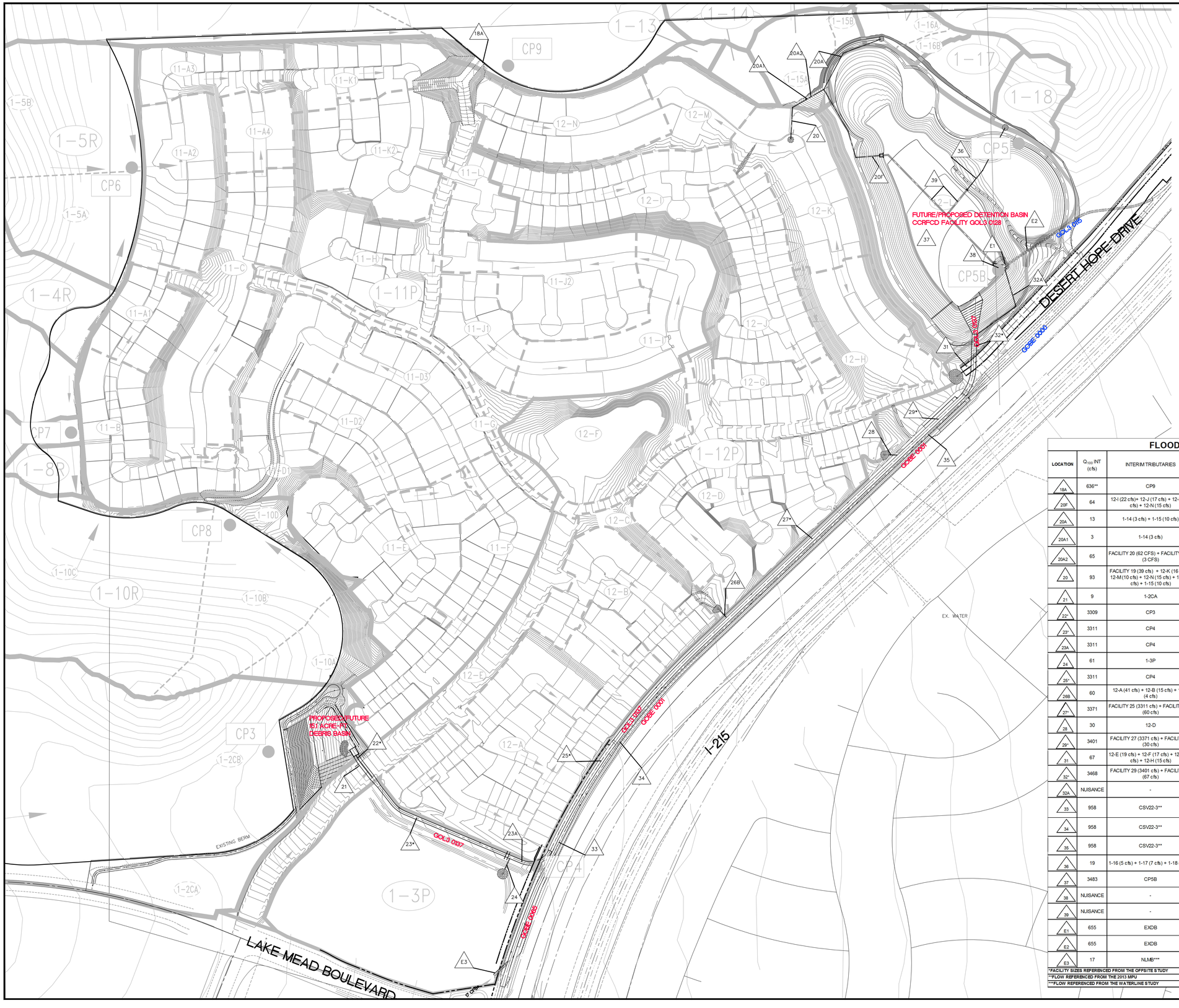

NORTH

SCALE 1" = 200'

GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

LEGEND

- 1-18 — DRAINAGE BASIN
- 3-E — ⊠RORATED DRAINAGE BASIN
- CP3 — ⊠ON⊠ENTRATION ⊠OINT
- BASIN BO⊠NDAR⊠
- ⊠RORATE BASIN BO⊠NDAR⊠
- FLOW DIRE⊠TION
- 1 1 — STREET ⊠ROSS SE⊠TION
- 1 — FA⊠ILIT⊠ IDENTIFIER

*17 CFS REFERENCED FROM THE WATERLINE STUDY

FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} INT (cfs)	INTERIM TRIBUTARIES	Q_{100} ULT (cfs)	ULTIMATE TRIBUTARIES	FACILITY
18A	636**	CP9	536	CP9	60' X 50' Rirpap Outlet Structure D_{50}=18" Thickness=36"
20F	64	12-I (22 cfs)+ 12-J (17 cfs) + 12-M (10 cfs) + 12-N (15 cfs)	49	12-I (22 cfs)+ 12-J (17 cfs) + 12-M (7 cfs) + 12-N (12 cfs)	36" RCP
20A	13	1-14 (3 cfs) + 1-15 (10 cfs)	-	-	18" RCP
20A1	3	1-14 (3 cfs)	3	1-14 (3 cfs)	STUB FOR PHASE 1 DROP INLET
20A2	65	FACILITY 20 (62 CFS) + FACILITY 20A1 (3 CFS)	63.5	FACILITY 20 (60.5 CFS) + FACILITY 20A1 (3 CFS)	EXISTING 42" RCP
20	93	FACILITY 19 (39 cfs) + 12-K (16 cfs) + 12-M (10 cfs) + 12-N (15 cfs) + 1-14 (3 cfs) + 1-15 (10 cfs)	62	FACILITY 19 (30 cfs) + 12-K (13 cfs) + 12-M (7 cfs) + 12-N (12 cfs)	42" RCP W/ 5.5' DEEP SUMP. 12" RIPRAP 5.5' HIGH
21	9	1-2CA	9	1-2CA	24" RCP
22*	3309	CP3	3309	CP3	20'X14' RCB
23*	3311	CP4	3311	CP4	14'X14' RCB (CCRFCD FACILITY GOL3)
23A	3311	CP4	3311	CP4	14'X14' RCB (CCRFCD FACILITY GOL3)
24	61	1-3P	63	1-3P	48" RCP W/ 6' DEEP SUMP. 12" RIPRAP 4' HIGH
25*	3311	CP4	3311	CP4	20' X 7.5' CONCRETE CHANNEL (CCRFCD FACILITY GOL3)
26B	60	12-A (41 cfs) + 12-B (15 cfs) + 12-C (4 cfs)	47	FACILITY 26A (33 cfs) + 12-B (11 cfs) + 12-C (3 cfs)	42" RCP W/ 5.5' DEEP SUMP. 12" RIPRAP 4' HIGH
27*	3371	FACILITY 25 (3311 cfs) + FACILITY 26B (60 cfs)	3358	FACILITY 25 (3311 cfs) + FACILITY 26B (47 cfs)	20' X 7.5' CONCRETE CHANNEL (CCRFCD FACILITY 0137)
28	30	12-D	24	12-D	36" RCP W/ 5' DEEP SUMP. 12" RIPRAP 6' HIGH
29*	3401	FACILITY 27 (3371 cfs) + FACILITY 28 (30 cfs)	3382	FACILITY 27 (3358 cfs) + FACILITY 28 (24 cfs)	20' X 7.5' CONCRETE CHANNEL (CCRFCD FACILITY 0137)
31	67	12-E (19 cfs) + 12-F (17 cfs) + 12-G (16 cfs) + 12-H (15 cfs)	54	12-E (15 cfs) + FACILITY 30 (14 cfs) + 12-G (13 cfs) + FACILITY 30A (12 cfs)	36" RCP
32*	3468	FACILITY 29 (3401 cfs) + FACILITY 31 (67 cfs)	3436	FACILITY 29 (3382 cfs) + FACILITY 31 (54 cfs)	20'X7' RCB
32A	NUISANCE	-	NUISANCE	-	36" RCP
33	958	CSV22-3**	958	CSV22-3**	17'W 7.5'-9'D CONCRETE CHANNEL (EX CCRFCD FACILITY GOBE 0065)
34	958	CSV22-3**	958	CSV22-3**	15'W 7.5'D CONCRETE CHANNEL (EX CCRFCD FACILITY GOBE 0001)
35	958	CSV22-3**	958	CSV22-3**	11'W 6.8'D CONCRETE CHANNEL (EX CCRFCD FACILITY GOBE 0001)
36	19	1-16 (5 cfs) + 1-17 (7 cfs) + 1-18 (7 cfs)	19	1-16 (5 cfs) + 1-17 (7 cfs) + 1-18 (7 cfs)	30" RCP
37	3483	CP5B	3464	CP5B	MODIFIED DETENTION BASIN
38	NUISANCE	-	NUISANCE	-	WATER QUALITY FEATURE
39	NUISANCE	-	NUISANCE	-	6' WIDE LOW FLOW U-CHANNELS
E1	655	EXDB	653	EXDB	EXISTING 65" ORIFICE PLATE
E2	655	EXDB	653	EXDB	EXISTING 96" OUTFALL PIPE (EX CCRFCD FACILITY GOL3 0115)
E3	17	NLMB***	-	-	EXISTING 8'X5' RCB TO BE REMOVED AND REPLACED

*FACILITY SIZES REFERENCED FROM THE OFFSITE STUDY

**FLOW REFERENCED FROM THE 2013 MPU

***FLOW REFERENCED FROM THE WATERLINE STUDY

LDP#:

HTE: 00-00000

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DATE:
GCW APP
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AGEN APP
DATE
DESCRIPTION
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DATE

PROJECT NO. 764-201-013

DESIGN:
DRAWN:
CHECK:

PLOT DATE: 03-17-16

PLOT TIME: 14:20:09

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Nelson Boggs

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PULTE HOMES

SUMMERLIN VILLAGE 26 – REVERENCE
OFFSITE DRAINAGE IMPROVEMENTS

FACILITIES MAP

DRAWING
FIG-6R
OF SHTS

IMPROVEMENT PLAN
FOR
SUMMERLIN
VILLAGE 26 - REVERENCE PHASE 1
PORTIONS OF: APN'S 137-14-601-002 & 137-14-501-005

DRAWING INDEX

NO.	DWG	DESCRIPTION
1	C1	COVER SHEET
2	C2	GENERAL NOTES AND QUANTITIES
3	C3	GENERAL NOTES AND MANHOLE SCHEDULE
4	G1	GRADING PLAN 1
5	G2	GRADING PLAN 2
6	G3	GRADING PLAN 3
7	G4	GRADING PLAN 4
8	G5	GRADING PLAN 5
9	G6	GRADING PLAN 6
10	G7	GRADING PLAN 7
11	G8	GRADING PLAN 8
12	G9	GRADING PLAN 9
13	G10	GRADING PLAN 10
14	G11	GRADING PLAN 11
15	G12	GRADING PLAN 12
16	G13	GRADING PLAN 13
17	G14	GRADING PLAN 14
18	G15	GRADING PLAN 15
19	G16	GRADING PLAN 16
20	G17	GRADING PLAN 17
21	G18	GRADING PLAN 18
22	G19	GRADING PLAN 19
23	G20	GRADING PLAN 20
24	G21	GRADING PLAN 21
25	G22	GRADING PLAN 22
26	G23	GRADING PLAN 23
27	G24	GRADING PLAN 24
28	G25	GRADING PLAN 25
29	G26	GRADING PLAN 26
30	G27	GRADING PLAN 27
31	G28	GRADING PLAN 28
32	G29	GRADING PLAN 29
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34	G31	GRADING PLAN 31
35	D1	SECTIONS AND DETAILS I
36	D2	SECTIONS AND DETAILS II
37	D3	SECTIONS AND DETAILS III
38	D4	SECTIONS AND DETAILS IV
39	D5	SECTIONS AND DETAILS V
40	D6	SECTIONS AND DETAILS VI
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42	P2	NATURAL ROCK DR PLAN AND PROFILE – STA 17+00 TO STA 22+00
43	P3	NATURAL ROCK DR PLAN AND PROFILE – STA 22+00 TO STA 26+00
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45	P5	DESERT HOPE DR PLAN AND PROFILE – STA 30+00 TO STA 35+00
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82	P42	OCEANIC BLISS DR PLAN AND PROFILE – STA 29+00 TO STA 32+50
83	P43	FULL LOTUS LN PLAN AND PROFILE – STA 32+50 TO STA 37+00
84	P44	FULL LOTUS LN PLAN AND PROFILE – STA 37+00 TO STA 41+00
85	P45	FULL LOTUS LN PLAN AND PROFILE – STA 41+00 TO END
86	P46	SKULLCAP CT PLAN AND PROFILE – BEGIN TO END
87	P47	ZUCKER CT PLAN AND PROFILE – BEGIN TO END
88	P48	CALM DESERT CT PLAN AND PROFILE – BEGIN TO END
89	P49	GREEN BAMBOO CT PLAN AND PROFILE – BEGIN TO END
90	P50	RENEWAL CT PLAN AND PROFILE – BEGIN TO END
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97	P57	STORM DRAIN LATERAL II
98	P58	STORM DRAIN LATERAL III
99	P59	STORM DRAIN LATERAL IV
100	P60	STORM DRAIN LATERAL V
101	P61	STORM DRAIN LATERAL VI
102	P62	
103	P63	
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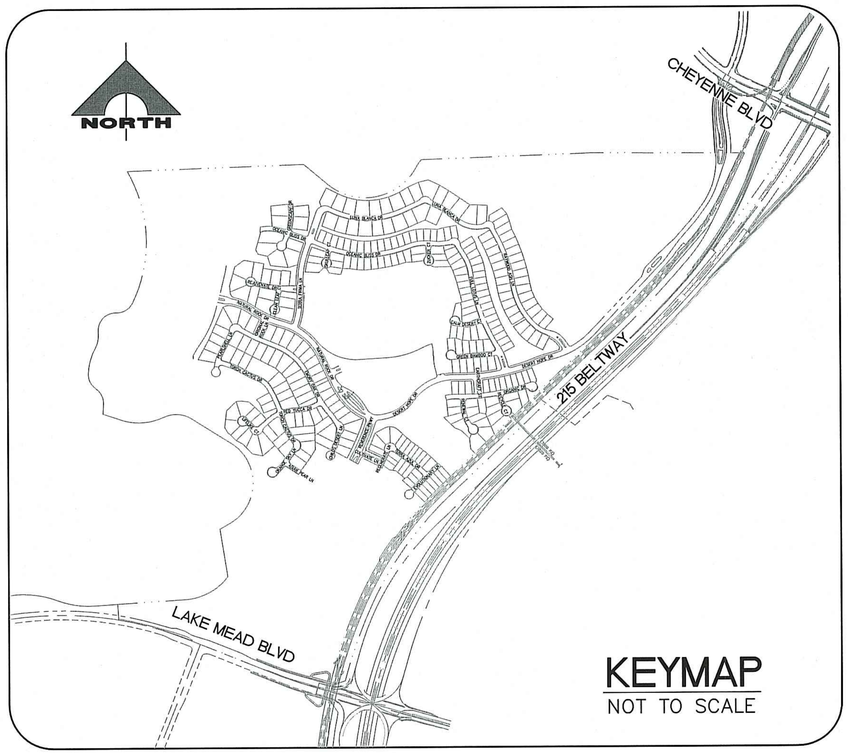

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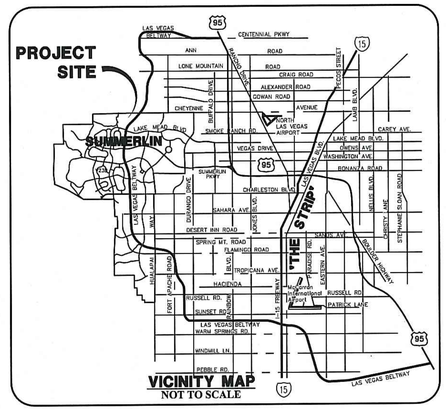

UTILITY/AGENCY APPROVALS

COX COMMUNICATIONS LAS VEGAS, INC. — DATE

CENTRAL TELEPHONE COMPANY, DBA CENTURY LINK — DATE

THE AFFIXED CENTRAL TELEPHONE COMPANY, DBA CENTURY LINK APPROVAL DOES NOT ASSUME OR GUARANTEE LIABILITY FOR KNOWN OR UNKNOWN CONFLICTS WITH EXISTING OR PROPOSED IMPROVEMENTS. RESOLUTION OF ANY CONFLICT WILL BE ACCOMPLISHED PURSUANT TO LOCAL ORDINANCES, NEVADA REVISED STATUTES AND/OR PUBLIC UTILITY COMMISSION RULES AND REGULATIONS.

NV ENERGY — DATE

NEVADA POWER COMPANY ACKNOWLEDGES THAT WE HAVE RECEIVED YOUR PLANS AND WILL PROVIDE SERVICE TO ALL ELECTRICAL NEEDS ASSOCIATED WITH THIS PROJECT. NEVADA POWER COMPANY RESERVES THE RIGHT TO ADDRESS ANY EXISTING OR FUTURE CONFLICTS ONCE THE FINAL DESIGN IS COMPLETED. THE NEW SERVICE AND THE RESOLUTION OF ANY CONFLICTS WILL BE ACCOMPLISHED PURSUANT TO THE NEVADA PUBLIC UTILITY COMMISSION'S RULES AND REGULATIONS.

NV ENERGY – TRANSMISSION ENGINEERING — DATE

SOUTHWEST GAS CORP. — DATE

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS FIRE AND RESCUE, FIRE FLOW X,XXX GPM AT 20 PSI RESIDUAL — DATE

ALLEN PAVELKA, PE# 9029 — DATE
CITY ENGINEER/ACTING
CITY OF LAS VEGAS, NEVADA

APPROVAL OF THESE PLANS IS LIMITED TO THOSE IMPROVEMENTS CONSTRUCTED IN THE DEDICATED RIGHTS-OF-WAY AND/OR DEDICATED EASEMENTS. THIS APPROVAL DOES NOT AUTHORIZE THE CONSTRUCTION OF ANY IMPROVEMENTS THAT DEVIATE FROM ADOPTED STANDARDS AND/OR SPECIFICATIONS, EXCEPT THOSE SPECIFICALLY LISTED UNDER "DEVIATIONS FROM STANDARDS". THE ENGINEER SHALL RESOLVE ANY DEVIATION OTHER THAN THOSE LISTED IN "DEVIATIONS FROM STANDARDS" IN FAVOR OF THE UNIFORM STANDARD DRAWINGS AND SPECIFICATIONS CLARK COUNTY AREA NEVADA.

CLV BUILDING AND SAFETY DEPARTMENT

THIS PLAN MEETS THE APPLICABLE STANDARDS OF THE CITY OF LAS VEGAS PLANNING DEPARTMENT

CHRIS KNIGHT, DIRECTOR BUILDING AND SAFETY — DATE

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL
SHEETS: _____

H# _____ CLV DWG# _____

STRUCTURAL DRAWING INDEX

NO.	DWG	DESCRIPTION
150	S1	GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS
151	S2	TRANSITION STRUCTURE AND WALL
152	S3	HEADWALL FOR 8'X7' RCB

BASIS OF BEARING

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010)
BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

OWNER
THE HOWARD HUGHES COMPANY LLC
10801 W. CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NV 89135
(702) 791-4300

OWNER
P N II, INC.
7255 S. TENAYA WAY #200
LAS VEGAS, NV 89113
(702) 914-4800

DEVELOPER
THE HOWARD HUGHES COMPANY LLC
10801 W. CHARLESTON BLVD., 3RD FLOOR
LAS VEGAS, NV 89135
(702) 791-4300

DEVELOPER
PULTE HOMES
7255 S. TENAYA WAY #200
LAS VEGAS, NV 89113
(702) 914-4800

ENGINEER
GCW, INC.
1555 S. RAINBOW BOULEVARD
LAS VEGAS, NEVADA 89146
(702) 804-2000
(702) 804-2299 (FAX)

GROSS ACREAGE: 157.49
NO. OF LOTS: 293
DENSITY(UNIT/AC): 1.86

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FAST
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1-702-432-5300
FRIENDLY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

ENGINEER – STATE OF NEVADA – HAO A. NGUYEN – No. 19396 – PROFESSIONAL – Exp. 12/31/2017 – CIVIL
DATE 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 764-204-013
DESIGN: HN
DRAWN: HN
CHECK: WP
PLOT DATE: 04-04-16
PLOT TIME: 11:10:37

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-C1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
COVER SHEET

DRAWING
C1
1 OF 152 SHTS

CITY OF LAS VEGAS GRADING NOTES

1. IN THE EVENT THAT ANY UNFORESEEN CONDITIONS NOT COVERED BY THESE NOTES ARE ENCOUNTERED DURING GRADING OPERATIONS, THE OWNER/ENGINEER SHALL BE IMMEDIATELY NOTIFIED FOR DIRECTION.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PERFORM ALL NECESSARY CUTS AND FILLS WITHIN THE LIMITS OF THIS PROJECT AND THE RELATED OFF-SITE WORK, SO AS TO GENERATE THE DESIRED SUBGRADE, FINISH GRADES AND SLOPES SHOWN.
3. CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR ALL EXCAVATION. ADEQUATE SHORING SHALL BE DESIGNED AND PROVIDED BY THE CONTRACTOR TO PREVENT UNDERMINING OF ANY ADJACENT FEATURES OR FACILITIES AND/OR CAVING OF THE EXCAVATION.
4. THE CONTRACTOR IS WARNED THAT AN EARTHWORK BALANCE WAS NOT NECESSARILY THE INTENT OF THIS PROJECT. ANY ADDITIONAL MATERIAL REQUIRED OR LEFTOVER MATERIAL FOLLOWING EARTHWORK OPERATIONS BECOMES THE RESPONSIBILITY OF THE CONTRACTOR.
5. THE GRADING CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE OWNER TO PROVIDE FOR THE REQUIREMENTS OF THE PROJECT STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND ASSOCIATED PERMIT.
6. CONTRACTOR SHALL GRADE TO THE LINES AND ELEVATIONS SHOWN ON THE PLANS WITHIN THE FOLLOWING HORIZONTAL AND VERTICAL TOLERANCES AND DEGREES OF COMPACTION, IN THE AREAS INDICATED:

	HORIZONTAL	VERTICAL	COMPACTION
A. PAVEMENT AREA SUBGRADE	0.1'±	+0.0' TO −0.1'	SEE SOILS REPORT
B. ENGINEERED FILL	0.5'±	+0.1' TO −0.1'	SEE SOILS REPORT

COMPACTION TESTING WILL BE PERFORMED BY THE OWNER OR HIS REPRESENTATIVE. COMPACTION SHALL COMPLY WITH THE REQUIREMENTS OF THE ENGINEER.

7. ALL CUT AND FILL SLOPES SHALL BE PROTECTED UNTIL EFFECTIVE EROSION CONTROL HAS BEEN ESTABLISHED.
8. THE USE OF POTABLE WATER WITHOUT A SPECIAL PERMIT FOR BUILDING OR CONSTRUCTION PURPOSES INCLUDING CONSOLIDATION OF BACKFILL OR DUST CONTROL IS PROHIBITED. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS FOR CONSTRUCTION WATER.
9. THE CONTRACTOR SHALL MAINTAIN THE STREETS, SIDEWALKS AND ALL OTHER PUBLIC RIGHT- OF-WAY IN A CLEAN, SAFE AND USABLE CONDITION. ALL SPILLS OF SOIL, ROCK OR CONSTRUCTION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE PUBLICLY OWNED PROPERTY DURING CONSTRUCTION AND UPON COMPLETION OF THE PROJECT. ALL ADJACENT PROPERTY, PRIVATE OR PUBLIC SHALL BE MAINTAINED IN A CLEAN, SAFE AND USABLE CONDITION.
10. IN THE EVENT THAT ANY TEMPORARY CONSTRUCTION ITEM IS REQUIRED THAT IS NOT SHOWN ON THESE DRAWINGS, SUCH ITEM SHALL BE PROVIDED, AS DIRECTED BY THE CITY ENGINEER, AT NO EXPENSE TO THE CITY OF LAS VEGAS. TEMPORARY CONSTRUCTION INCLUDES DITCHES, BERMS, ROAD SIGNS AND BARRICADES, ETC.

REVISED 4/15/10

STORMWATER RUNOFF MANAGEMENT

1. THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE CITY OF LAS VEGAS AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BEST MANAGEMENT PRACTICES MANUAL.
3. TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CESSATION OF ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.5.
4. AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR100000, SECTION III.A.12.
5. ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

CITY OF LAS VEGAS SEWER NOTES

1. ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEMS AND THE UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA, AS AMENDED. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO BE AWARE OF THE CONTENTS OF THE ABOVE SPECIFICATIONS.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PERFORM CONSTRUCTION AS PER PLANS. ANY ADDITIONS, DELETIONS, OR CHANGES SHALL FIRST MEET WITH THE APPROVAL OF THE CITY ENGINEER.
3. CHISEL "S" OR "G" IN CURBS WHERE SEWER OR GAS LATERALS PASS UNDER THE CURB.
4. POLYVINYL (PVC) SEWER PIPE SHALL MEET ASTM D-3034 SDR 35 SPECIFICATIONS, INSTALLED WITH SAND BEDDING AND BACKFILL OF TYPE II AGGREGATE BASE.
5. ALL MANHOLES PAVED IN STREETS EIGHTY (80') FOOT R/W AND LARGER SHALL HAVE CONCRETE COLLARS. STREETS LESS THAN EIGHTY (80') FOOT R/W WILL REQUIRE RETROFIT IF PAVING DOES NOT CONFORM TO CITY STANDARDS AT THE MANHOLE.
6. TEE SADDLES SHALL BE USED TO CONNECT SEWER LATERALS TO EXISTING MAIN LINES UP TO TWELVE INCH (12") DIAMETER. CONNECTIONS TO FIFTEEN INCH (15") OR LARGER MAINS SHALL REQUIRE SPECIAL PROCEDURES. IN LINE "Y" 'S SHALL BE USED ON LINES TWELVE INCHES (12") OR ABOVE.
7. WATER MAINS SHALL BE PROTECTED IN ACCORDANCE WITH LVVWD STANDARDS WHENEVER A SEWER MAIN CROSSES OVER A WATER MAIN OR THE SEWER IS LESS THAN EIGHTEEN INCH (18") UNDER A WATER MAIN.
8. ALL CONTRACTORS INSTALLING SEWER MAINS THAT WILL BE UNDER THE JURISDICTION OF THE CITY OF LAS VEGAS MUST BE STATE OF NEVADA CLASS "A" CONTRACTORS.
9. THE CITY OF LAS VEGAS WILL NOT ACCEPT ANY SEWER MAINS WHICH HAVE A VERTICAL DEFLECTION OF MORE THAN ONE TENTH (0.1) OF A FOOT FROM THE APPROVED CONSTRUCTION PLANS AT ANY LOCATION. SEWER MAINS FOUND TO EXCEED THIS TOLERANCE WILL HAVE TO BE REPAIRED OR REMOVED OR REPLACED TO THE SATISFACTION OF THE CITY ENGINEER PRIOR TO ACCEPTANCE BY THE CITY OF LAS VEGAS.
10. INSTALLATION OF CURVED SEWER REQUIRES THE USE OF C-900 PIPE WHICH ALLOWS FOR PIPE DEFLECTION AT THE JOINTS.

REVISED 04/15/10

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LAS VEGAS FIRE AND RESCUE GENERAL NOTES

1. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE LAS VEGAS FIRE AND RESCUE ADOPTED FIRE CODE ORDINANCE #6325 FOR HYDRANT SPECIFICATIONS AND HYDRANT INSTALLATION SPECIFICATIONS.
2. AUTHORIZED FIRE HYDRANTS ARE AS FOLLOWS:
   A. KENNEDY – GUARDIAN MODELS K81A AND K81D
   B. MUELLER – SUPER CENTURION 250 MODEL A-423
   C. CLOW – MEDALLION MODEL F-2546LVD
   D. U.S. PIPE – METROFLOW/M-03
3. A PERMIT IS REQUIRED FROM LAS VEGAS FIRE AND RESCUE FOR THE INSTALLATION OF ON-SITE WATER LINES AND FIRE HYDRANTS. THE PERMIT AND CONTRACTORS MATERIAL TEST CERTIFICATE FOR UNDERGROUND PIPING FORM SHALL BE OBTAINED FROM THE FIRE PROTECTION ENGINEER BEFORE COMMENCEMENT OF WORK. [IFC §105.7.12]
4. ON ANY RESIDENTIAL OR COMMERCIAL INSTALLATIONS, FIRE HYDRANTS SHALL BE INSTALLED AND FIRE APPARATUS ACCESS ROADS SHALL BE MAINTAINED BEFORE COMMENCEMENT OF ANY COMBUSTIBLE CONSTRUCTION. ALL FIRE HYDRANTS SHALL BE IN GOOD WORKING ORDER AND SHALL BE CAPABLE OF DELIVERING THE REQUIRED FIRE FLOW. [IFC §3310, §3312]
5. TO IDENTIFY THE FIRE HYDRANT LOCATIONS, THE CONTRACTOR SHALL PLACE A BLUE REFLECTIVE MARKER AT THE CENTER LINE OF THE STREET ADJACENT TO THE FIRE HYDRANTS. [IFC §507.5.7.3]
6. ALL UNDERGROUND INSPECTIONS, PRESSURE AND FLUSH VERIFICATIONS OF ALL FIRE HYDRANTS AND FIRE LINES, SHALL BE CONDUCTED BEFORE COVERING THE LINES. CENTER LOADING IS ACCEPTABLE FOR THE HYDRO TESTS WITH PRIOR FIRE PREVENTION APPROVAL. [IFC §106.3]
7. ALL ON-SITE UNDERGROUND WATER MAINS AND MATERIALS SHALL BE U.L. LISTED, A.W.W.A. APPROVED AND SHALL BE RATED FOR THE APPROPRIATE WORKING PRESSURE. [IFC §507.2.1, NFPA 24]
8. PAINTING OF CURBS, FIRE HYDRANTS, PADS, PROTECTION OF FIRE HYDRANTS FROM PHYSICAL DAMAGE, AND ALL OTHER WORK NECESSARY PER PLANS SHALL BE COMPLETED BEFORE APPROVAL BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION. [IFC §507]
9. PRIVATE FIRE HYDRANTS SHALL BE PAINTED RED. [IFC §507.5.7.1]
10. PRIOR TO THE FINAL OCCUPANCY, A FIRE FLOW TEST SHALL BE WITNESSED BY LAS VEGAS FIRE AND RESCUE, FIRE PREVENTION DIVISION TO VERIFY AVAILABILITY OF THE REQUIRED FIRE FLOW. [IFC §507]
11. FIRE HYDRANTS SPACING SHALL BE AS FOLLOWS: [IFC §C102]
    RESIDENTIAL – 500 FT UNSPRINKLERED; 600 FT SPRINKLERED.
    COMMERCIAL – 300 FT UNSPRINKLERED; 400 FT SPRINKLERED.
12. WHERE NEW WATER MAINS ARE EXTENDED ALONG STREETS OR NEW STREETS ARE INSTALLED WHERE FIRE HYDRANTS ARE NOT NEEDED FOR PROTECTION OF THE STRUCTURES, FIRE HYDRANTS SHALL BE INSTALLED AT A MAXIMUM 1,000 FT SPACING, TO PROVIDE FOR TRANSPORTATION HAZARDS. WHERE STREETS ARE PROVIDED WITH MEDIAN DIVIDERS OR HAVE FOUR (4) OR MORE TRAFFIC LANES AND HAVE A TRAFFIC COUNT OF MORE THAN 30,000 PER DAY, HYDRANTS ARE REQUIRED ON EACH SIDE OF THE STREET SPACED AT 500 FEET ON AN ALTERNATING BASIS. [IFC §C102.8]
13. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN THE RADIUS OF THE CUL-DR-SAC OR WITHIN 20 FT OF THE PERIMETER OF THE RADIUS OF THE CUL-DE-SAC.
14. NO FIRE HYDRANTS SHALL BE LOCATED WITHIN 6 FEET OF ANY CURB RETURN, DRIVEWAY, POWER POLE, STREETLIGHT OR ANY OTHER OBSTRUCTION. [IFC §C102.12]
15. A MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A ONE-TWO FAMILY DWELLING SHALL NOT EXCEED 300 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC §C102.4]
16. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO A FIRE DEPARTMENT CONNECTION (FDC) SHALL NOT EXCEED 100 FT, AS MEASURED BY AN APPROVED ROUTE. [IFC § C102.7]
17. THE MAXIMUM DISTANCE FROM A FIRE HYDRANT TO THE END OF A DEAD-END STREET SHALL NOT EXCEED 200 FT. [IFC §C102.6]
18. TWO SOURCES OF SUPPLY ARE REQUIRED WHENEVER THERE ARE 4 OR MORE FIRE HYDRANTS/SPRINKLER LEAD-INS INSTALLED ON A SINGLE SYSTEM. SECTIONAL CONTROL VALVES SHALL BE INSTALLED SO THAT NO MORE THAN 2 FIRE HYDRANTS CAN BE OUT OF SERVICE DUE TO A BREAK IN A WATER MAIN. [IFC §C104]
19. ALL FIRE APPARATUS ACCESS ROADS SHALL BE PAVED TO PROVIDE ALL-WEATHER DRIVING CAPABILITIES, AND SHALL BE DESIGNED AND MAINTAINED TO SUPPORT THE IMPOSED LOADS OF THE FIRE APPARATUS. [IFC §503.2.3]
20. THE GRADIENT FOR THE FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 12%. ANGLES OF APPROACH AND ANGLES OF DEPARTURE SHALL NOT EXCEED 6% FOR 25 FEET PRIOR TO OR AFTER THE GRADE CHANGE. ADJACENT TO THE STRUCTURES GRADIENT SHALL NOT EXCEED 6%. [IFC §503.2.7, §503.2.8]
21. THE TURNING RADIUS OF THE FIRE APPARATUS ACCESS ROADS SHALL BE NO LESS THAN 52 FT OUTSIDE AND 28 FT INSIDE TURNING RADIUS. [IFC §503.2.4]
22. VERTICAL CLEARANCE OF ALL FIRE APPARATUS ACCESS ROADS SHALL NOT BE LESS THAN 13 FT 6 INS. [IFC §503.2.1]
23. FIRE DEPARTMENT ACCESS ROADS SHALL HAVE A MINIMUM UNOBSTRUCTED WIDTH OF NOT LESS THAN 40 FT FLOW LINE TO THE FLOW LINE WITH PARALLEL PARKING PERMITTED ON BOTH SIDES. NOT LESS THAN 32 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE PARKING IS PERMITTED ONLY ON ONE SIDE OF THE FIRE APPARATUS ACCESS ROAD. NOT LESS THAN 24 FT WIDE, FLOW-LINE TO FLOW-LINE, WHERE NO PARKING IS PERMITTED ON EITHER SIDE. FIRE LANES THROUGH PARKING LOTS SHALL BE NOT LESS THAN 24 FT. [IFC §503.2.1.1]
24. A FIRE APPARATUS ACCESS ROAD SHALL BE REQUIRED WHEN ANY PORTION OF AN EXTERIOR WALL OF THE FIRST STORY IS LOCATED MORE THAN 150 FT FROM A FIRE DEPARTMENT VEHICLE ACCESS. THIS DISTANCE COULD BE INCREASE TO 250 FT IF THE BUILDING IS SPRINKLERED. [IFC §503.1.1]
25. APPROVED SECONDARY FIRE APPARATUS ACCESS SHALL BE PROVIDED FOR 100 OR MORE DWELLING UNITS, ROAD(S) WITH DEAD-ENDS OR WITH A SINGLE POINT OF ACCESS IN EXCESS OF 600 FT. COMMERCIAL AND INDUSTRIAL DEVELOPMENTS WHERE BUILDINGS EXCEED 2 STORIES OR 30 FEET IN HEIGHT, OR EXCEEDING 62,000 SQUARE FEET IN AREA. [IFC §503.1.2]
26. ALL DEAD-END FIRE APPARATUS ROADS AND/OR FIRE LANES, PUBLIC OR PRIVATE, IN EXCESS OF 150 FT IN LENGTH SHALL BE PROVIDED WITH AN APPROVED TURN AROUND HAVING A MINIMUM DIAMETER OF 81 FT. [IFC §503.2.5]
27. ALL FIRE APPARATUS ACCESS ROADS SHALL BE MARKED BY PLACING APPROVED SIGNS AT THE START OF THE DESIGNATED FIRE LANE, ONE SIGN AT THE END OF THE FIRE LANE AND WITH SIGNS AT INTERVALS 100 FT ALONG THE DESIGNATED FIRE LANES. SIGNS TO BE PLACED ON BOTH SIDES OF AN ACCESS ROADWAY IF NEEDED TO PREVENT PARKING ON EITHER SIDE. SIGNS TO BE INSTALLED NO HIGHER THAN 10 FT OR LESS THAN 6 FT FROM ROADWAY LEVEL. THE CURB ALONG OR ON THE PAVEMENT OR CEMENT (IF NO CURB IS PROVIDED) SHALL BE PAINTED WITH A RED WEATHER RESISTANT PAINT IN ADDITION TO THE SIGNS. [IFC §503.3]
28. ELECTRICALLY CONTROLLED ACCESS GATES SHALL BE PROVIDED WITH AN APPROVED EMERGENCY VEHICLE DETECTOR/RECEIVER SYSTEM. SAID SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH THE IFC 503.6 AND IFC APPENDIX M.

REVISED JULY 1, 2014

FLOOD ZONE NOTE

NO PORTION OF THE SITE FALLS WITHIN A FEMA DESIGNATED SPECIAL FLOOD HAZARD AREA. SITE LOCATED ON PANEL 3200320150E, DATED SEPTEMBER 27, 2002, TO REFLECT A LOMR. THIS PANEL SHOWS THAT THE PROJECT IS LOCATED WITHIN A ZONE X AND NOT LOCATED WITHIN A FEMA DESIGNATED 100-YEAR ZONE A OR SPECIAL FLOOD HAZARD AREA.

DEVIATION FROM STANDARDS

1. NONE

CITY OF LAS VEGAS TRAFFIC NOTES

1. ALL CONSTRUCTION SIGNING, BARRICADING, AND TRAFFIC DELINEATION SHALL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", LATEST EDITION.
2. THE STREET SIGN CONTRACTOR SHALL OBTAIN STREET NAMES AND BLOCK NUMBERING FROM THE PLANNING DEPARTMENT PRIOR TO CONSTRUCTION.
3. BEFORE ANY WORK IS STARTED IN THE RIGHT-OF-WAY, THE CONTRACTOR SHALL INSTALL ADVANCED WARNING SIGNS FOR THE CONSTRUCTION ZONE. THE CONTRACTOR SHALL INSTALL TEMPORARY STOP SIGNS AT ALL NEW STREET ENCROACHMENTS INTO EXISTING CITY STREETS WHERE WARRANTED IMMEDIATELY AFTER FIRST GRADING WORK IS ACCOMPLISHED, AND SHALL MAINTAIN SAID SIGNS UNTIL PERMANENT SIGNS ARE INSTALLED.
4. WHEN A DESIGNATED "SAFE ROUTE TO SCHOOL" IS ENCROACHED UPON BY A CONSTRUCTION WORK ZONE AND PUBLIC WORKS STAFF IDENTIFIES A NEED FOR STUDENTS TO BE ASSISTED IN THE SAFE CROSSING THROUGH THAT WORK ZONE, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE A QUALIFIED "CROSSING GUARD". THE GUARD SHALL BE PRESENT FOR THE FULL DURATION OF TIME THAT CHILDREN ARE LIKELY TO BE PRESENT.
5. IF THE IMPROVEMENTS NECESSITATE THE OBLITERATION, TEMPORARY OBSTRUCTION, TEMPORARY REMOVAL OR RELOCATION OF ANY EXISTING TRAFFIC PAVEMENT MARKING, SUCH PAVEMENT MARKING SHALL BE RESTORED OR REPLACED WITH LIKE MATERIALS TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PERMANENT SIGNS SHOWN ON THE PLANS. ALL NEW SIGNS SHALL BE FABRICATED WITH DIAMOND GRADE VIP CLASS 6 REFLECTIVE SHEETING OR APPROVED EQUAL. ALL NEW TRAFFIC SIGNS, EXCEPT STREET NAME AND SCHOOL SPEED LIMIT SIGNS, SHALL HAVE 3M SERIES 1160 OR APPROVED EQUIVALENT ANTI-GRAFFITI PROTECTIVE OVERLAY FILM; SCHOOL ZONE SIGNS SHALL HAVE 3M SERIES 1150 ANIT-GRAFFITI PROTECTIVE OVERLAY FILM. STREET NAME SIGNS SHALL CONFORM IN THEIR ENTIRETY TO CURRENT CITY STANDARDS. ALL OTHER SIGNS SHALL BE STANDARD SIZE UNLESS OTHERWISE SPECIFIED ON THE PLANS. ALL SIGN POSTS SHALL BE INSTALLED IN ACCORDANCE WITH THE CURRENT CITY STANDARDS.
7. WHEN A PROPOSED STREET LIGHT STANDARD IS LOCATED WITHIN FIVE (5') FEET OF ANY PROPOSED SIGN SHOWN ON THE PLANS TO BE MOUNTED ON A SIGNPOST, THE SIGN SHALL BE MOUNTED ON THE STREET LIGHT STANDARD AND THE SIGNPOST SHALL BE ELIMINATED.
8. ALL PERMANENT TRAFFIC CONTROL DEVICES CALLED FOR HEREON SHALL BE IN PLACE AND IN FINAL POSITION PRIOR TO ALLOWING ANY PUBLIC TRAFFIC ONTO THE PORTIONS OF THE ROAD(S) BEING IMPROVED HERE UNDER, REGARDLESS OF THE STATUS OF COMPLETION OF PAVING OR OTHER OFF-SITE IMPROVEMENTS CALLED FOR BY THESE PLANS.
9. STREET SIGNS AND STOP SIGNS SHALL BE INSTALLED PER CITY STANDARD SPECIFICATIONS FOR PLACEMENT OF STREET NAME SIGNS.
10. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TRAFFIC CONTROL DEVICES AND FLAGGERS TO INSURE THE SAFETY OF THE PUBLIC IN OR AROUND THE WORK AREA. THE CONTRACTOR SHALL HAVE A CERTIFIED ATSSA TRAFFIC CONTROL TECHNICIAN OR IMSA WORK ZONE SAFETY SPECIALIST SET UP, MAINTAIN AND REMOVE ALL TRAFFIC CONTROL DEVICES IN THE CITY OF LAS VEGAS RIGHT-OF-WAY.
11. WORK IN PUBLIC STREETS, ONCE BEGUN, SHALL BE EXPEDITED TO COMPLETION SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND TO TO THE TRAVELING PUBLIC.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING CITIZENS AREA TRANSIT (C.A.T.) IF THE CONSTRUCTION INTERRUPTS OR RELOCATES A BUS STOP OR HAS AN ADVERSE EFFECT ON BUS SERVICE ON THAT STREET TO ARRANGE FOR TEMPORARY RELOCATION OF STOP.
13. GUARDS SHALL BE OBTAINED BY CONTACTING THE METROPOLITAN POLICE DEPARTMENT SPECIAL EVENTS UNIT (PHONE # 828-3442) WHO WILL PROVIDE OFFICERS PROPERLY TRAINED IN TRAFFIC CONTROL. FEES FOR THE USE OF THESE OFFICERS SHALL BE SET BY METRO AND WILL BE PAID BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE FOR ALL ARRANGEMENTS WITH METRO.
14. ANY WORK WITHIN 300' OF A SIGNALIZED INTERSECTION WILL BE NIGHT WORK, UNLESS DIRECTED BY THE CITY OF LAS VEGAS TRAFFIC ENGINEER.
15. CONTRACTOR SHALL CONTACT THE TRAFFIC ENGINEERING DIVISION (TRANSPORTATION SECTION) THROUGH THE PROJECT'S OFFSITE INSPECTOR PRIOR TO INITIATING PAVING TO RECEIVE DIRECTION FOR ANY PERMANENT OR TEMPORARY MODIFICATIONS TO THE APPROVED DRAWINGS REGARDING FINAL PAVEMENT TRANSITIONS, MARKINGS AND SIGNING THAT ARE REQUIRED TO MATCH ADJACENT ROADWAY SEGMENTS. THE CONTRACTOR SHALL PROVIDE A DRAWING FOR APPROVAL BY THE TRAFFIC ENGINEERING DIVISION DEPICTING ANY ADJUSTMENTS TO THE FINAL PAVEMENT MARKINGS AND SIGNAGE, WHICH MAY INCLUDE OMITTING, ADDING OR MODIFYING PAVEMENT MARKINGS AND TRAFFIC CONTROL SIGNS SUCH THAT ADEQUATE TRANSITIONS AND LANE TERMINATIONS BETWEEN ADJACENT ROADWAY SEGMENTS ARE CONSTRUCTED.

REVISED 4/15/10

CITY OF LAS VEGAS STREETLIGHT NOTES

1. ALL STREET LIGHTING INSTALLATIONS SHALL BE IN ACCORDANCE WITH THE STREET LIGHTING PLANS, THE "UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION, AND THE "UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA, NEVADA", LATEST REVISION, AND ANY ADOPTED SPECIAL AREA STANDARDS.
2. NO DEVIATION OF STREET LIGHT, PULL BOX, CONDUITS (ETC.) LOCATIONS SHALL BE PERMITTED WITHOUT WRITTEN APPROVAL OF THE TRAFFIC ENGINEER AND THE CITY ENGINEER.
3. ALL EXISTING STREET LIGHTING SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.
4. ALL STREET LIGHTING CONDUITS STUB SHALL HAVE AT LEAST ONE GREEN #8 THW WIRE INSTALLED, AS TRACER WIRE. WHEN "EMPTY" CONDUIT IS COMPLETELY INSTALLED FROM PB TO PB, IT SHALL HAVE MINIMUM OF 2 #4 AND 1 #8 THW WIRE WITH THE ENDS TAPED OR "SAFE OFF" PRIOR TO FINAL INSPECTION.
5. ANY STRUCTURE SUCH AS BLOCK WALLS, CHAIN LINK FENCES, RETAINING WALLS, ETC., SHALL LEAVE A MINIMUM CLEARANCE IN ACCORDANCE WITH THE USD NO. 320A.
6. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE TEFO PRIOR TO ANY PRE-FINAL INSPECTION. THE AS-BUILT DRAWING NEEDS TO BE STAMPED AS-BUILT AND SIGNED BY THE PREPARER.
7. SERVICE POINT SHALL BE COORDINATED WITH NV ENERGY COMPANY, AND WHEREVER POSSIBLE, BE LOCATED NEAR THE CENTER OF THE CIRCUIT. SERVICE POINTS SHALL BE SHOWN ON THE PLANS.
8. IT SHALL BE ASSUMED THAT IN THE ABSENCE OF AN EXISTING, WORKABLE CIRCUIT TO ATTACH TO, ALL INSTALLATIONS SHALL REQUIRE A NEW SERVICE FOR OPERATION OF THE CIRCUIT.
9. WHEREVER THERE IS AN OVERHEAD UTILITY THAT MAY CONFLICT WITH THE INSTALLATION OF STREET LIGHTING CIRCUITS AND/OR POLES, THESE CONFLICTS MUST BE RESOLVED BETWEEN THE DEVELOPER AND THE UTILITIES INVOLVED, AT NO EXPENSE TO THE CITY OF LAS VEGAS, BEFORE STREETLIGHT BASES ARE INSTALLED.
10. THE CONTRACTOR SHALL FURNISH COMPLETE SERVICE TO TRANSFORMERS AND CONTROL SYSTEMS IF REQUIRED ON PLANS.
11. THE DEVELOPER/OWNER WILL BE REQUIRED TO SUPPLY POWER TO ALL NEW PUBLIC STREET LIGHTS INSTALLED UNDER THIS DESIGN PRIOR TO BOND RELEASE OR PROJECT COMPLETION. THE DEVELOPER/OWNER WILL BE RESPONSIBLE FOR ALL ITEMS ASSOCIATED WITH THE INSTALLATION, CONSTRUCTION, ENERGIZING, MAINTENANCE AND OPERATIONAL COST OF SAID STREET LIGHTS PRIOR TO PROJECT COMPLETION. REFER TO THE PLAN FOR ANY NEW SERVICE REQUIREMENTS. THE TRANSFER OF OWNERSHIP FROM THE DEVELOPER/OWNER TO THE CITY OF LAS VEGAS FOR ALL NEW PUBLIC STREET LIGHT/S AND/OR SERVICE/S INSTALLED UNDER THIS PLAN WILL BE IN CONJUNCTION WITH THIS PROJECT COMPLETION. COORDINATE ALL MAINTENANCE AND OPERATIONAL TRANSFERS WITH THE CITY OF LAS VEGAS TRAFFIC ENGINEERING DEPARTMENT (TEFO) AT (702) 229-6331.

REVISED 04/15/10

BASIS OF BEARING

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

LAS VEGAS VALLEY WATER DISTRICT (LVVWD) STANDARD NOTES

LVVWD PROJECT #

1. NO WORK SHALL BEGIN UNTIL THE WATER PLANS HAVE BEEN APPROVED FOR CONSTRUCTION BY THE LVVWD. FOLLOWING WATER PLAN APPROVAL, NOTICE SHALL BE GIVEN TO THE LVVWD COMMUNICATION SUPPORT CENTER (258-7171) TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION. FOR FUTURE INSPECTIONS, NOTICE MUST BE GIVEN BY 2:00 P.M. THE BUSINESS DAY PRIOR TO THE REQUESTED LVVWD INSPECTION. WHEN REQUESTING INSPECTIONS, PLEASE REFER TO THE PROJECT # IDENTIFIED ABOVE.
2. ALL WORK SHALL CONFORM TO LVVWD STANDARD PLATES, DRAWINGS, AND SPECIFICATIONS, AND TO THE 2010 EDITION OF THE UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR POTABLE WATER SYSTEMS (UDACS). THE LATEST EDITION OF UDACS SHALL SUPERSEDE ANY CONFLICTS CONTAINED IN THE APPROVED DRAWINGS AND/OR SPECIFICATIONS.
3. ALL WORK, EXCEPT AS MODIFIED BY THESE PLANS OR BY NOTE 2 ABOVE, SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT DRAFT OR EDITION OF THE UNIFORM SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION OFFSITE IMPROVEMENT, CLARK COUNTY AREA.
4. A SINGLE PIPE MATERIAL SHALL BE USED THROUGHOUT THE PROJECT UNLESS OTHERWISE APPROVED BY THE LVVWD.
5. ALL SERVICE LATERALS TWO (2) INCHES IN DIAMETER AND SMALLER SHALL BE TYPE K COPPER TUBING WITH LVVWD APPROVED SERVICE SADDLES.
6. ALL WATER METER BOXES SHALL BE LOCATED OUTSIDE OF DRIVEWAY AREAS.
7. ALL VALVES SHALL BE LOCATED OUTSIDE OF DRIVEWAYS, VALLEY AND CURB GUTTERS.
8. ALL WATER AND STORM DRAIN OR SANITARY SEWER CROSSINGS SHALL CONFORM TO SECTION 2.22 OF THE 2010 EDITION OF THE UDACS
9. ALL WATER FACILITIES SHALL BE FILLED, DISINFECTED, PRESSURE TESTED, FLUSHED, FILLED, AND AN ACCEPTABLE WATER SAMPLE OBTAINED, PRIOR TO CONNECTION TO THE LVVWD DISTRIBUTION SYSTEM.
10. THE CONTRACTOR MUST OBTAIN ALL METERS TWO (2) INCHES AND SMALLER FROM LVVWD CENTRAL STORES. TELEPHONE 258-3152 OR 258-3802, TWO (2) WORKING DAYS PRIOR TO METER PICKUP.
11. ANY INTERRUPTION OF SERVICE MUST BE PERFORMED IN ACCORDANCE WITH UDACS SECTION 3.14.01, AND APPROVED BY THE LVV

ABBREVIATIONS

A	AIR
AB	AGGREGATE BASE
AC	ASPHALT CONCRETE, ACRE
ACP	ASBESTOS CEMENT PIPE
ADD'L	ADDITIONAL
A.E.	ACCESS EASEMENT
AP	ANGLE POINT
APN	ASSESSOR'S PARCEL NUMBER
APPROX	APPROXIMATELY
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AVE	AVENUE
AVAR	AIR VALVE, AIR RELEASE ASSEMBLY
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BACK OF CURB
BCR	BEGIN CURB RETURN
BLM	BUREAU OF LAND MANAGEMENT
BLVD	BOULEVARD
BM	BENCHMARK
BO	BLOW-OFF
BVCE	BEGIN VERTICAL CURVE ELEVATION
BVCS	BEGIN VERTICAL CURVE STATION
BW	BACK OF SIDEWALK
BWV	BACK WATER VALVE
C, ℄	CENTERLINE
C&G	CURB AND GUTTER
CATV	UNDERGROUND CABLE TV
CCBM	CLARK COUNTY BENCH MARK
CCPW	CLARK COUNTY PUBLIC WORKS
CCTV	CLOSED-CIRCUIT TELEVISION
CCWRD	CLARK COUNTY WATER RECLAMATION DISTRICT
C.E.	COMMON ELEMENT
CFS	CUBIC FEET PER SECOND
CIP	CAPITAL IMPROVEMENTS PROJECT, CORRUGATED IRON PIPE
CIPM	CURED-IN-PLACE MANHOLE
CIPP	CURED-IN-PLACE PIPE
CIR	CIRCLE
CLR	CLEAR OR CLEARANCE
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CLV	CITY OF LAS VEGAS
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNLV	CITY OF NORTH LAS VEGAS
CO	CLEANOUT
CONC	CONCRETE
COND	CONDUIT
CONST	CONSTRUCT OR CONSTRUCTION
COORD	COORDINATE
COR	CORNER
CPEP	CORRUGATED POLYETHELYNE PIPE
CT	COURT
CY	CUBIC YARD(S)
Δ	DELTA
DCS	DESIGN AND CONSTRUCTION STANDARDS FOR WASTEWATER COLLECTION SYSTEM (LATEST EDITION)
D.E.	DRAINAGE EASEMENT
DEFL	DEFLECTION
DG	DESIGNED GRADE
D.I.	DROP INLET
DIA, ø	DIAMETER
DIP	DUCTILE IRON PIPE
DR	DRIVE
DS	DOWNSPOUT
DTL	DETAIL
DW	DRIVEWAY
DWG	DRAWING
E	EAST
E.A.E.	EMERGENCY ACCESS EASEMENT
ECR	END CURB RETURN
ELE.ELEC	ELECTRICAL
ELEV	ELEVATION
EP, EOP	EDGE OF PAVEMENT
ESMT	EASEMENT
EVC	END VERTICAL CURVE
EXIST,EX	EXISTING
EXP	EXPANSION JOINT
FC	FACE OF CURB
FF, FFE	FINISH FLOOR ELEVATION
FG	FINISH GRADE
FH	FIRE HYDRANT
FL	FLOW LINE
FO	FIBER OPTIC
FRP	FIBERGLASS REINFORCED PLASTIC
FS	FINISH SURFACE
FT	FOOT/FEET
FTG	FOOTING
FUT	FUTURE
G	GAS
GA	GAGE, GUY ANCHOR
GB	GRADE BREAK
GND	GROUND
GRD	GRADE, GROUND
H, HGT	HEIGHT
HDWL	HEADWALL
HGL	HYDRAULIC GRADE LINE
HOA	HOME OWNERS ASSOCIATION
HORIZ	HORIZONTAL
HP	HIGH POINT, HIGH PRESSURE
HPS	HIGH PRESSURE SODIUM
IBC	INTERNATIONAL BUILDING CODE
INV	INVERT
INT	INTERIM
JT	JOINT
L	LENGTH
L, LT	LEFT
LF	LINEAR FEET
LIP	LIP OF GUTTER
LN	LANE
LP	LIGHT POLE
LSCP	LANDSCAPE
LVVWD	LAS VEGAS VALLEY WATER DISTRICT
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MLCP	MORTAR LINED AND COATED PIPE
MOD	MODIFY/MODIFIED
MON	MONUMENT
MPH	MILES PER HOUR
N	NORTH
NDOT	NEVADA DEPARTMENT OF TRANSPORTATION
NO	NUMBER
NOSHA	STATE OF NEVADA OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
NPC	NEVADA POWER COMPANY
NTS	NOT TO SCALE
OC	ON CENTER
OHC	OVERHEAD COX COMMUNICATION
OHP	OVERHEAD POWER LINE
P.A.E.	PEDESTRIAN ACCESS EASEMENT
PB	PULL BOX
PC	POINT OF CURVE, PRESSURE CLASS
PCC	POINT OF COMPOUND CURVE
P.D.E.	PUBLIC DRAINAGE EASEMENT
PE	PROJECT ENGINEER OR POLYETHYLENE
PED	PEDESTRIAN
PGL	PROFILE GRADE LINE
PH	POTHOLE
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
P/L	PROPERTY LINE
PLCP	POLYURETHANE LINED AND COATED STEEL PIPE
PMF	PAVEMENT MARKING FILM
POB	POINT OF BEGINNING
POC	POINT ON CURVE
P.O.C.	POINT OF CONNECTION
POT	POINT ON TANGENT
PP	POWER POLE
PROP	PROPOSED
PRC	POINT OF REVERSE CURVE
P.S.E.	PUBLIC SEWER EASEMENT TO BE PRIVATELY MAINTAINED BY HOA
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
P.U.E.	PUBLIC UTILITY EASEMENT
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVT	PRIVATE
PZ	PRESSURE ZONE
R, RAD	RADIAL, RADIUS
R, RT	RIGHT
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDWY	ROADWAY
REC	RECTANGULAR
REF	REFERENCE
REINF	REINFORCED
REQD	REQUIRED
RIM	TOP OF RIM ELEVATION
RND	ROUND
ROW,R/W	RIGHT OF WAY
RP	RADIUS POINT
RPM	RAISED PAVEMENT MARKERS
RPPA	REDUCED PRESSURE PRINCIPAL ASSEMBLY
RSGV	RESILIENT SEAT GATE VALVE
S	SEWER, SOUTH
SCH	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SECT	SECTION
SF	SQUARE FOOT/FEET
SHLDR	SHOULDER
SHT	SHEET
SL	STREET LIGHT
SP	SERVICE POINT
SQ	SQUARE
SR	SEWER RECLAIM MAIN
SS	SANITARY SEWER
SSMH	SANITARY SEWER MANHOLE
STA	STATION
ST	STREET
STD	STANDARD
STL	STEEL
STRUCT	STRUCTURE
SVZ	SIGHT VISIBILITY ZONE
SW	SIDEWALK
SWG	SOUTHWEST GAS
T	TELEPHONE OR TOP
TAN	TANGENT
TB	TOP OF BERM
TC	TOP OF CURB
TCE	TEMPORARY CONSTRUCTION ESMT
TEL,TELE	TELEPHONE
TEMP	TEMPORARY
TF	TOP OF FOOTING
TG	TOP OF GRATE
TMH	TOP OF MANHOLE
TOP	TOP OF PIPE
TP	TELEPHONE POLE
TRANS	TRANSITION
TS	TRAFFIC SIGNAL
TW	TOP OF RETAINING WALL
TYP,(TYP)	TYPICAL
UDACS	UNIFORM DESIGN AND CONSTRUCTION STANDARDS FOR WATER DISTRIBUTION SYSTEMS (LATEST EDITION)
UG	UNDERGROUND
ULT	ULTIMATE
USDCCA	UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS CLARK COUNTY AREA, NEVADA (LATEST EDITION)
UT	UNDERGROUND TELEPHONE
VAR	VARIABLE/VARIES
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VERT	VERTICAL
VG	VALLEY GUTTER
VOL	VOLUME
W	WATER, WEST, WATT
W/	WITH
W.I.	WROUGHT IRON
WS	WATER SUPPLY
WT	WEIGHT
WTR	WATER
XING	CROSSING
YD	YARD, YARD DRAIN
Z	PRESSURE ZONE

QUANTITY ESTIMATE

NOTE: CONTRACTOR TO VERIFY QUANTITIES FOR BIDDING PURPOSES

STREET IMPROVEMENT - PRIVATE

DESCRIPTION	UNIT	TOTAL
2" AC PAVEMENT	SY	65,065
4" AC PAVEMENT	SY	8,410
4" TYPE II AGGREGATE BASE MATERIAL	CY	8,165
CONCRETE VALLEY GUTTER	SF	15,940
4' WIDE CONCRETE SIDEWALK	SF	56,896
5' WIDE CONCRETE SIDEWALK	SF	64,140
SIDEWALK RAMP	EA	25
"L" TYPE CURB	LF	32,040
A CURB	LF	2415

STREET IMPROVEMENT - PUBLIC

DESCRIPTION	UNIT	TOTAL
4" AC PAVEMENT	SY	8,990
4.5" AC PAVEMENT	SY	2,900
4" TYPE II AGGREGATE BASE MATERIAL	CY	1,321
CONCRETE VALLEY GUTTER	SF	1,075
5' WIDE CONCRETE SIDEWALK	SF	16,461
"L" TYPE CURB	LF	4,192
A CURB	LF	585

DRAINAGE - PUBLIC

DESCRIPTION	UNIT	TOTAL
18" RCP	LF	70
24" RCP	LF	3,450
30" RCP	LF	540
36" RCP	LF	785
42" RCP	LF	231
66" RCP	LF	1,336
72" RCP	LF	1,190
8'x7' RCB	LF	70
48" TYPE I MANHOLE	EA	2
60" TYPE I MANHOLE	EA	5
48" TYPE II MANHOLE	EA	31
60" TYPE III MANHOLE	EA	6
STORM DRAIN PER STRUCTURAL PLAN	EA	1
5' MODIFIED TYPE "CM2" DROP INLET	EA	5
7.5' MODIFIED TYPE "CM2" DROP INLET	EA	2
10' MODIFIED TYPE "CM2" DROP INLET	EA	6
12.5' MODIFIED TYPE "CM2" DROP INLET	EA	8
15' MODIFIED TYPE "CM2" DROP INLET	EA	6
17.5' MODIFIED TYPE "CM2" DROP INLET	EA	2
TYPE 2 NDOT	EA	3
RIP-RAP D50=12", T=24"	CY	1,237
RIP-RAP D50=18", T=36"	CY	990

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OR
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FAST
Call before you UnderGround
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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES, IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — No. 19396 — HIEU D. NGUYEN — Exp. 12/31/2017 — CIVIL
DATE 4/4/17

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GSW APP

PROJECT NO. 764-204-013
DESIGN: HN
DRAWN: HN
CHECK: WP
PLOT DATE: 04-04-16
PLOT TIME: 11:35:05

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

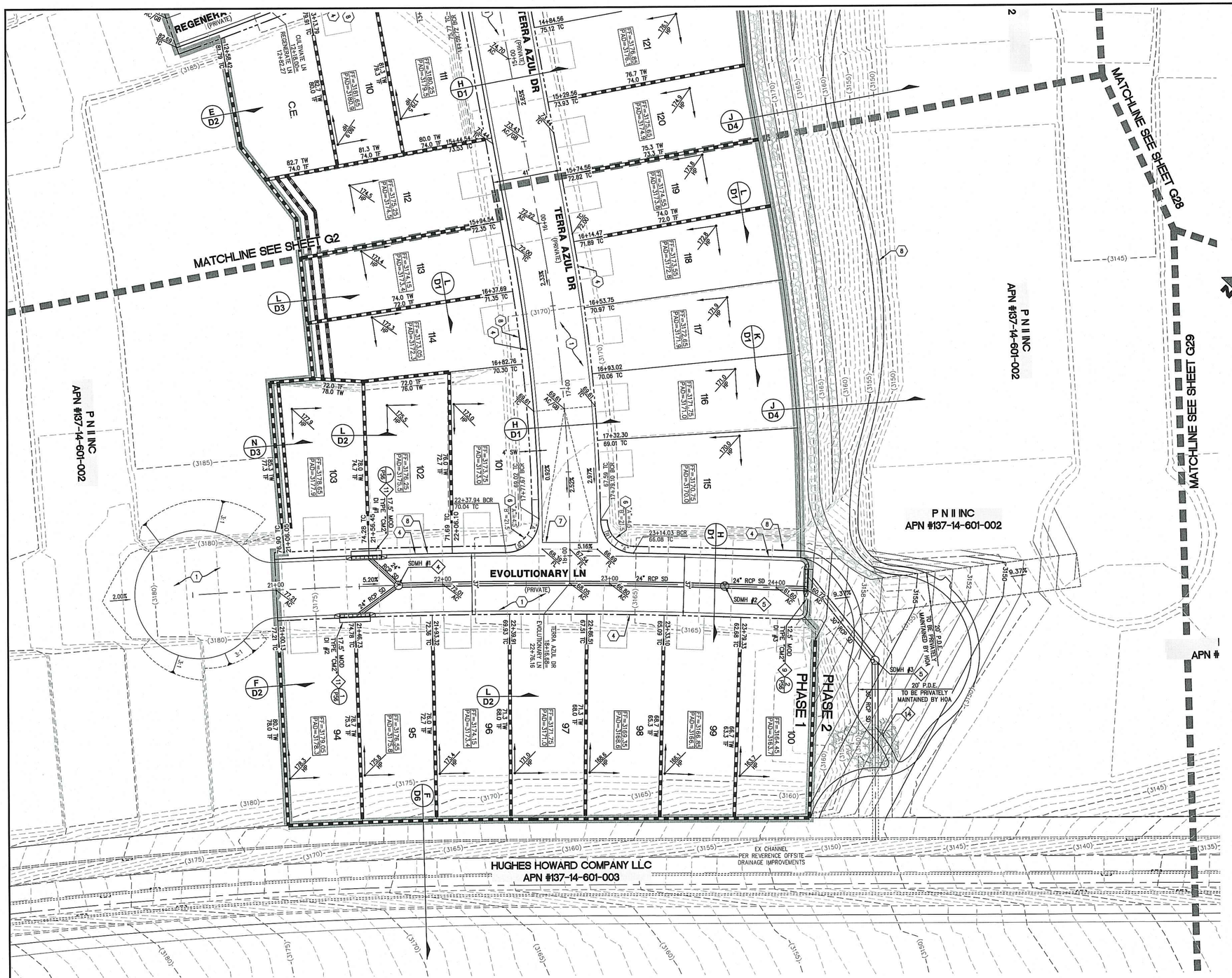
F:\Projects\700\764-204-013\DWG\Production\PH 01\01-3dPH1-C1.dwg
Hao Nguyen

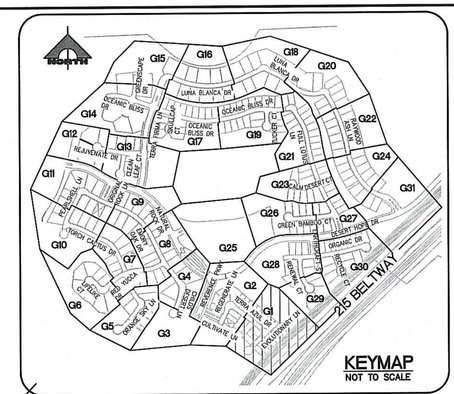
PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

GENERAL NOTES, MANHOLE SCHEDULE, AND QUANTITIES

DRAWING
C3
3 OF 152 SHTS





30' 0' 15' 30'
SCALE: 1" = 30'

CONSTRUCTION NOTES

GRADING

1. CONSTRUCT 2" AC OVER 4" TYPE II AB.
2. CONSTRUCT 3" AC OVER 4" TYPE II AB.
3. CONSTRUCT 4.5" AC OVER 4" TYPE II AB.
4. CONSTRUCT 24" L TYPE CURB AND GUTTER PER SUMMERLIN STD DWG NO. S-47.
5. CONSTRUCT "A" TYPE CURB PER SUMMERLIN STD DWG NO. S-50.
6. CONSTRUCT SIDEWALK RAMP USING ARMOR TILE TRUNCATED DOMES OR EQUIVALENT PER USDCCA DWG NO. 235 CASE 1, A=B=8.0' UNLESS OTHERWISE NOTED ON PLANS.
7. CONSTRUCT 8' WIDE CROSS GUTTER PER SUMMERLIN STD DWG NO. S-64.
8. CONSTRUCT CONCRETE SIDEWALK PER SUMMERLIN STD DWG NO. S-72 AND S-48.

STORM DRAIN

1. REMOVE PRECAST CONCRETE PLUG AND CONNECT STORM DRAIN.
2. CONSTRUCT 48" TYPE I MANHOLE PER USDCCA DWG NO. 403.1.
3. CONSTRUCT 60" TYPE I MANHOLE PER USDCCA DWG NO. 403.1.
4. CONSTRUCT 48" TYPE II MANHOLE PER USDCCA DWG NO. 405.2
5. CONSTRUCT 60" TYPE III MANHOLE PER USDCCA DWG NO. 406.1.
6. CONSTRUCT STORM DRAIN MANHOLE PER DETAIL 1 ON SHEET S2.
7. CONSTRUCT 5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.2 AND 421.
8. CONSTRUCT 10' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.
9. CONSTRUCT 12.5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.
10. CONSTRUCT 15' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.
11. CONSTRUCT 17.5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.
12. CONSTRUCT NDOT TYPE 2 DROP INLET PER "NDOT STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" (LATEST EDITION) R=4.2.1 ON SHEET D5, "A"=3.5' AND USDCCA DWG NO. 421.
13. CONSTRUCT SIDEWALK DRAIN PER USDCCA DWG NO. 236.
14. REMOVE EXISTING RIP-RAP.
15. INSTALL RIP-RAP, D50=12", THICKNESS=24"
16. CONSTRUCT HEADWALL PER DETAIL 1 ON SHEET S3.
17. CONSTRUCT PRECAST CONCRETE PLUG.
18. CONSTRUCT 7.5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.

NOTE: SEE SHEET C1 & C2 FOR ABBREVIATIONS AND QUANTITIES

STORMWATER MANAGEMENT NOTES

1. STANDARD NOTE NO. 1: THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATED IN, THE PUBLIC RIGHTS OF WAY OF THE CITY OF LAS VEGAS AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM SEWER SYSTEM.
2. STANDARD NOTE NO. 2: ADDITIONAL CONSTRUCTION SITE DISCHARGE BEST MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN THE TITLE 24.40 AND THE LAS VEGAS VALLEY CONSTRUCTION SITE BMP GUIDANCE MANUAL.
3. STANDARD NOTE NO. 3: TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY, REFER TO THE NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR 100000, SECTION III.A.5.
4. STANDARD NOTE NO. 4: AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMPS WEEKLY, AND WITHIN 24 HOURS AFTER ANY RAIN EVENT OF 0.5 INCHES OR MORE. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORMWATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO NEVADA STORMWATER GENERAL PERMIT FOR CONSTRUCTION ACTIVITY NVR 100000, SECTION III.A.12.
5. STANDARD NOTE NO. 5: ACCUMULATED SEDIMENT IN BMPS SHALL BE REMOVED WITHIN SEVEN DAYS AFTER A STORMWATER RUNOFF EVENT OR PRIOR TO THE NEXT ANTICIPATED STORM EVENT, WHICHEVER IS EARLIER. SEDIMENT MUST BE REMOVED WHEN BMP DESIGN CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

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Avoid cutting underground utility lines. It's costly.
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OR 1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

NOTE TO CONTRACTOR

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

NOTE

ALL ONSITE STORM DRAINS AND ASSOCIATED STORM FACILITIES ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE HOA.

ALL PRIVATE STREETS ARE P.U.E., PUBLIC DRAINAGE EASEMENT AND PUBLIC SEWER EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.

BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

NOTE

1. THE GEOTECHNICAL EXPLORATION PROPOSED RESIDENTIAL DEVELOPMENT SUMMERLIN VILLAGE 23B, PARCEL BB LAS VEGAS, NEVADA AS PREPARED BY ANGLE ENGINEERING, PROJECT NUMBER 77053-1, DATED MAY 28, 2014.
2. CONSTRUCTION FOR BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING SAFETY AND MAINTENANCE DEPARTMENT
3. WALLS CONSTRUCTED OTHER THAN THOSE AS DETAILED ON THIS SHEET ARE TO BE CONSTRUCTED BY WALL SUB-CONTRACTOR, DETAILS AND STRUCTURAL CALCS AS PREPARED BY OTHERS.
4. NO OBJECT OVER 24" OTHER THAN TRAFFIC CONTROL DEVICES AND STREET LIGHT POLES CAN BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE.
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NEVADA — PROFESSIONAL ENGINEER — STATE OF NEVADA — No. 19396 — HAO A. NGUYEN — Exp. 12/31/2017 — CIVIL — DATE: 4/4/16

REV	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:41:01

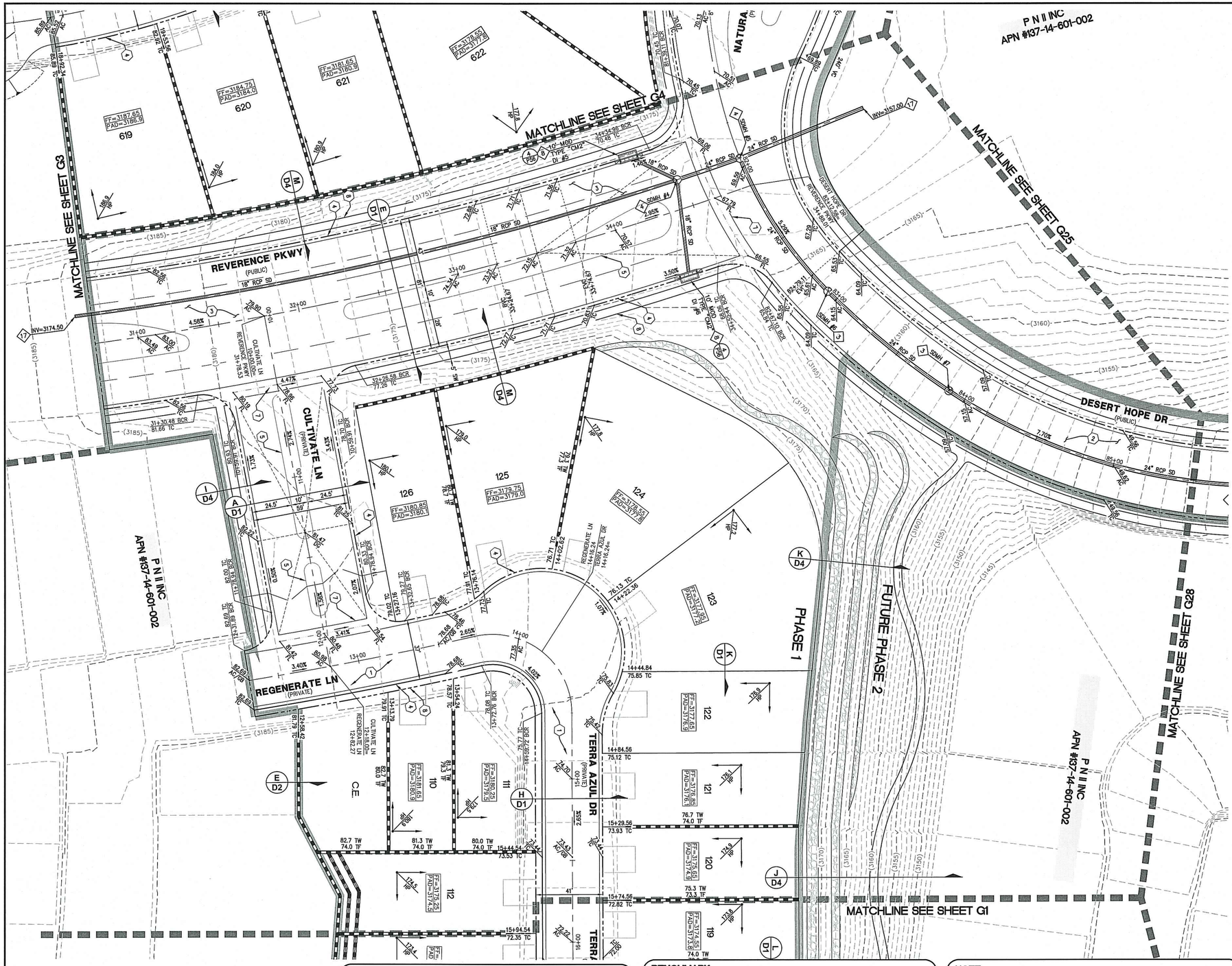
GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

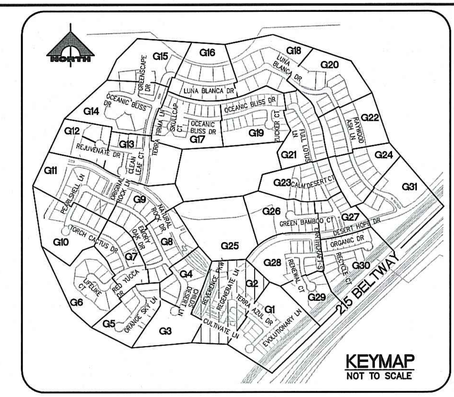
F:\Projects\700\764-204-013\DWG\Production\PH 01\01c3cPH1-G1.dwg
Hao Nguyen

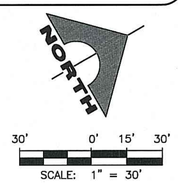
PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

GRADING PLAN 1

DRAWING
G1
4 OF XX SHTS







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HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

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ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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STATE OF NEVADA — PROFESSIONAL ENGINEER — HAO A. NGUYEN — No. 19396 — DATE: 4/4/16

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PROJECT NO. 764-204-013
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PLOT TIME: 10:40:50

GCW
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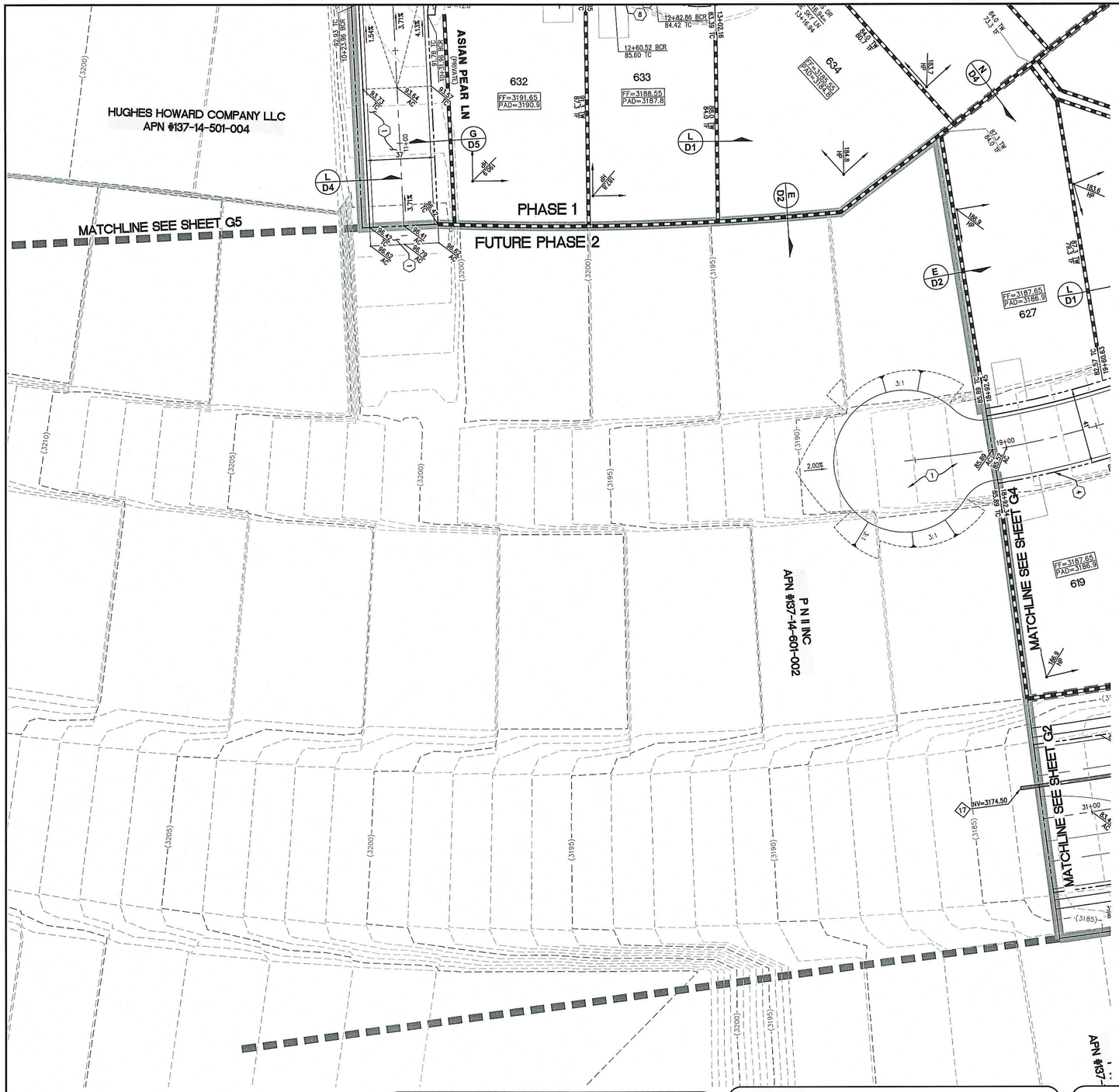
gcwengineering.com

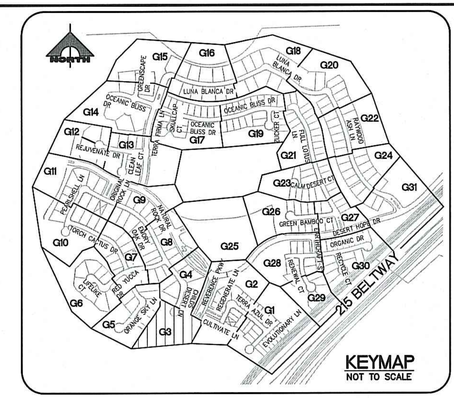
F:\Projects\700\764-204-013\DWG\Production\PH 01\01ScPH1-G1.dwg
Hao Nguyen

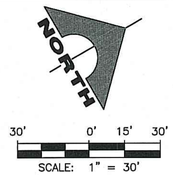
PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

GRADING PLAN 2

DRAWING G2
5 OF XX SHTS







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STATE OF NEVADA — REGISTERED PROFESSIONAL ENGINEER
HAO A. NGUYEN
No. 19396
CIVIL
DATE: 4/4/16

REV	DATE	DESCRIPTION	AGEN APP	DATE	GOV APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:40:39

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
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T: 702.804.2000
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F:\Projects\700\764-204-013\DWG\Production\PH 01\01sPH1-G1.dwg
Hao Nguyen

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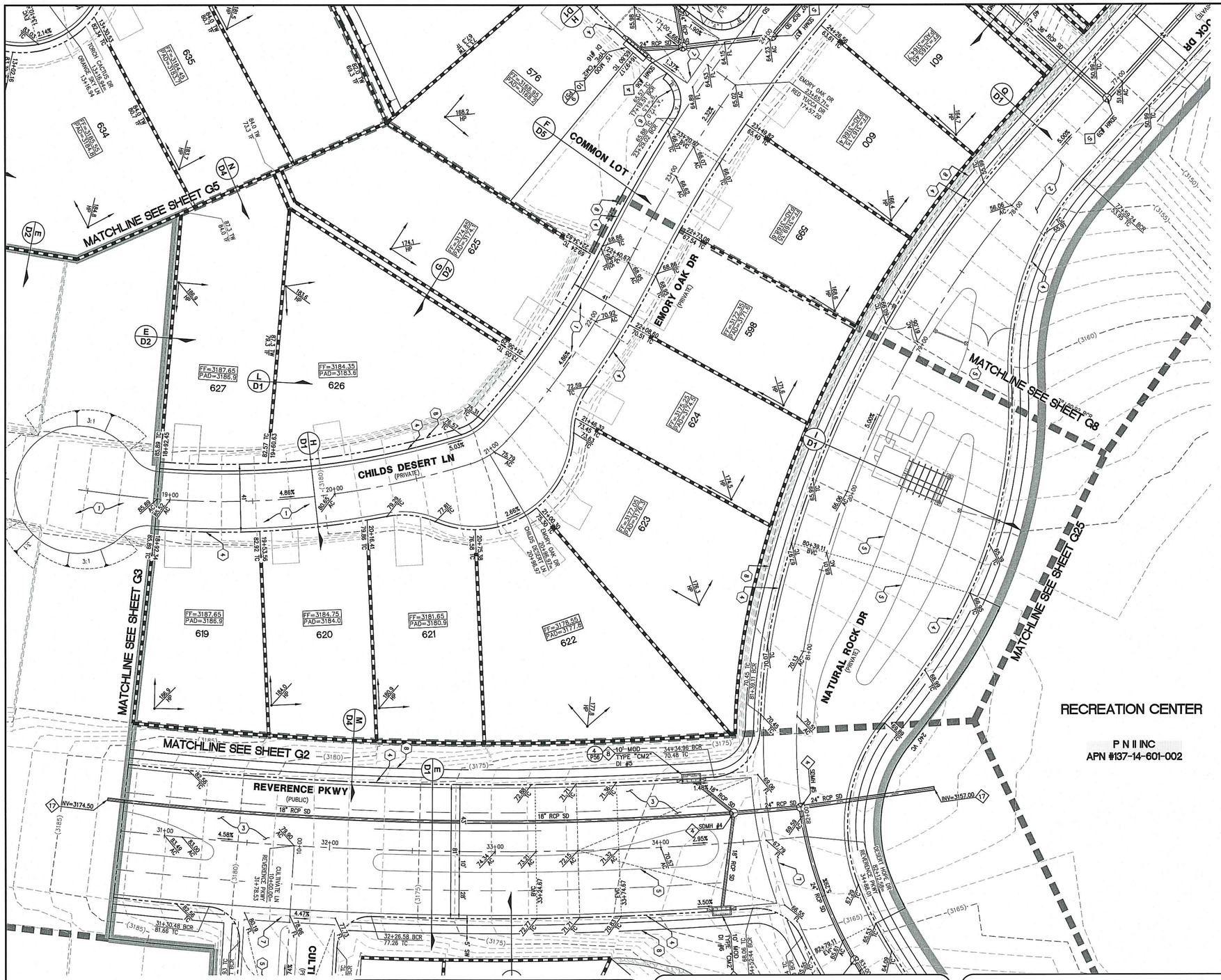
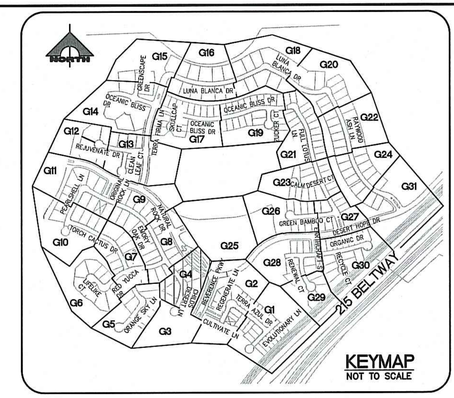
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
GRADING PLAN 3

DRAWING G3
6 OF XX SHTS





NORTH

30' 0' 15' 30'

SCALE: 1" = 30'

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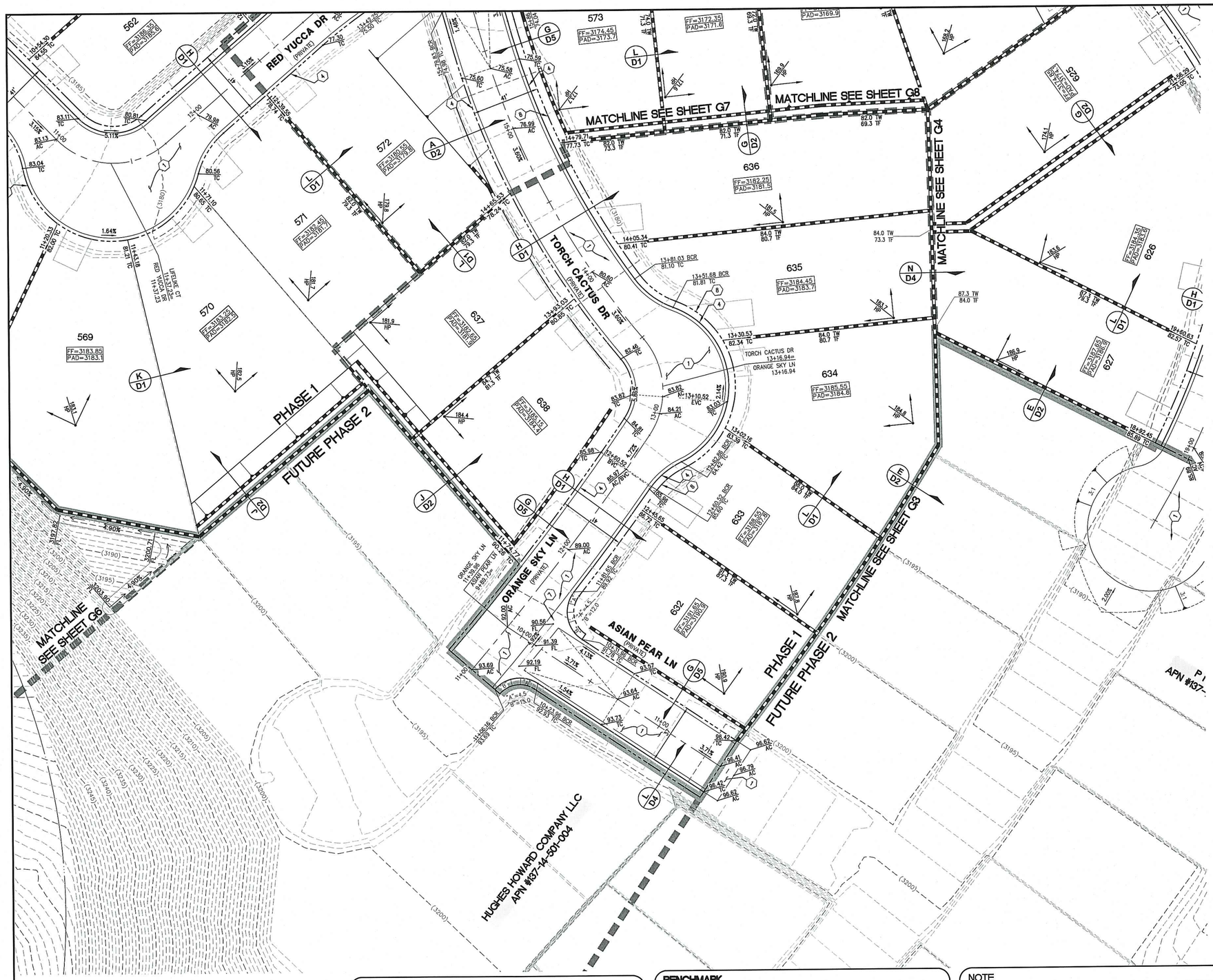
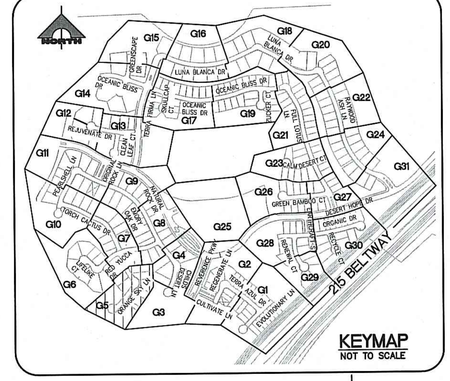
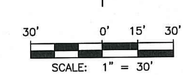
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
GRADING PLAN 4

DRAWING G4
7 OF XX SHTS







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3. CONSTRUCT 60" TYPE I MANHOLE PER USDCCA DWG NO. 403.1.
4. CONSTRUCT 48" TYPE II MANHOLE PER USDCCA DWG NO. 405.2
5. CONSTRUCT 60" TYPE III MANHOLE PER USDCCA DWG NO. 406.1.
6. CONSTRUCT STORM DRAIN MANHOLE PER DETAIL 1 ON SHEET S2.
7. CONSTRUCT 5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.
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9. CONSTRUCT 12.5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.
10. CONSTRUCT 15' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.
11. CONSTRUCT 17.5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.
12. CONSTRUCT NDOT TYPE 2 DROP INLET PER "NDOT STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION" (LATEST EDITION) R-4.2.1 ON SHEET D5, "A"=3.5' AND USDCCA DWG NO. 421.
13. CONSTRUCT SIDEWALK DRAIN PER USDCCA DWG NO. 236.
14. REMOVE EXISTING RIP-RAP.
15. INSTALL RIP-RAP, D50=12", THICKNESS=24"
16. CONSTRUCT HEADWALL PER DETAIL 1 ON SHEET S3.
17. CONSTRUCT PRECAST CONCRETE PLUG.
18. CONSTRUCT 7.5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.

NOTE: SEE SHEET C1 & C2 FOR ABBREVIATIONS AND QUANTITIES

DRAINAGE CERTIFICATION

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HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

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OR 1-800-227-2600

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

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STATE OF NEVADA — ENGINEER — HAO A. NGUYEN — Exp. 12/31/2017 — CIVIL — No. 19396 — PROFESSIONAL
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

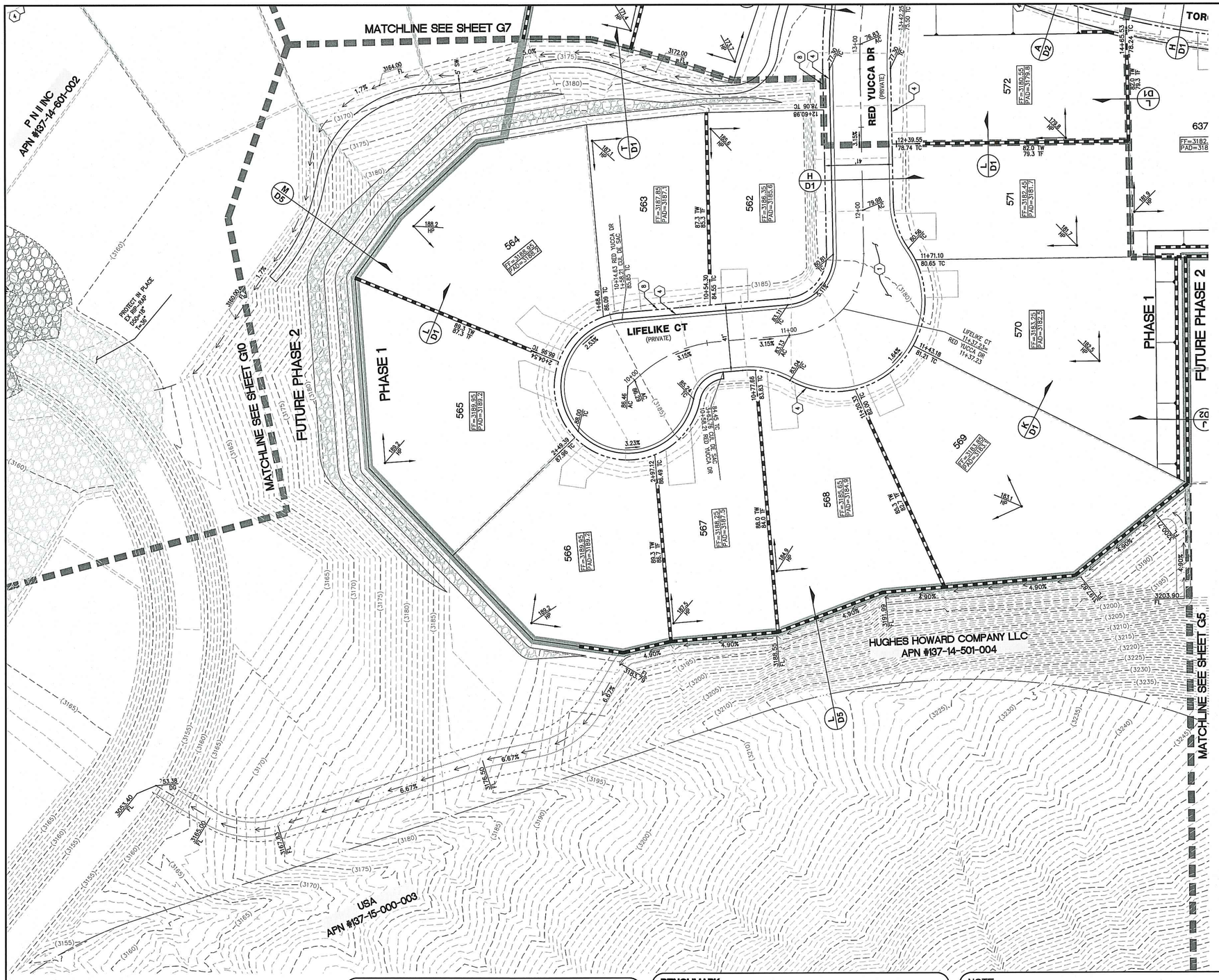
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10-40-22

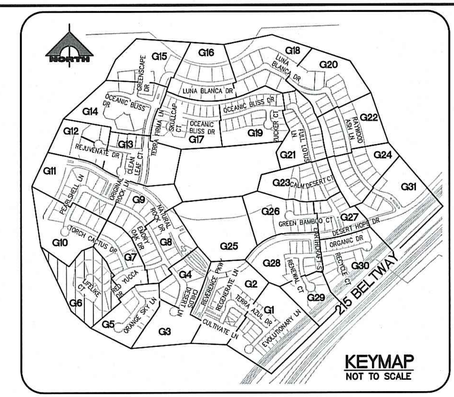
GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

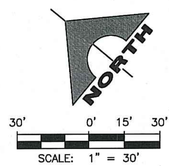
F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-G1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
GRADING PLAN 5

DRAWING
G5
8 OF XX SHTS







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STATE OF NEVADA — PROFESSIONAL ENGINEER — No. 19396 — HAO A. NGUYEN — 4/4/2016 — DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

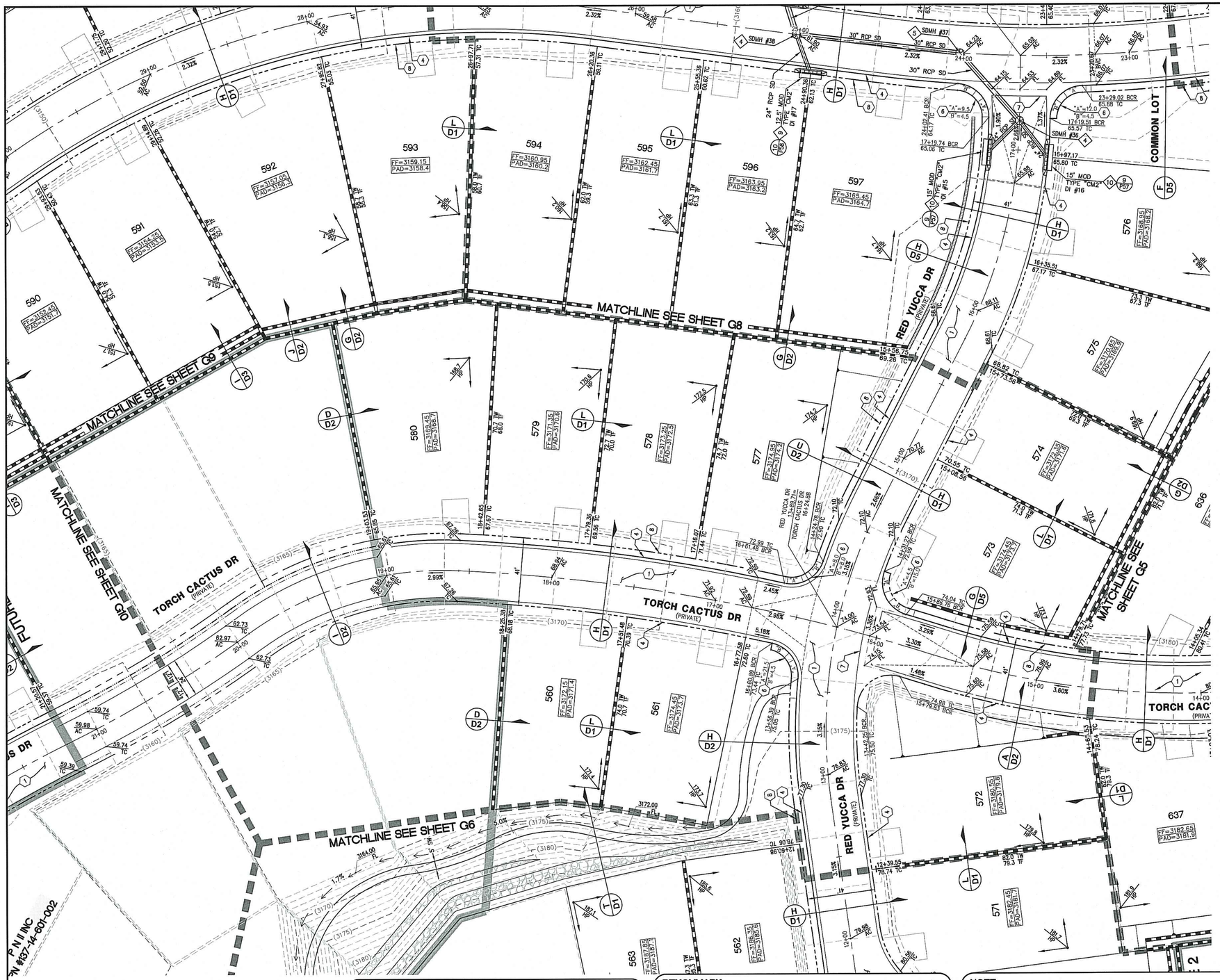
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:40:12

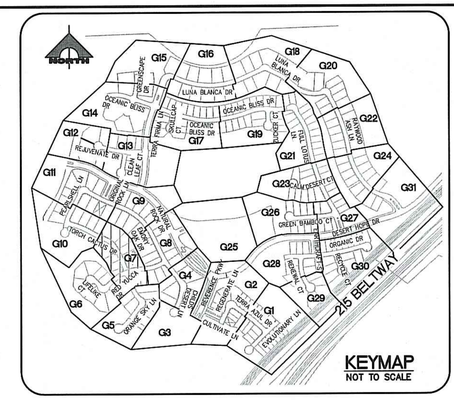
GCV
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcvengineering.com

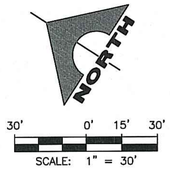
F:\Projects\700\764-204-013\DWG\Production\PH 01\01sPH1-G1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
GRADING PLAN 6

DRAWING G6
9 OF XX SHTS







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ENGINEER - STATE OF NEVADA
HAO A. NGUYEN
No. 19396
PROFESSIONAL
CIVIL
4/4/16
DATE

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DESIGN:
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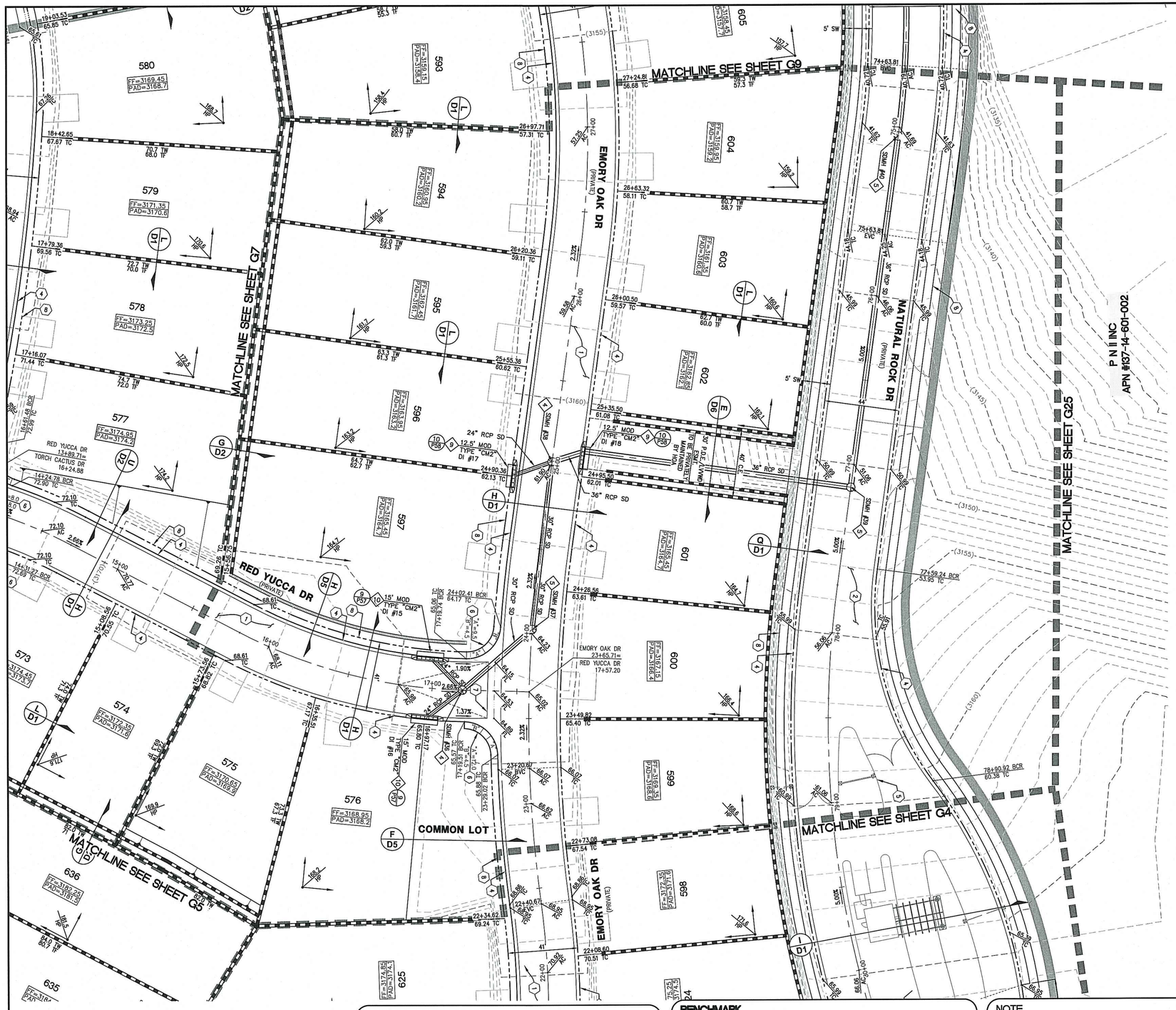
F:\Projects\700\764-204-013\DWG\Production\PH 01\01cPH1-G1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
GRADING PLAN 7

DRAWING
G7
10 OF XX SHTS


MATCHLINE SEE SHEET G9
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MATCHLINE SEE SHEET G4
MATCHLINE SEE SHEET G5
EMORY OAK DR (PRIVATE)
NATURAL ROCK DR (PRIVATE)
RED YUCCA DR (PRIVATE)
COMMON LOT
P N II INC
APN #137-14-601-002
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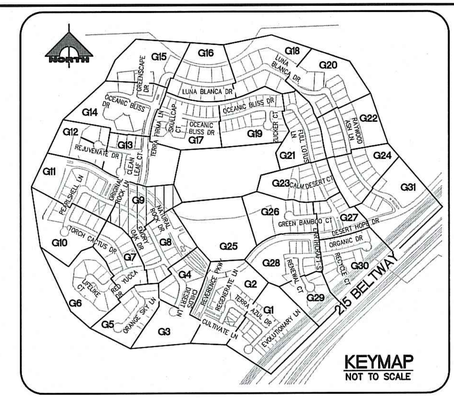

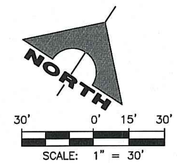

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13. CONSTRUCT SIDEWALK DRAIN PER USDCCA DWG NO. 236.
14. REMOVE EXISTING RIP-RAP.
15. INSTALL RIP-RAP, D50=12", THICKNESS=24"
16. CONSTRUCT HEADWALL PER DETAIL 1 ON SHEET S3.
17. CONSTRUCT PRECAST CONCRETE PLUG.
18. CONSTRUCT 7.5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.

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HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

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ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

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FAST
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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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ENGINEER: STATE OF NEVADA — HAO A. NGUYEN — No. 19396 — PROFESSIONAL — CIVIL — DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	CCW APP

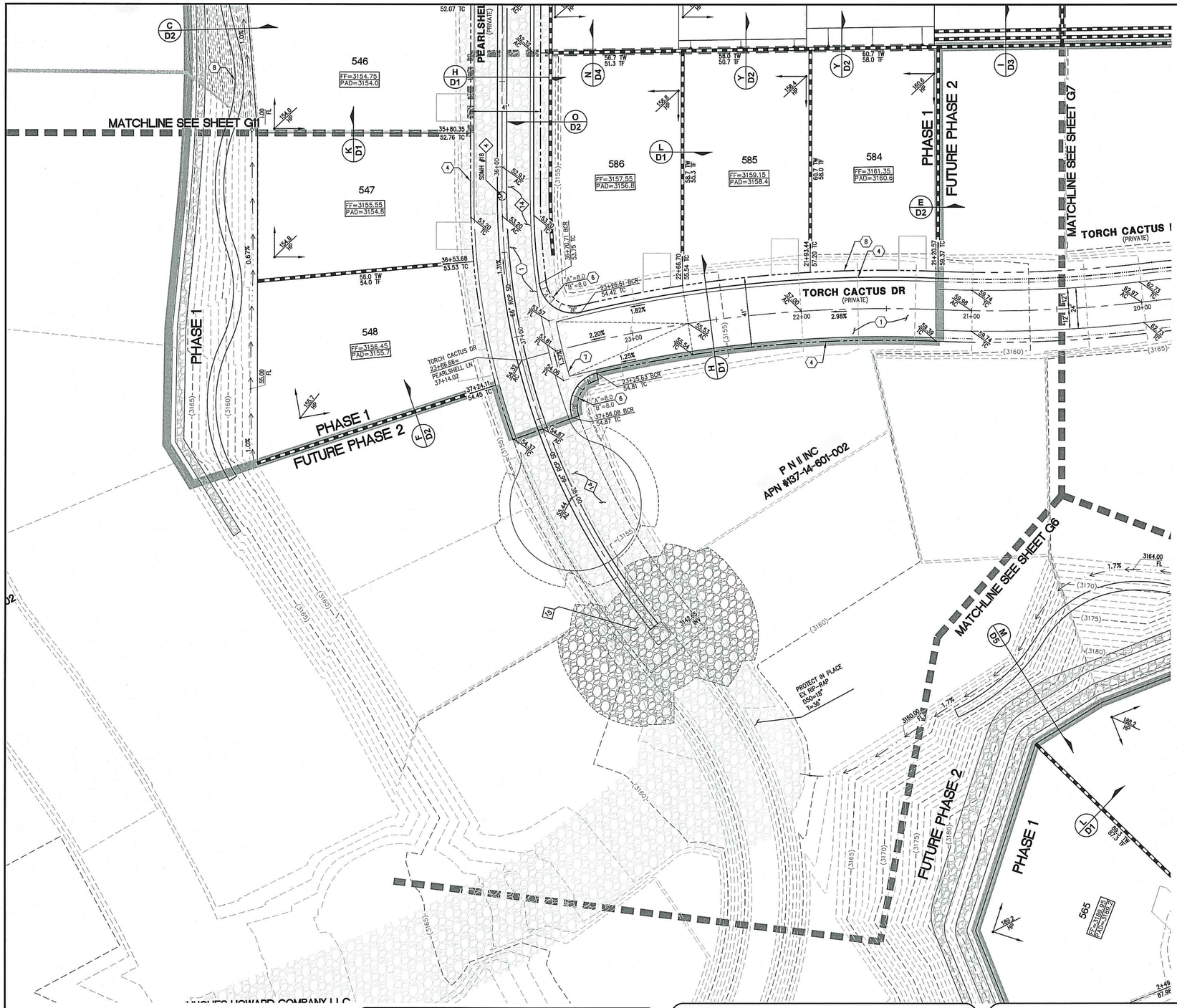
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:39:38

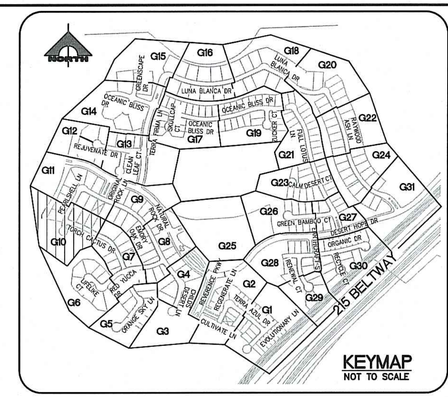
GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

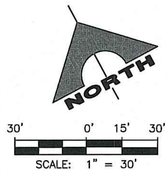
F:\Projects\700\764-204-013\DWG\Production\PH 01\013ePH1-G1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
GRADING PLAN 9

DRAWING G9
12 OF XX SHTS







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NEVADA — ENGINEER — STATE OF NEVADA — PROFESSIONAL — HAO A. NGUYEN — No. 19396 — DATE: 4/4/16

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T: 702.804.2000
F: 702.804.2299
gcwengineering.com

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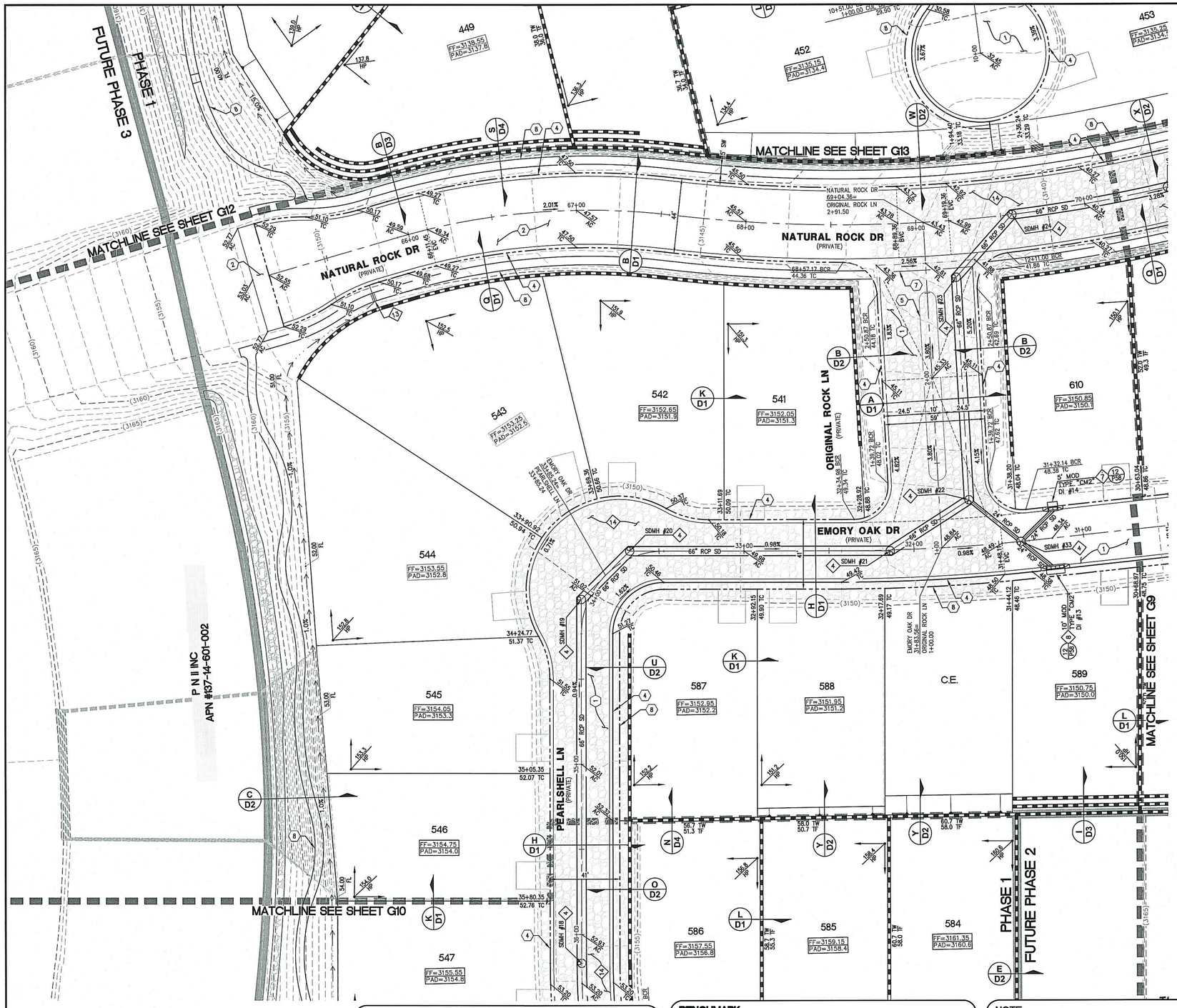
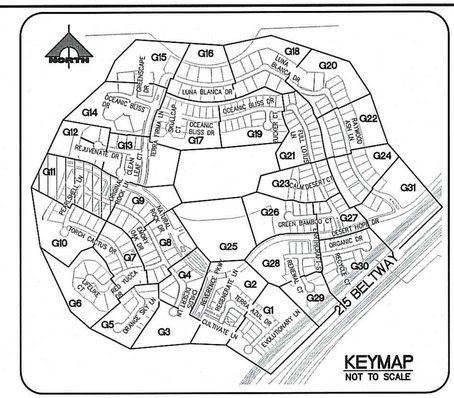
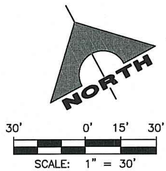
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
GRADING PLAN 10

DRAWING G10
13 OF XX SHTS







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PROFESSIONAL ENGINEER - STATE OF NEVADA - HAO A. NGUYEN - No. 19396 - Exp. 12/31/2017 - CIVIL - DATE: 4/4/16

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Hao Nguyen

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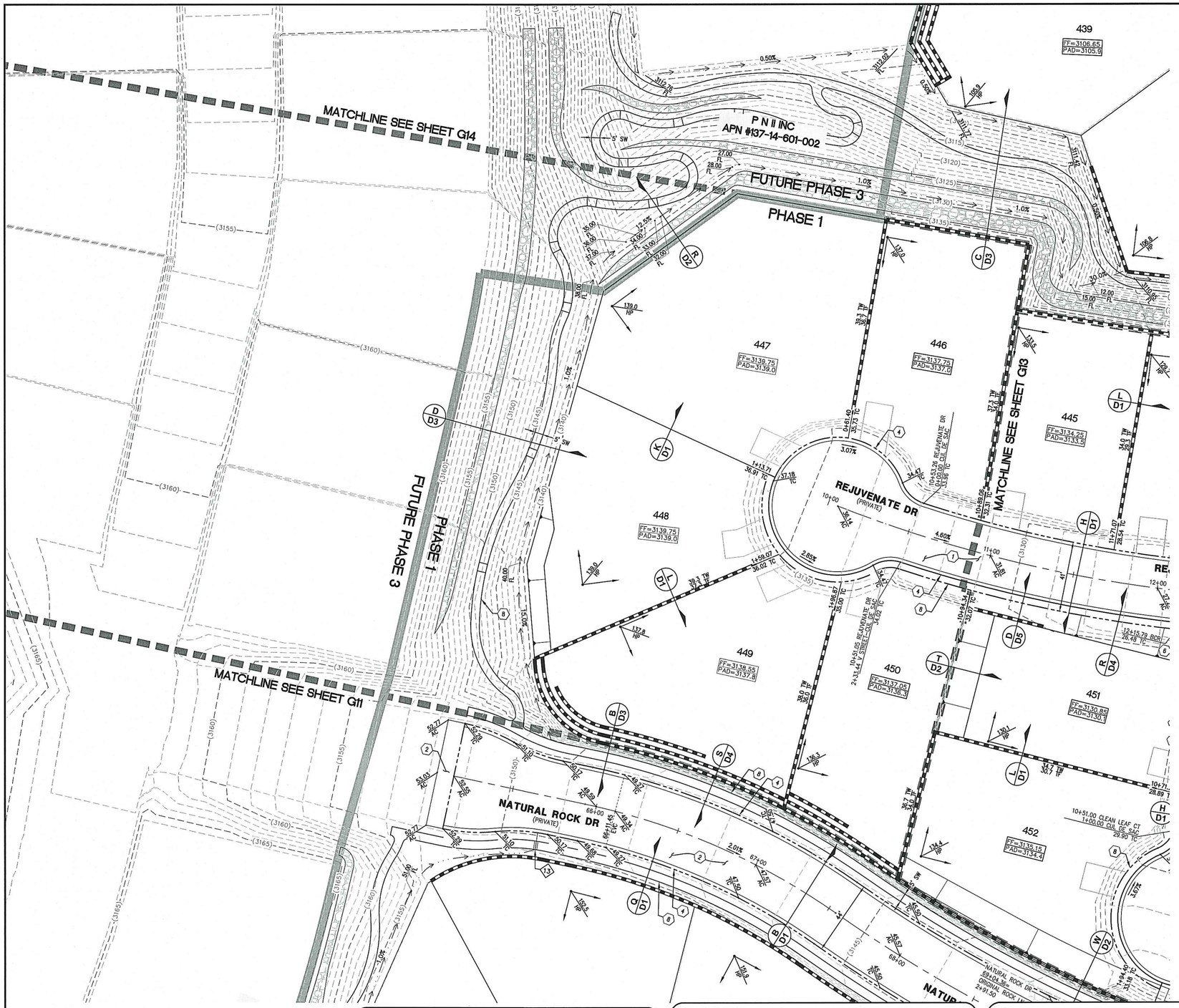
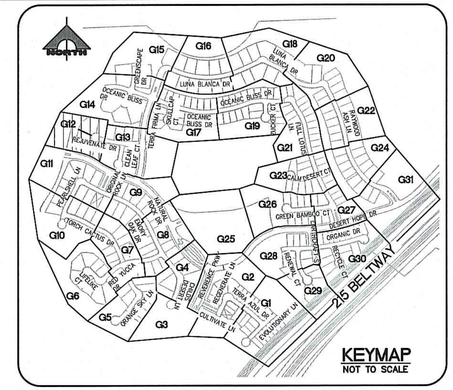
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
GRADING PLAN 11

DRAWING G11
14 OF XX SHTS





NORTH

30' 0' 15' 30'

SCALE: 1" = 30'

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SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

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STATE OF NEVADA
HAO A. NGUYEN
No. 19396
PROFESSIONAL ENGINEER
DATE: 4/4/16

DESCRIPTION	DATE	APP	DATE	APP	DATE	APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:39:05

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

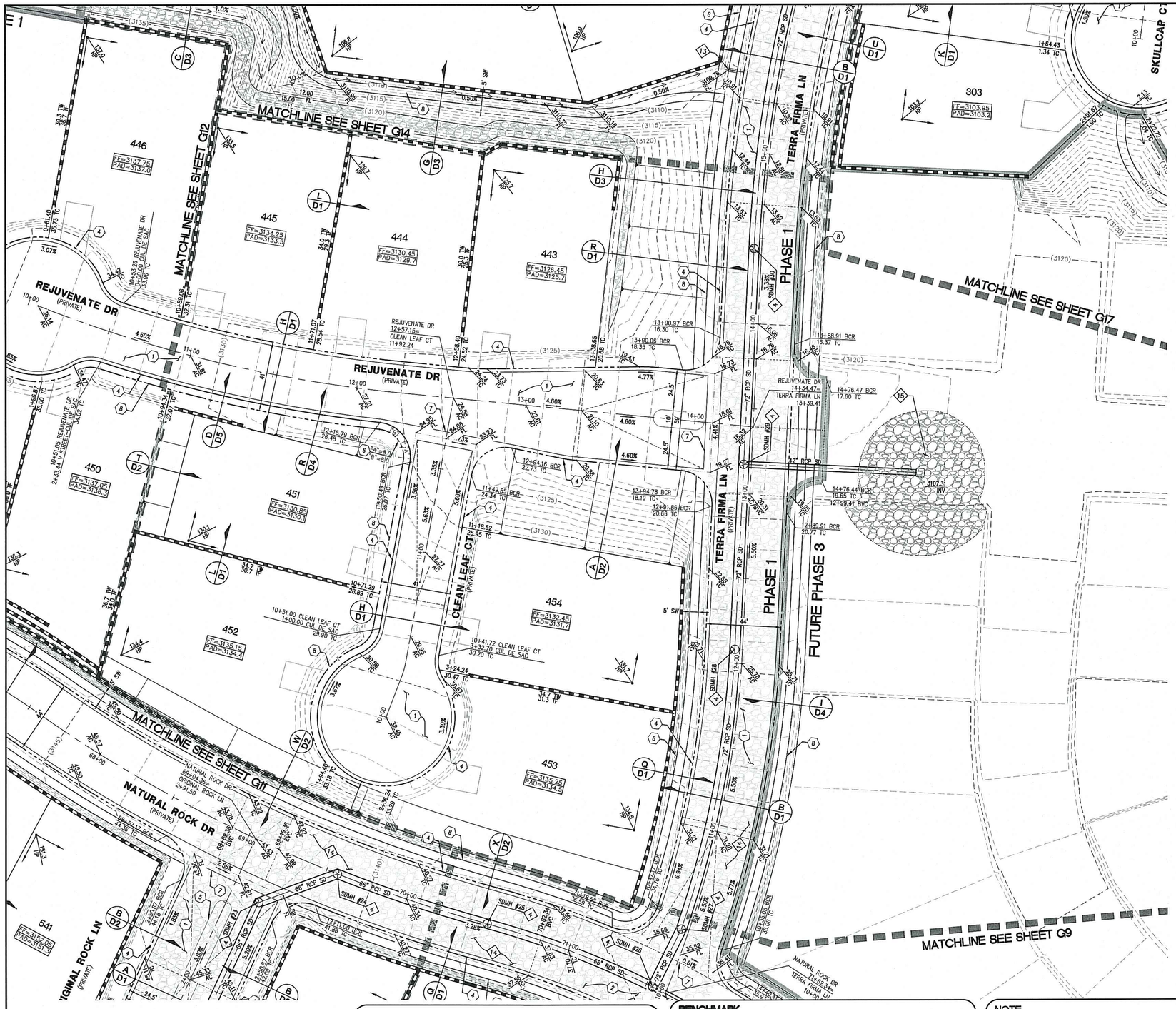
F:\Projects\7xx\764-204-013\DWG\Production\PH 01\013cPH1-G1.dwg
Hao Nguyen

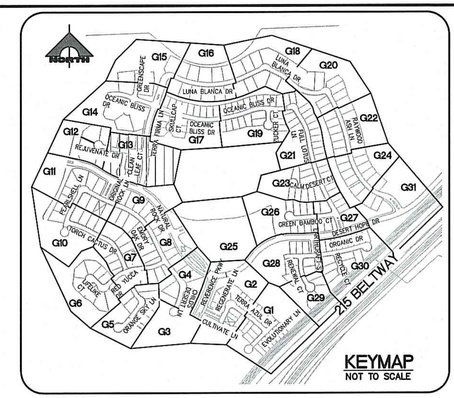
PULTE HOMES

SUMMERLIN VILLAGE 26 – REVERENCE
PHASE 1

GRADING PLAN 12

DRAWING
G12
15 OF XX SHTS





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30' 0' 15' 30'

SCALE: 1" = 30'

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NOTE: SEE SHEET C1 & C2 FOR ABBREVIATIONS AND QUANTITIES

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

HAO A. NGUYEN P.E. 19396 — DATE 12/14/16

H# _____ CLV DWG# _____

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
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F:\Projects\700\764-204-013\DWG\Production\PH 01\13cPH1-G1.dwg
Hao Nguyen

PROFESSIONAL ENGINEER - STATE OF NEVADA
HAO A. NGUYEN
No. 19396
CIVIL
DATE: 12/14/16

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DESIGN:
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CHECK:
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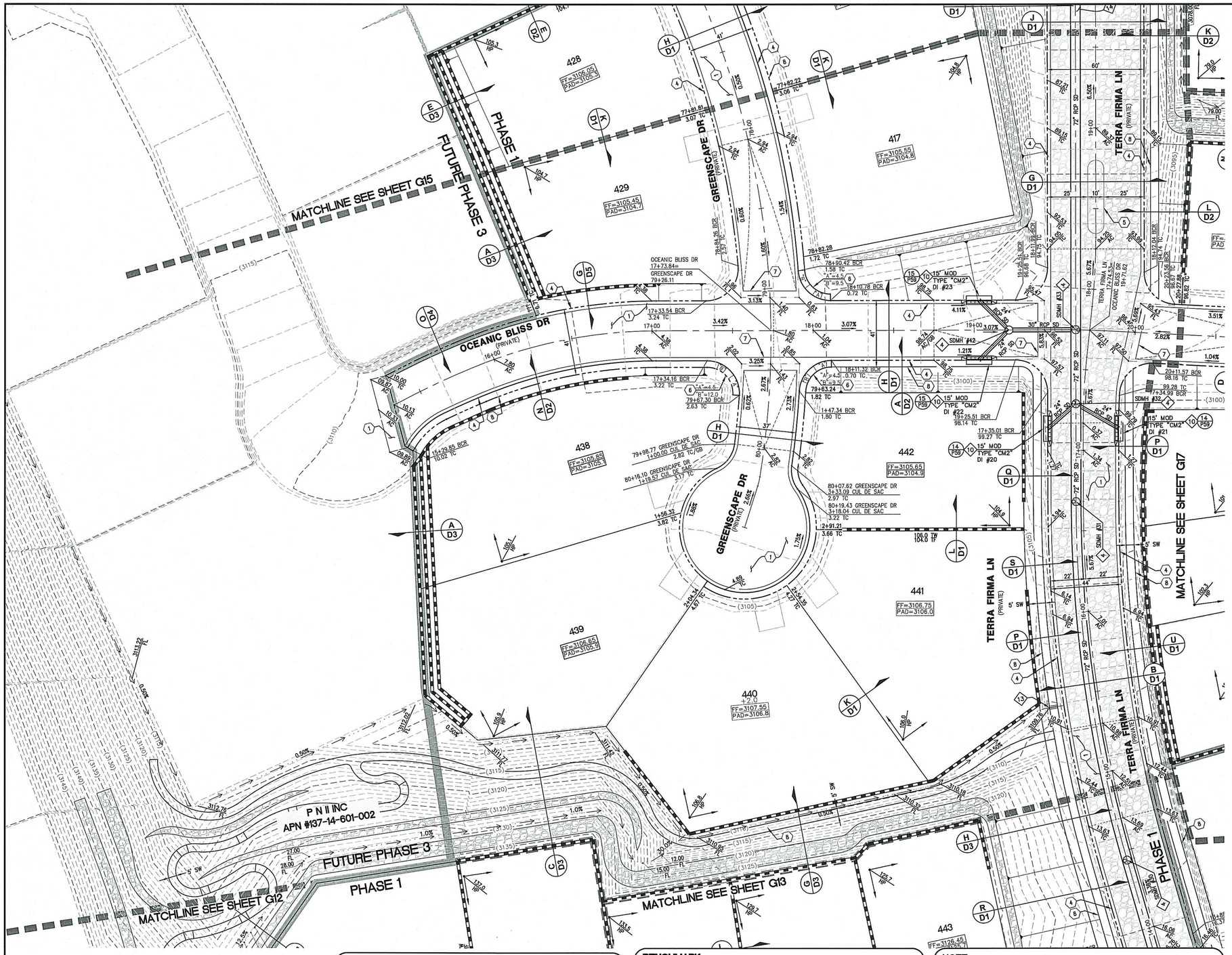
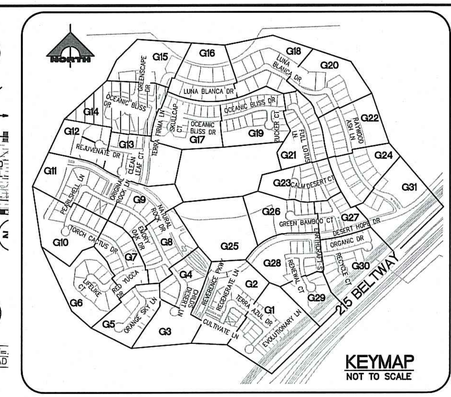
PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
GRADING PLAN 13

DRAWING G13
16 OF XX SHTS





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ENGINEER - STATE OF NEVADA
HAO A. NGUYEN
EXP. 6/30/2017
No. 19396
PROFESSIONAL
DATE: 4/4/16

REV	DATE	DESCRIPTION	AGEN APP	DATE	GOW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
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GCW
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Hao Nguyen

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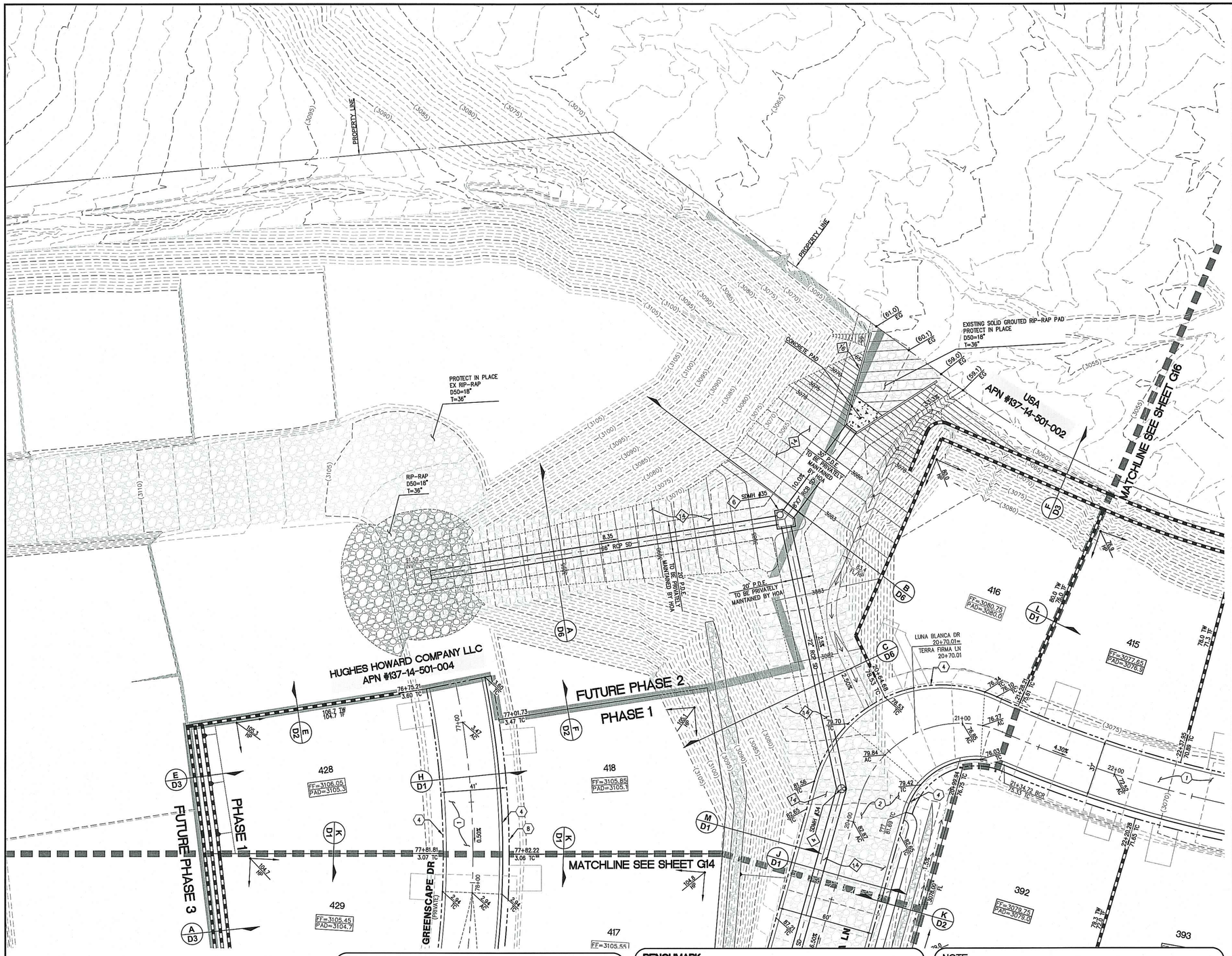
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
GRADING PLAN 14

DRAWING
G14
17 OF XX SHTS


PROPERTY LINE
PROTECT IN PLACE EX RIP-RAP D50=18" T=36"
RIP-RAP D50=18" T=36"
CONCRETE PAD
EXISTING SOLID GROUTED RIP-RAP PAD PROTECT IN PLACE D50=18" T=36"
USA APN #137-14-501-002
MATCHLINE SEE SHEET G16
SDMH #35
8.35
66" RCP SD
20' P.D.E. TO BE PRIVATELY MAINTAINED BY HOA
20' P.D.E. TO BE PRIVATELY MAINTAINED BY HOA
HUGHES HOWARD COMPANY LLC APN #137-14-501-004
FUTURE PHASE 2
PHASE 1
FUTURE PHASE 3
PHASE 1
MATCHLINE SEE SHEET G14
GREENSCAPE DR (PRIVATE)
LUNA BLANCA DR 20+70.01= TERRA FIRMA LN 20+70.01
428
FF=3106.05 PAD=3105.3
429
FF=3105.45 PAD=3104.7
418
FF=3105.85 PAD=3105.1
417
FF=3105.55
416
FF=3080.75 PAD=3080.0
415
FF=3077.65 PAD=3076.9
392
FF=3078.75 PAD=3078.0
393
EXISTING 66" RCP SD
EXISTING 24" RCP SD
EXISTING 18" RCP SD
EXISTING 30" RCP SD
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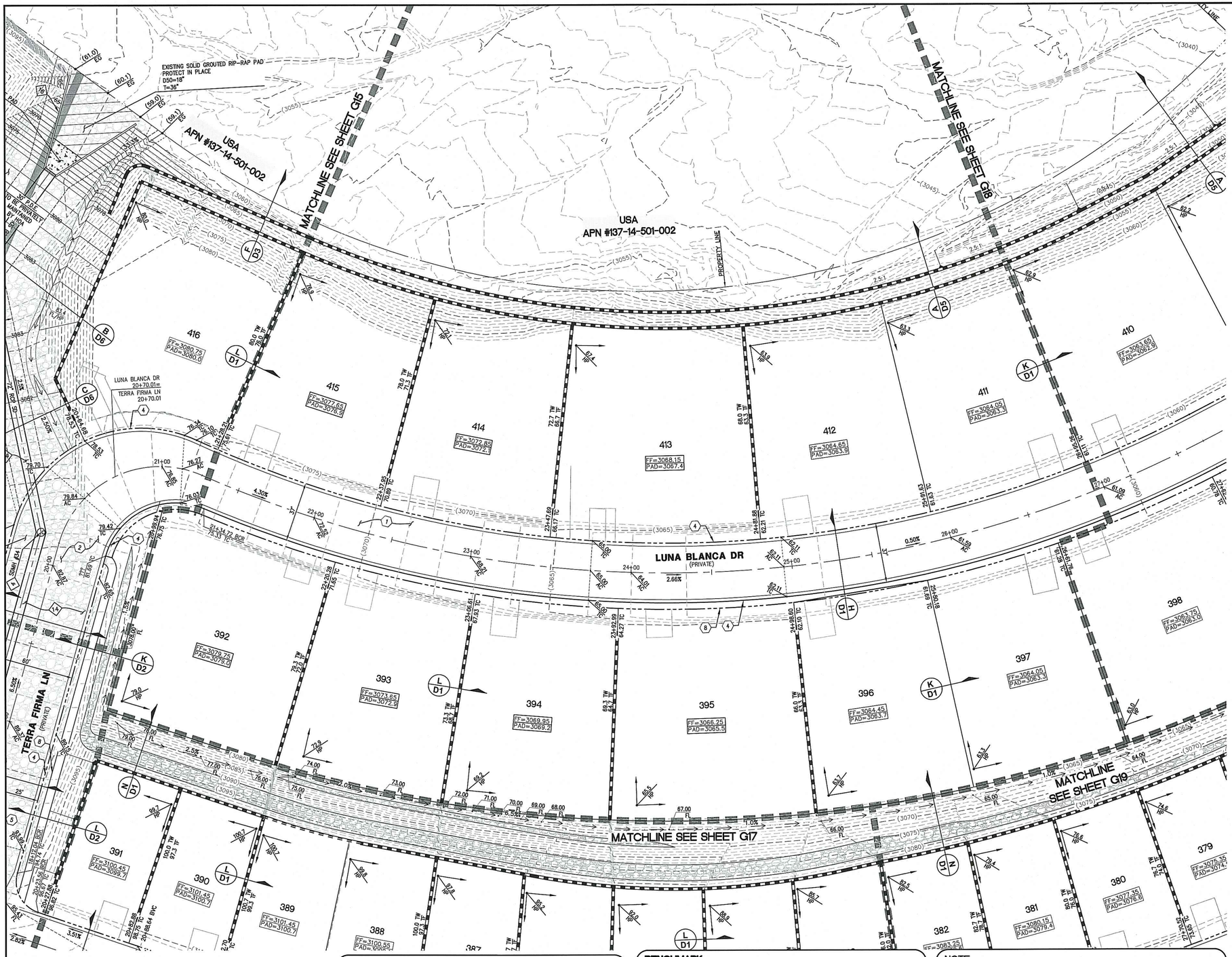

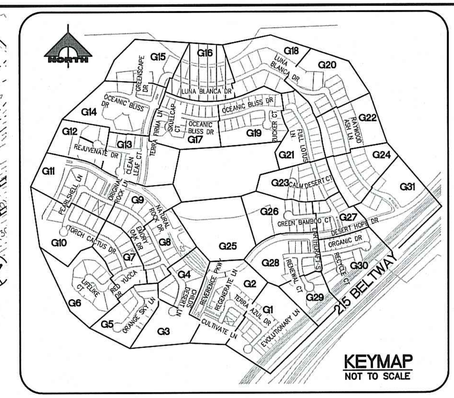

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ENGINEER – STATE OF NEVADA
HAO A. NGUYEN
No. 19396
PROFESSIONAL
Exp. 12/31/2017
CIVIL
DATE: 4/4/16

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ENGINEERS \ SURVEYORS
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LAS VEGAS, NV 89146
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gcvengineering.com

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE=04-04-16
PLOT TIME=10:38:27

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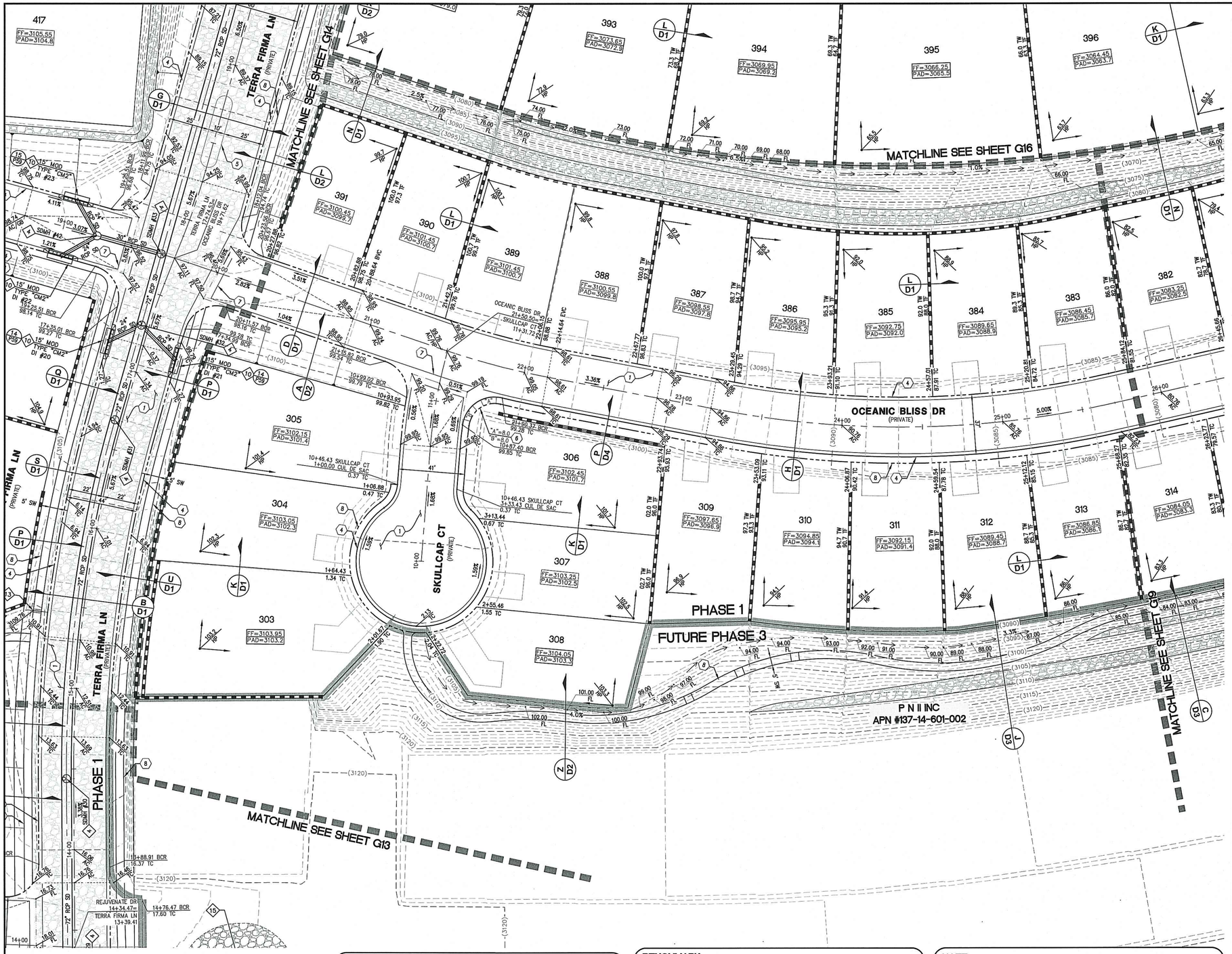
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
GRADING PLAN 16

DRAWING
G16
19 OF XX SHTS



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H# _____ CLV DWG# _____

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EXP. 12/31/2017
CIVIL
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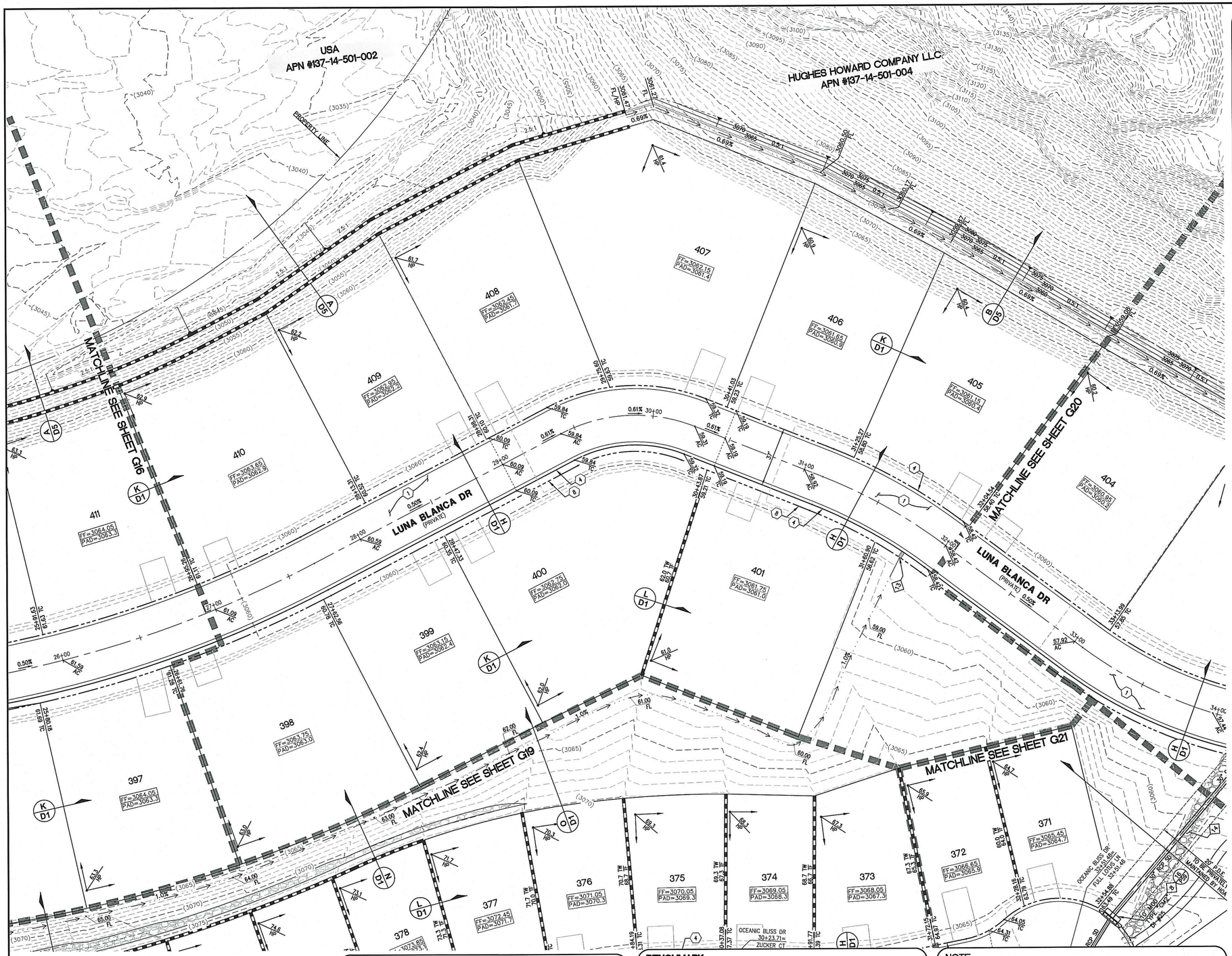
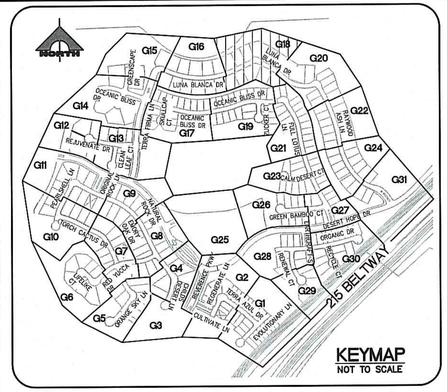
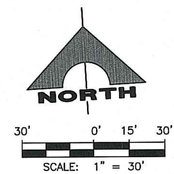
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
GRADING PLAN 17

DRAWING
G17
20 OF XX SHTS







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PHASE 1
GRADING PLAN 18

DRAWING
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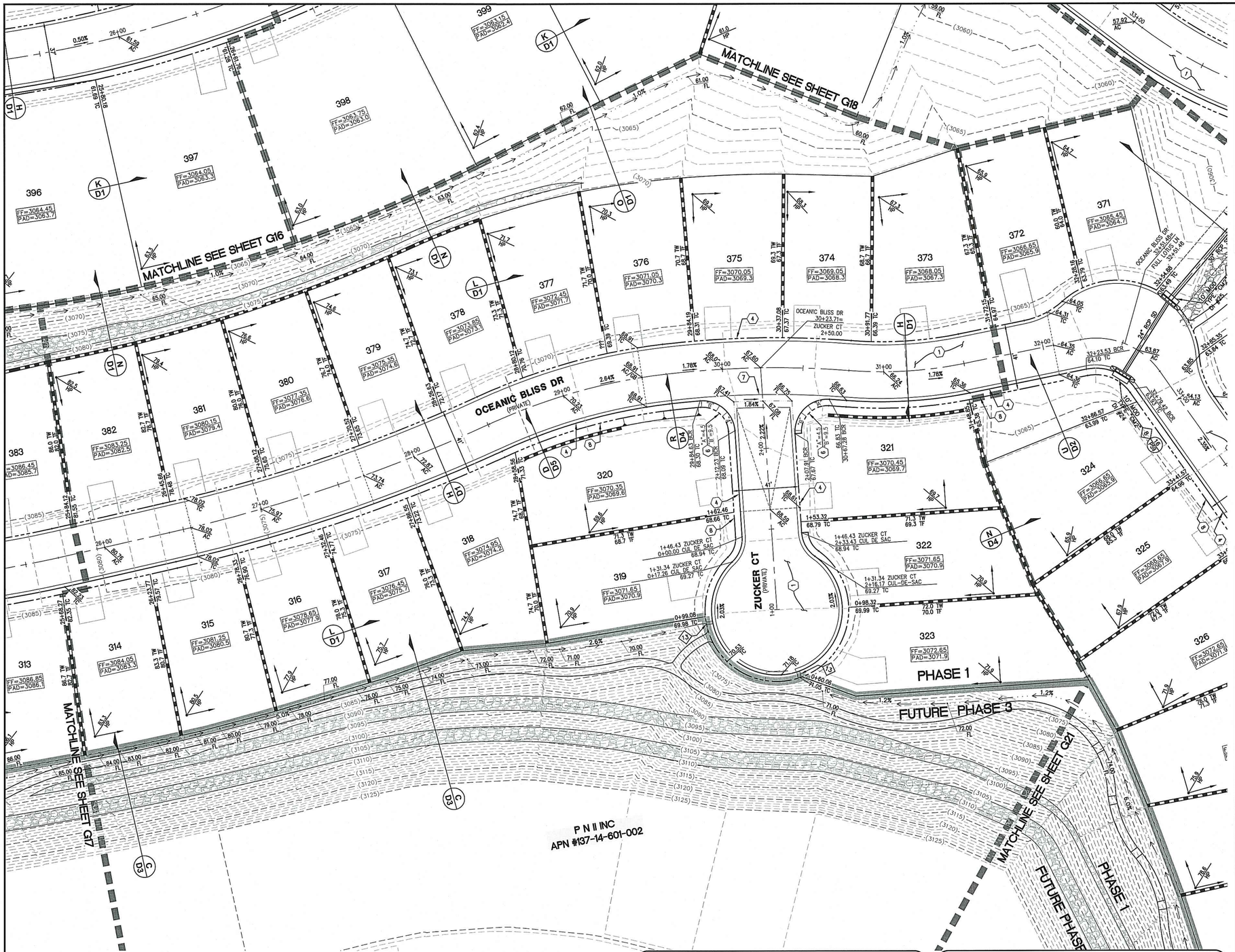

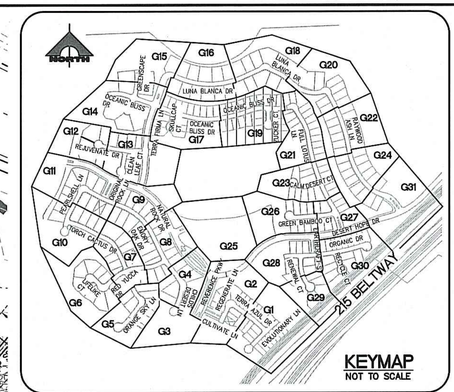

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SUMMERLIN VILLAGE 26 - REVERENCE
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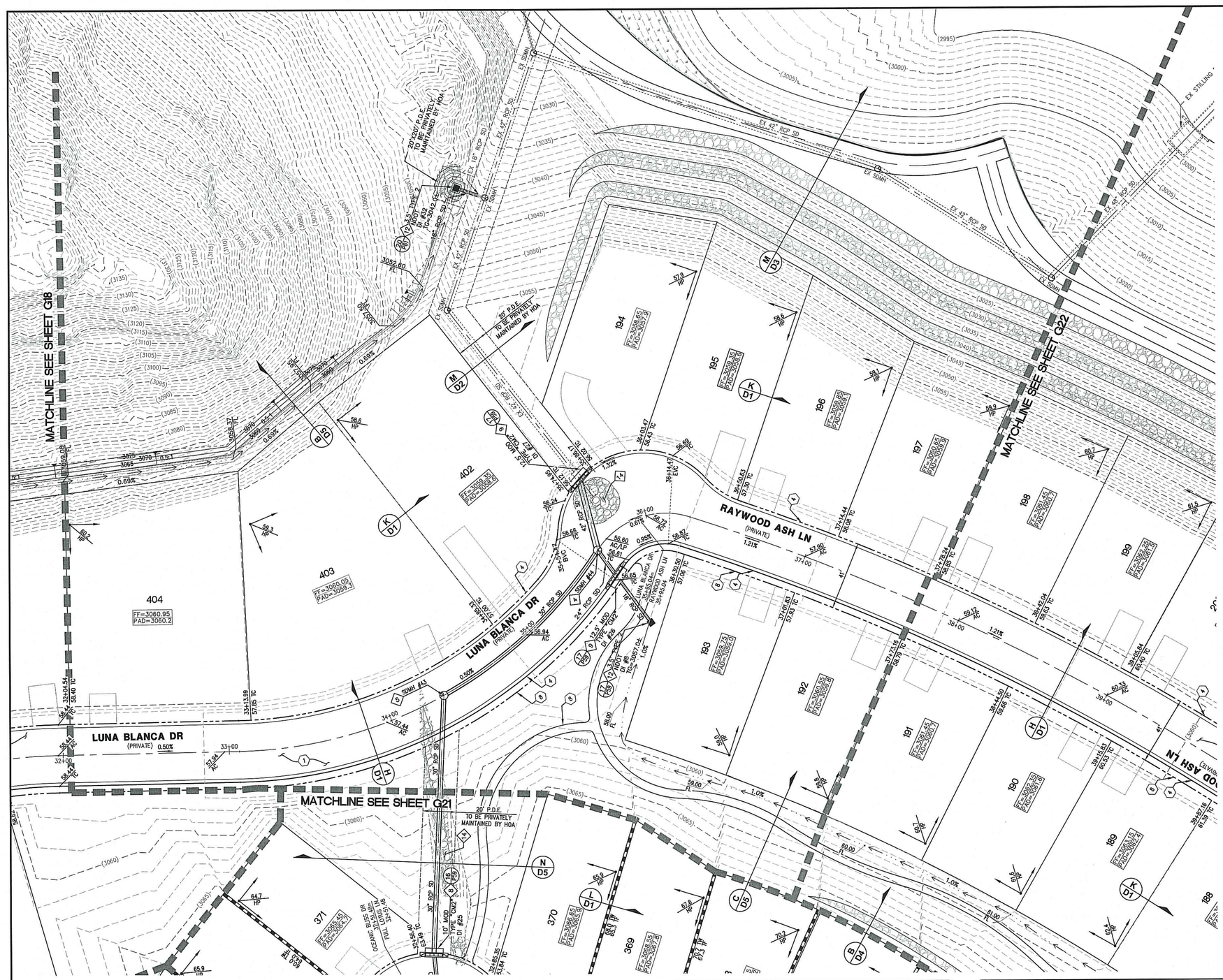
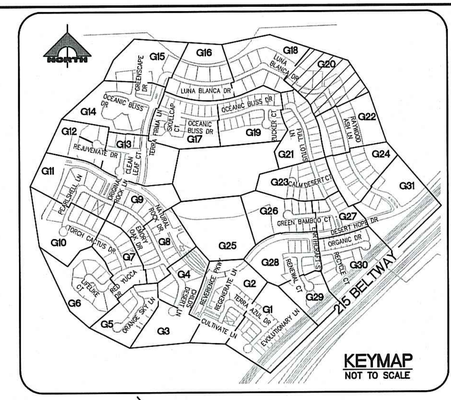
GRADING PLAN 19

DRAWING
G19
22 OF XX SHTS







30' 0' 15' 30'
SCALE: 1" = 30'

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NOTE: SEE SHEET C1 & C2 FOR ABBREVIATIONS AND QUANTITIES

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

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HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — HAO A. NGUYEN — No. 19396 — Exp. 12/31/2017 — CIVIL
DATE: 4/4/16

REV	DESCRIPTION	DATE	AGEN APP	DATE	GSW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:35:45

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

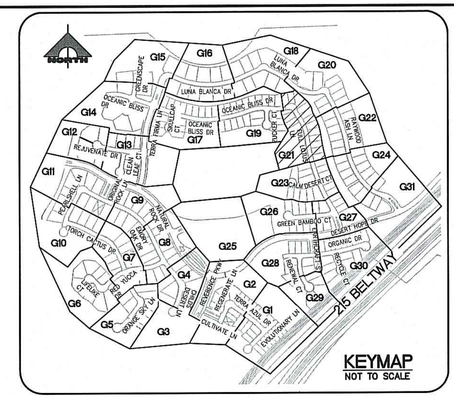
F:\Projects\700\764-204-013\DWG\Production\PH1 01\01-3PH1-G20.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

GRADING PLAN 20

DRAWING
G20
23 OF XX SHTS





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HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

NEVADA — STATE OF NEVADA — PROFESSIONAL ENGINEER — HAO A. NGUYEN — No. 19396 — CIVIL — Exp. 12/31/2017 — DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 764-204-018
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:35:35

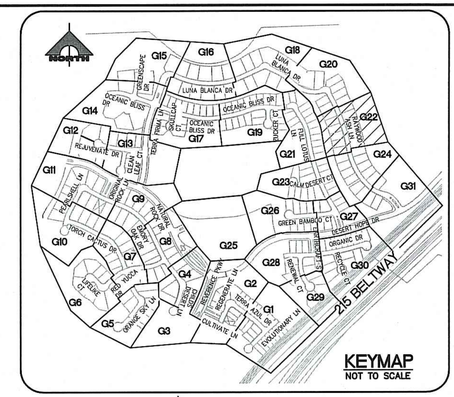
GCV
ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcvengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\01cPH1-G20.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
GRADING PLAN 21

DRAWING G21
24 OF XX SHTS







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HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

STATE OF NEVADA
HAO A. NGUYEN
No. 19396
PROFESSIONAL ENGINEER
Exp. 12/31/2017
DATE: 4/4/16

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:35:25

GCW
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
ENGINEERS \ SURVEYORS

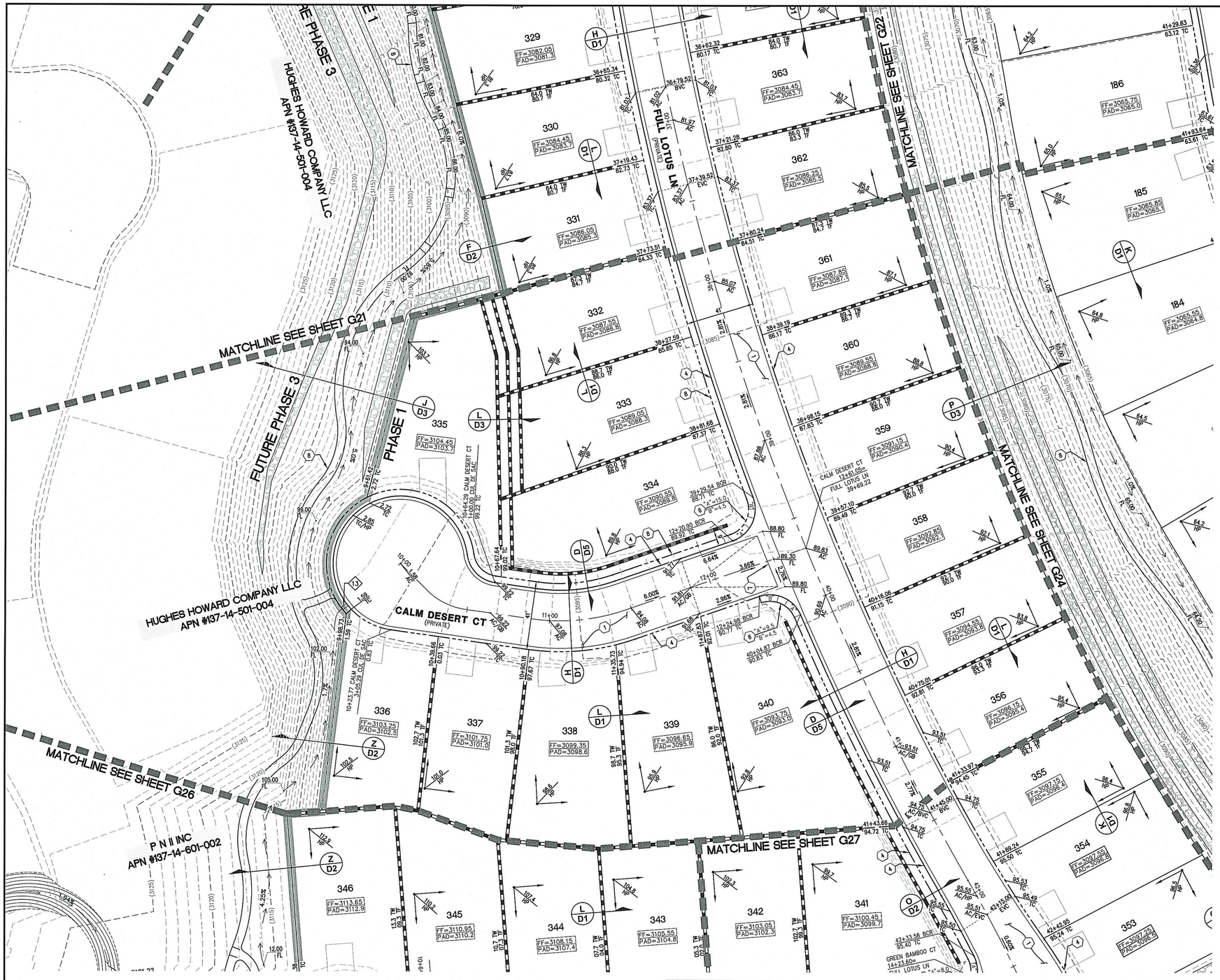
F:\Projects\700\764-204-013\DWG\Production\PH 01\01SHT-G20.dwg
Hao Nguyen

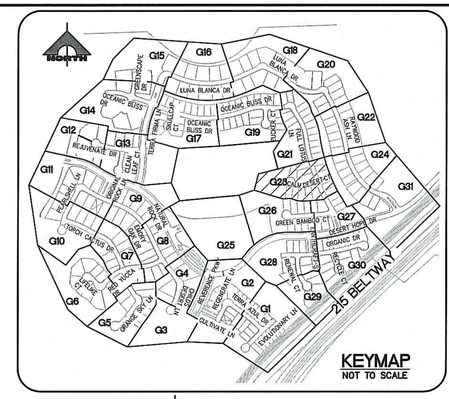
PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

GRADING PLAN 22

DRAWING
G22
25 OF XX SHTS





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HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

NEVADA — HAO A. NGUYEN — No. 19396 — PROFESSIONAL ENGINEER — exp. 12/31/2017 — DATE: 4/4/16

REV	DESCRIPTION	DATE	AGEN APP	DATE	GOW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:35:15

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\01.3cPH1-G20.dwg
Hao Nguyen

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

GRADING PLAN 23

DRAWING
G23
26 OF XX SHTS


MATCHLINE SEE SHEET G22
MATCHLINE SEE SHEET G23
MATCHLINE SEE SHEET G27
MATCHLINE SEE SHEET G31
DETENTION BASIN
RAYWOOD ASH LN (PRIVATE)
362
361
360
359
358
357
356
355
354
353
186
185
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183
182
181
180
179
178
203
204
205
206
207
208
209
FF=3086.25 PAD=3085.5
FF=3087.85 PAD=3087.1
FF=3089.55 PAD=3088.8
FF=3091.15 PAD=3090.4
FF=3092.85 PAD=3092.1
FF=3094.55 PAD=3093.8
FF=3096.15 PAD=3095.4
FF=3097.15 PAD=3096.4
FF=3097.55 PAD=3096.8
FF=3097.25 PAD=3096.5
FF=3065.75 PAD=3065.0
FF=3065.85 PAD=3065.1
FF=3065.55 PAD=3064.8
FF=3065.25 PAD=3064.5
FF=3064.95 PAD=3064.2
FF=3064.55 PAD=3063.8
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FF=3063.95 PAD=3063.2
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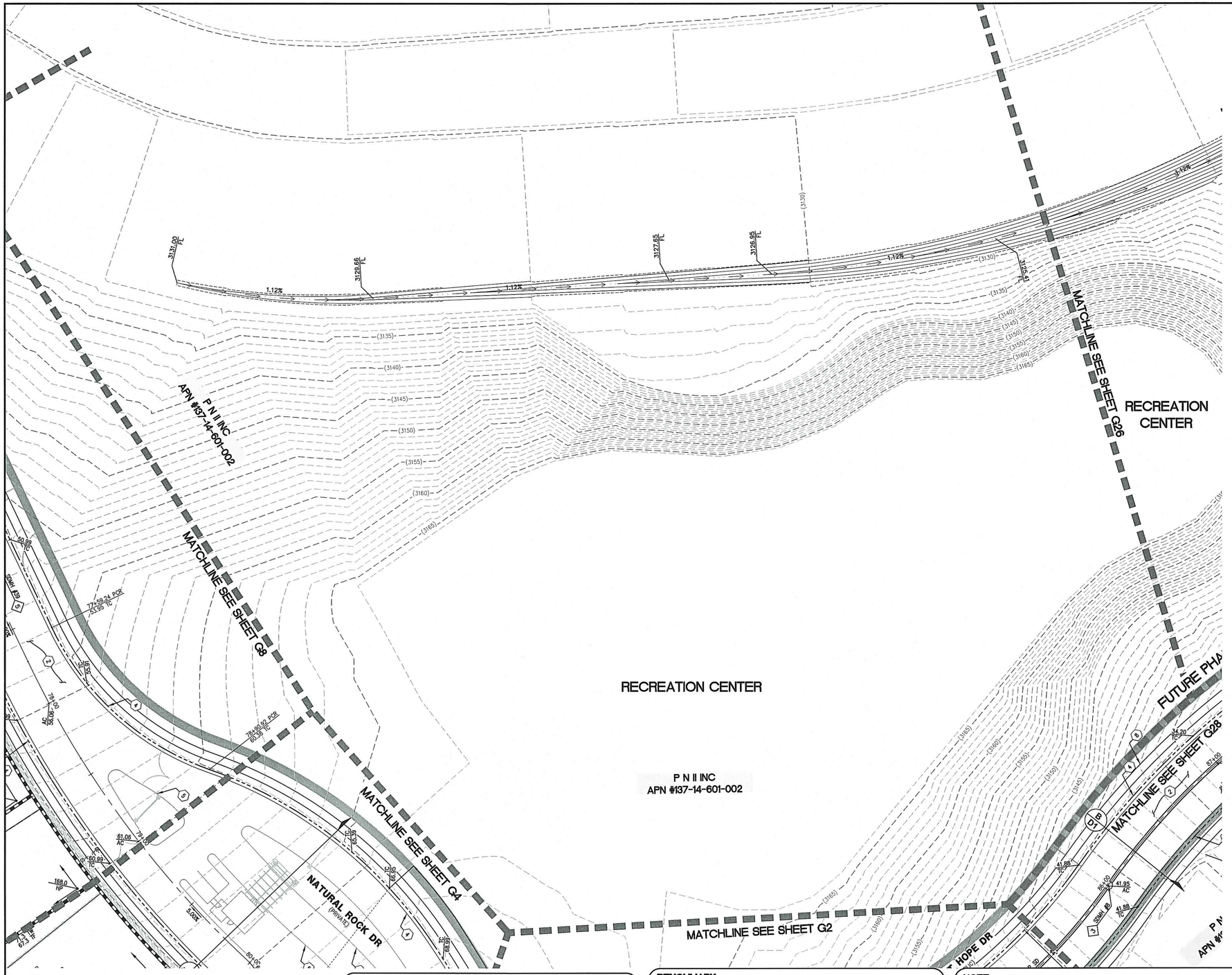
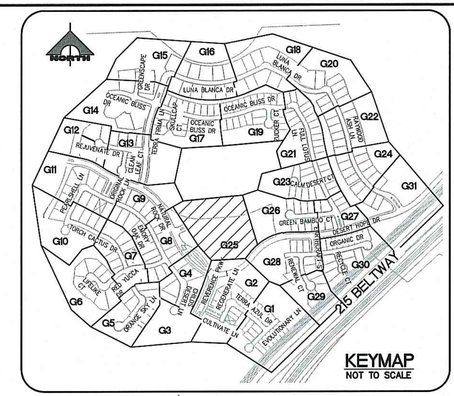
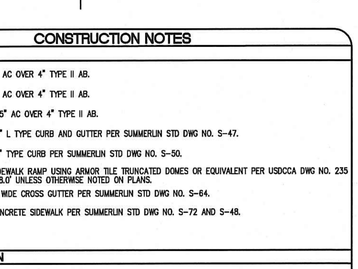
FF=3065.15 PAD=3064.4
FF=3064.75 PAD=3064.0
FF=3064.35 PAD=3063.6
FF=3063.95 PAD=3063.2
FF=3063.95 PAD=3063.2
41+29.83 63.12 TC
41+48.92 63.30 AC/CC
41+81.24 63.48 TC
41+93.64 63.61 TC
42+08.92 63.50 AC/CC
42+43.29 63.40 TC
42+55.50 63.34 TC
43+17.36 63.03 TC
43+25.34 62.99 TC
43+79.23 62.72 TC
44+07.40 62.58 TC
44+41.81 62.41 TC
44+51.49 62.36 TC
44+61.20 62.31 TC
44+89.45 62.17 TC
45+22.09 62.00 TC
45+71.51 61.76 TC
45+92.93 61.70 TC
46+44.53 61.39 TC
46+40.13 61.41 TC
47+07.12 61.51 TC
42+95.24 TC
42+95.99 94.81 TC
61.61 AC
61.49 TC
61.46 AC/GB
61.11 AC
60.95 TC
60.77 TC
60.97 TC
60.93 AC
60.59
63.11 AC
62.61 AC
63.61 AC/CC
63.57 AC/CC
63.30 AC/CC
63.61 AC/CC
63.50 AC/CC
63.61 AC
63.57 AC
63.11 AC
62.61 AC
61.61 AC
61.49 TC
61.46 AC/GB
61.11 AC
60.95 TC
60.77 TC
60.97 TC
60.93 AC
60.59
3065.05 FG
3065.20 FG/HP
2.59%
1.00%
3.84%
0.50%
0.50%
0.50%
0.50%
1.00%
1.00%
1.00







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1. CONSTRUCT 2" AC OVER 4" TYPE II AB.
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7. CONSTRUCT 8' WIDE CROSS GUTTER PER SUMMERLIN STD DWG NO. S-64.
8. CONSTRUCT CONCRETE SIDEWALK PER SUMMERLIN STD DWG NO. S-72 AND S-48.

STORM DRAIN

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3. CONSTRUCT 60" TYPE I MANHOLE PER USDCCA DWG NO. 403.1.
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13. CONSTRUCT SIDEWALK DRAIN PER USDCCA DWG NO. 236.
14. REMOVE EXISTING RIP-RAP.
15. INSTALL RIP-RAP, D50=12", THICKNESS=24"
16. CONSTRUCT HEADWALL PER DETAIL 1 ON SHEET S3.
17. CONSTRUCT PRECAST CONCRETE PLUG.
18. CONSTRUCT 7.5' TYPE "CM2" MODIFIED DROP INLET PER USDCCA DWG NO. 412.1 AND 421.

NOTE: SEE SHEET C1 & C2 FOR ABBREVIATIONS AND QUANTITIES

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NOTE

ALL ONSITE STORM DRAINS AND ASSOCIATED STORM FACILITIES ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE HOA.

ALL PRIVATE STREETS ARE P.U.E., PUBLIC DRAINAGE EASEMENT AND PUBLIC SEWER EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.

BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

NOTE

1. THE GEOTECHNICAL EXPLORATION PROPOSED RESIDENTIAL DEVELOPMENT SUMMERLIN VILLAGE 23B, PARCEL BB LAS VEGAS, NEVADA AS PREPARED BY ANGLE ENGINEERING, PROJECT NUMBER 77053-1, DATED MAY 28, 2014.
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3. WALLS CONSTRUCTED OTHER THAN THOSE AS DETAILED ON THIS SHEET ARE TO BE CONSTRUCTED BY WALL SUB-CONTRACTOR, DETAILS AND STRUCTURAL CALCS AS PREPARED BY OTHERS.
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DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

HAO A. NGUYEN P.E. 19396 — DATE 4/6/16

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — HAO A. NGUYEN — No. 19396 — 04-07-2007 — CIVIL — DATE: 4/6/16

REV	DATE	DESCRIPTION	AGEN APP	DATE	GOW APP	DATE

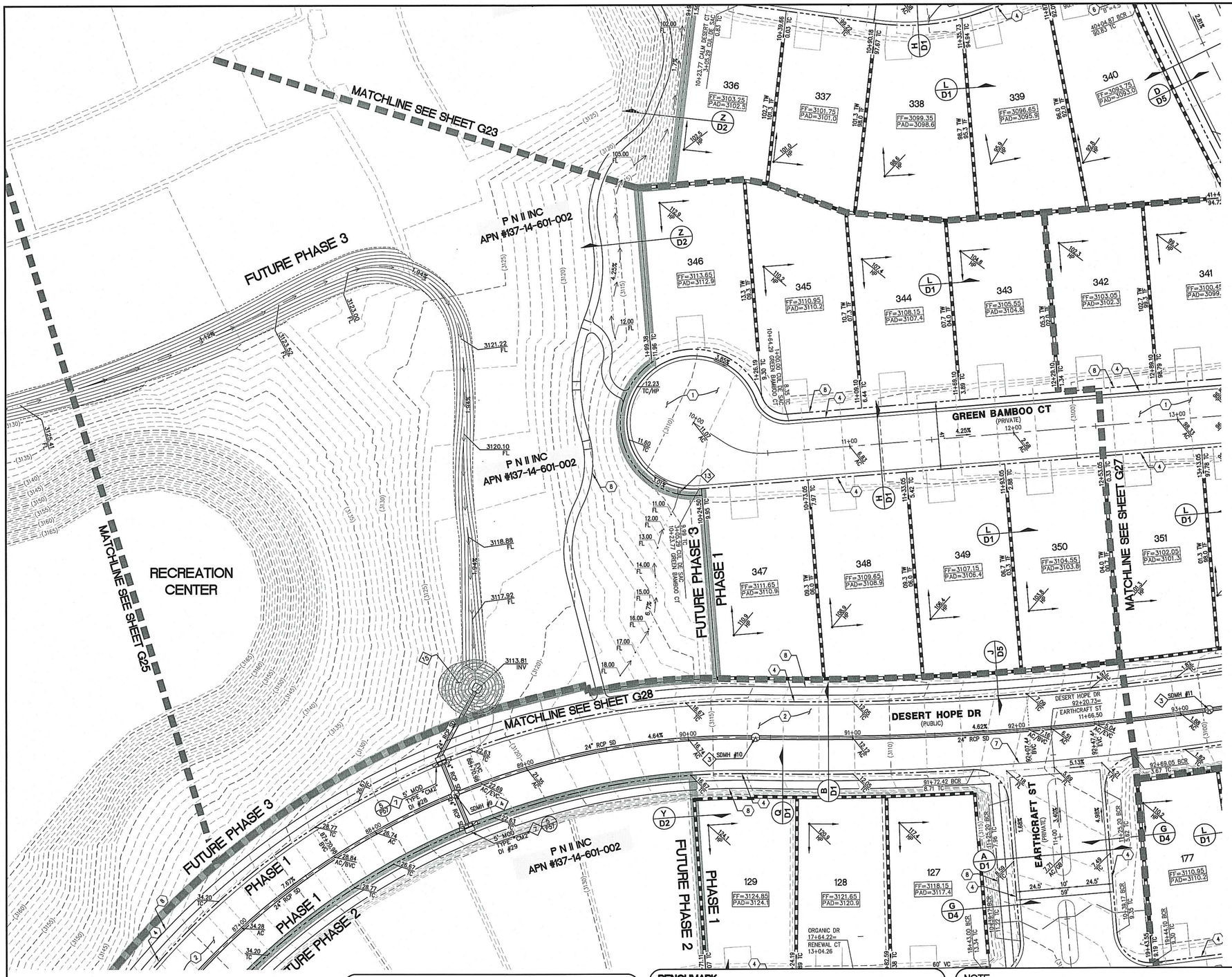
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:34:56

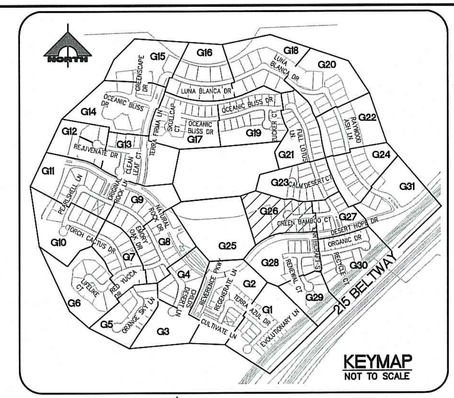
GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2999
gcwengineering.com

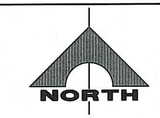
F:\Projects\700\764-204-013\DWG\Production\PH 01\01.3cPH1-G25.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
GRADING PLAN 25

DRAWING G25
28 OF XX SHTS







30' 0' 15' 30'
SCALE: 1" = 30'

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BENCHMARK

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ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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HAO A. NGUYEN P.E. 19396 — 4/6/16 DATE

H# _____ CLV DWG# _____

STATE OF NEVADA — HAO A. NGUYEN — No. 19396 — PROFESSIONAL ENGINEER — CIVIL — Exp. 12/31/2017 — DATE: 4/6/16

REV	DESCRIPTION	DATE	AGEN APP	DATE	CCW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:34:47

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

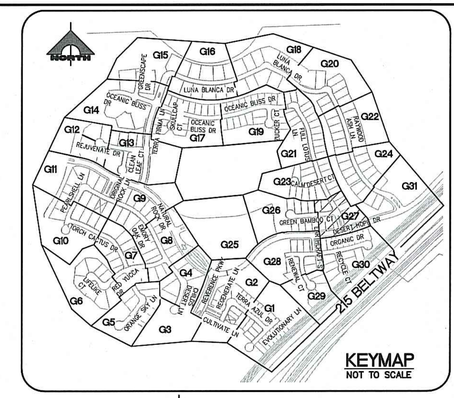
F:\Projects\700\764-204-013\DWG\Production\PH 01\013-PH1-G20.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

GRADING PLAN 26

DRAWING
G26
29 OF XX SHTS





NORTH

30' 0' 15' 30'

SCALE: 1" = 30'

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BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

ENGINEER - STATE OF NEVADA
HAO A. NGUYEN
No. 19396
PROFESSIONAL
DATE: 4/4/16

REV	DATE	DESCRIPTION
		AGEN APP
		DATE
		GCW APP
		DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:34:38

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

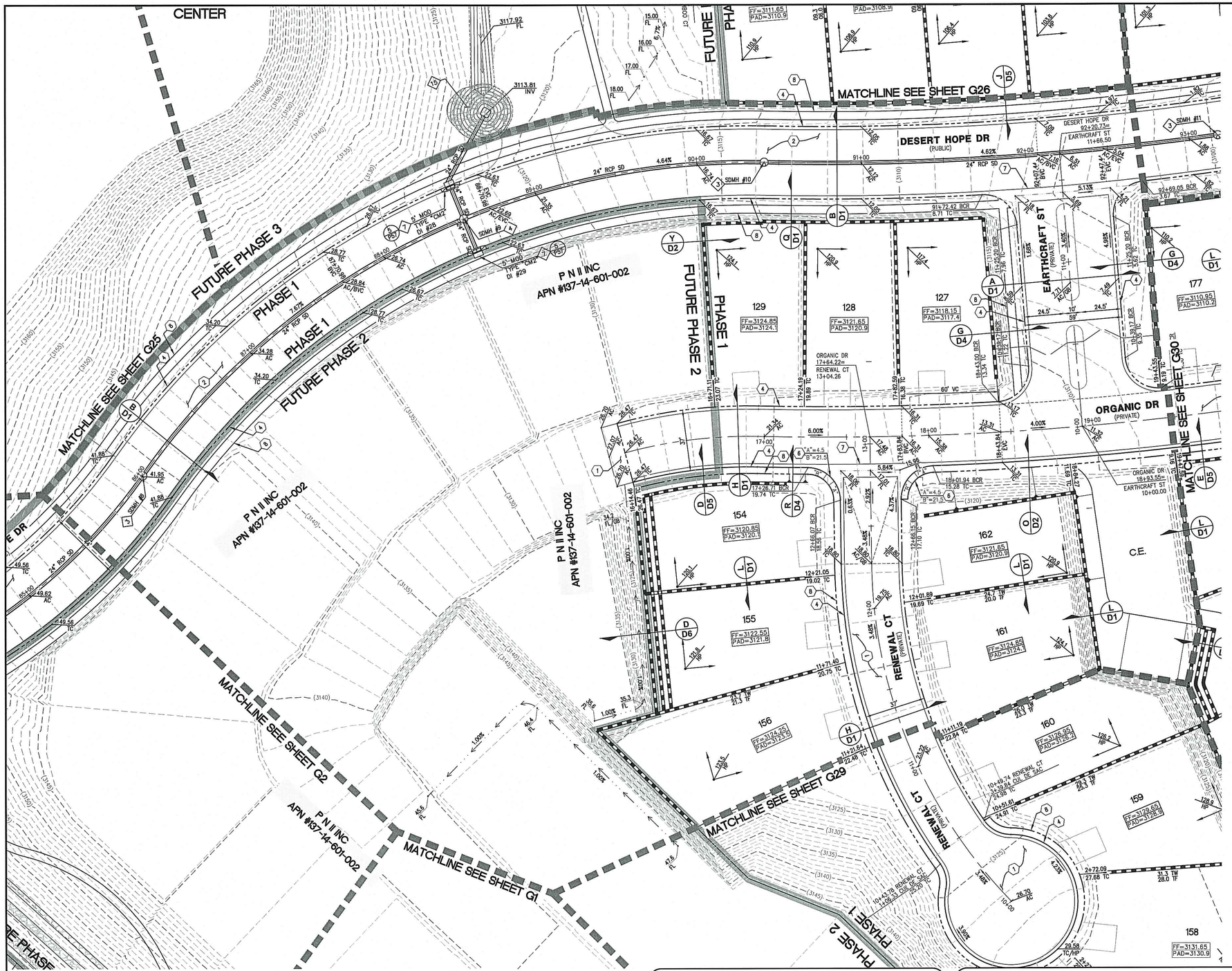
F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-c220.dwg
Hao Nguyen

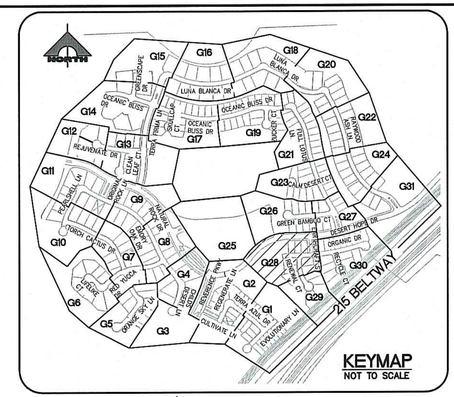
PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

GRADING PLAN 27

DRAWING
G27
30 OF XX SHTS





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30' 0' 15' 30'
SCALE: 1" = 30'

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

HAO A. NGUYEN P.E. 19396 — 4/4/16 DATE

H# _____ CLV DWG# _____

ENGINEER - STATE OF NEVADA
HAO A. NGUYEN
No. 19396
PROFESSIONAL
Exp. 12/31/2017
CIVIL
DATE: 4/4/16

REV	DATE	DESCRIPTION	DRAWN	CHK'D	APP'D	DATE	AGEN APP	DATE	CCW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:34:28

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F:\Projects\700\764-204-013\DWG\Production\PH 01\013-PH1-G28.dwg
Hao Nguyen

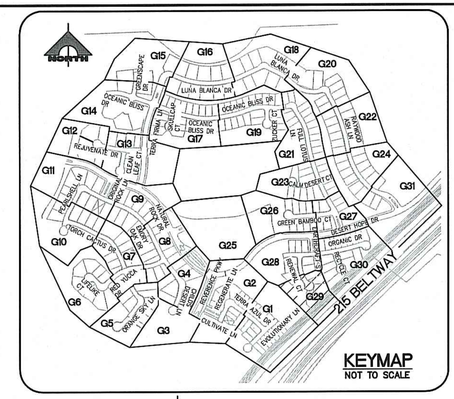
PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

GRADING PLAN 28

DRAWING
G28
31 OF XX SHTS





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HAO A. NGUYEN P.E. 19396 — DATE 2/4/16

H# _____ CLV DWG# _____

STATE OF NEVADA — HAO A. NGUYEN — No. 19396 — PROFESSIONAL ENGINEER — CIVIL — Exp. 12/31/2017
DATE: 2/4/16

DESCRIPTION	DATE	APP
		GCW
		AGEN

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:34:19

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
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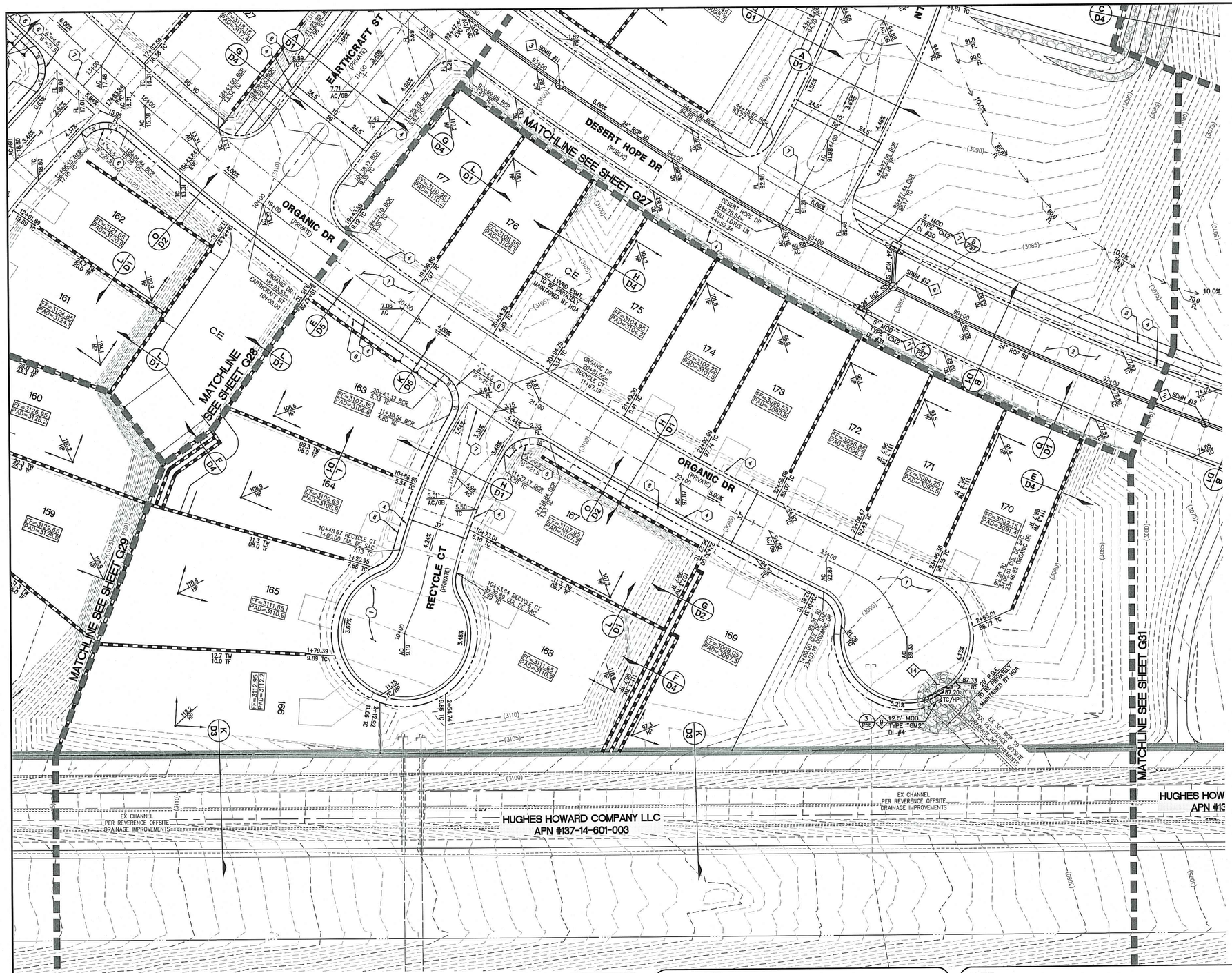
F:\Projects\700\764-204-013\DWG\Production\PH 01\013-PH1-G20.dwg
Hao Nguyen

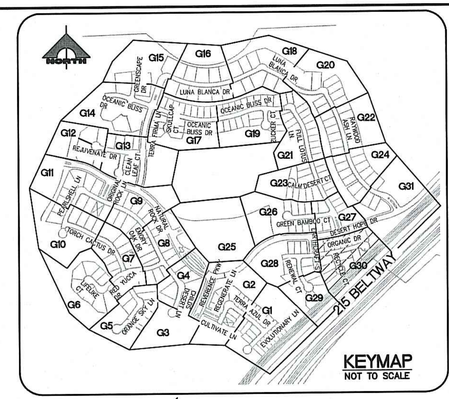
PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

GRADING PLAN 29

DRAWING G29
32 OF XX SHTS





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DATE 7/6/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
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PLOT TIME: 10:34:09

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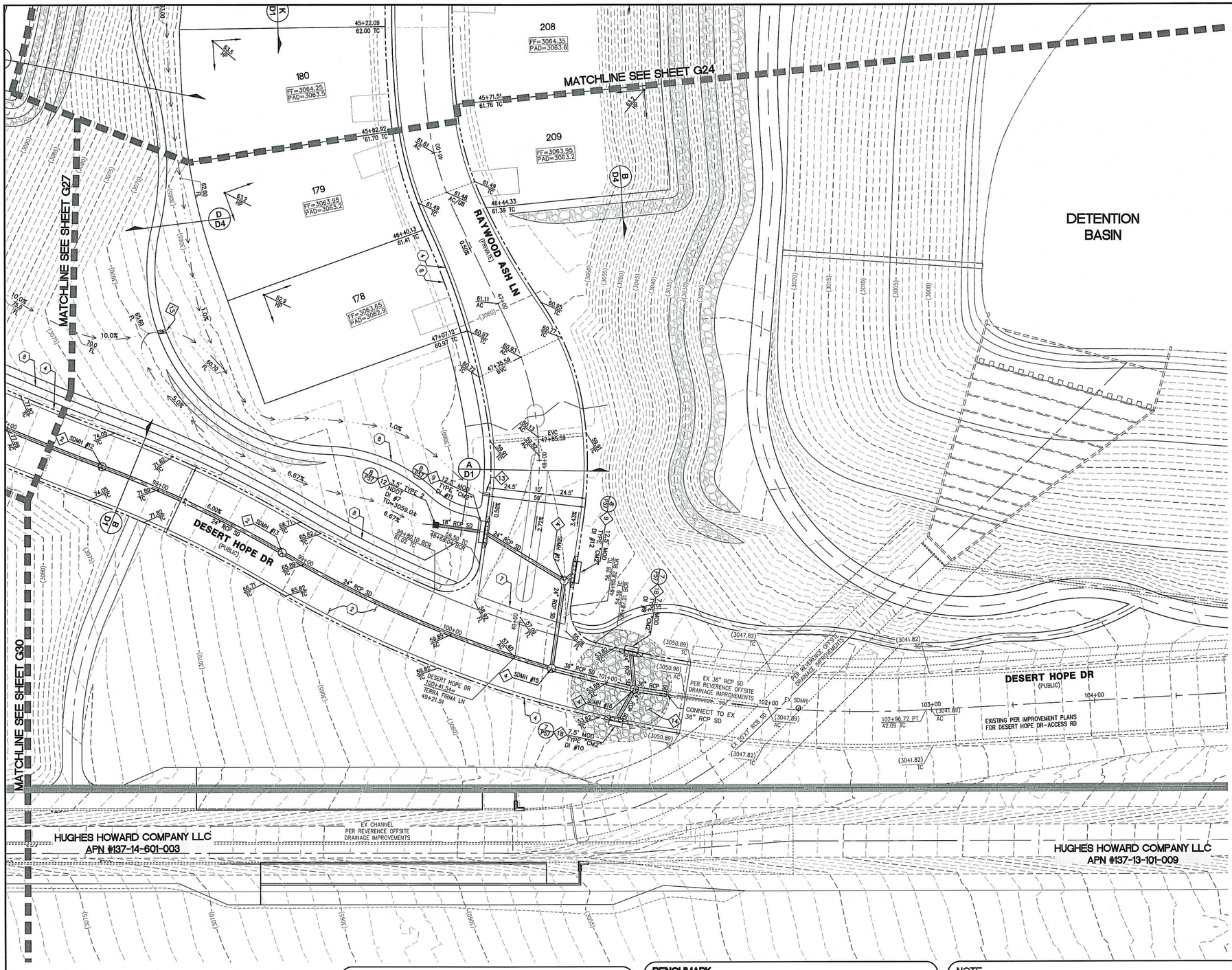
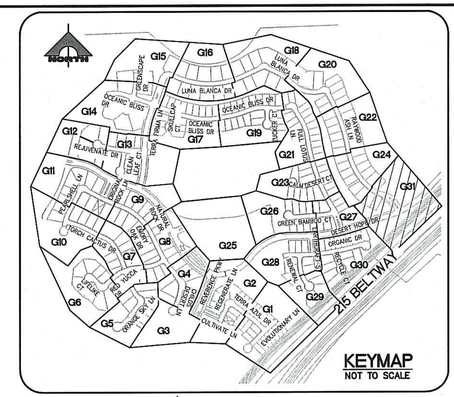
GRADING PLAN 30

DRAWING G30
33 OF XX SHTS





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NOTE: SEE SHEET C1 & C2 FOR ABBREVIATIONS AND QUANTITIES

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 OR 1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

NOTE TO CONTRACTOR

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

NOTE

ALL ONSITE STORM DRAINS AND ASSOCIATED STORM FACILITIES ARE PRIVATELY OWNED AND TO BE PRIVATELY MAINTAINED BY THE HOA.

ALL PRIVATE STREETS ARE P.U.E., PUBLIC DRAINAGE EASEMENT AND PUBLIC SEWER EASEMENTS TO BE PRIVATELY MAINTAINED BY HOA.

BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

NOTE

1. THE GEOTECHNICAL EXPLORATION PROPOSED RESIDENTIAL DEVELOPMENT SUMMERLIN VILLAGE 23B, PARCEL BB LAS VEGAS, NEVADA AS PREPARED BY ANGLE ENGINEERING, PROJECT NUMBER 77053-1, DATED MAY 28, 2014.
2. CONSTRUCTION FOR BLOCK WALLS REQUIRES A SEPARATE BUILDING PERMIT AND APPROVAL BY THE BUILDING SAFETY AND MAINTENANCE DEPARTMENT
3. WALLS CONSTRUCTED OTHER THAN THOSE AS DETAILED ON THIS SHEET ARE TO BE CONSTRUCTED BY WALL SUB-CONTRACTOR, DETAILS AND STRUCTURAL CALCS AS PREPARED BY OTHERS.
4. NO OBJECT OVER 24" OTHER THAN TRAFFIC CONTROL DEVICES AND STREET LIGHT POLES CAN BE CONSTRUCTED OR INSTALLED WITHIN THE SIGHT VISIBILITY ZONE.
5. ALL PRIVATE STREETS ARE TO BE DEDICATED AS PUBLIC DRAINAGE EASEMENT AND PUBLIC UTILITY EASEMENT TO BE PRIVATELY MAINTAINED.

DRAINAGE CERTIFICATION

I CERTIFY THAT THE GRADING PLANS ARE IN CONFORMANCE WITH THE APPROVED DRAINAGE STUDY ON FILE AT THE CITY OF LAS VEGAS FOR THIS PROJECT.

HAO A. NGUYEN P.E. 19396 — 4/6/16 DATE

H# _____ CLV DWG# _____

STATE OF NEVADA — HAO A. NGUYEN — No. 19396 — PROFESSIONAL ENGINEER — Exp. 12/31/2017 — CIVIL

DATE: 4/6/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:33:59

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

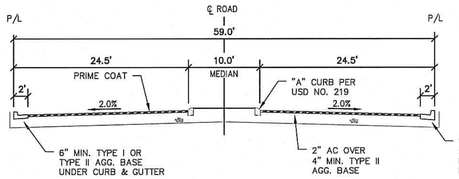
F:\Projects\700\764-204-013\DWG\Production\PH 01\01sPH1-G20.dwg
Hao Nguyen

PULTE HOMES

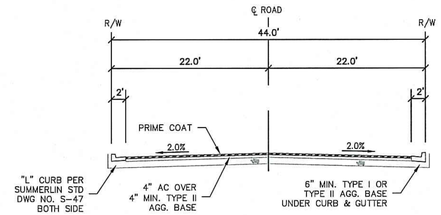
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

GRADING PLAN 31

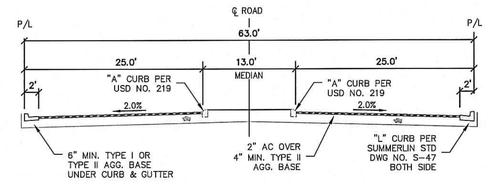
DRAWING G31
34 OF XX SHTS



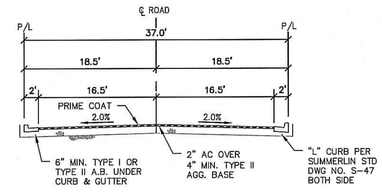
A **59.0' PRIVATE ENTRY** (TYPICAL STREETS) NTS



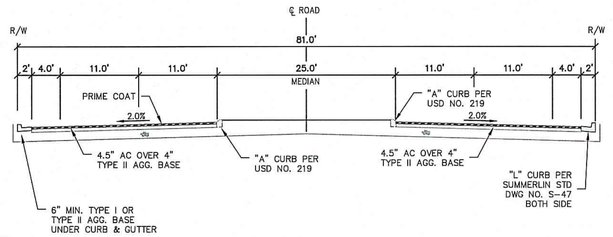
B **44.0' DESERT HOPE DRIVE AND NATURAL ROCK DRIVE** (TYPICAL STREETS) NTS



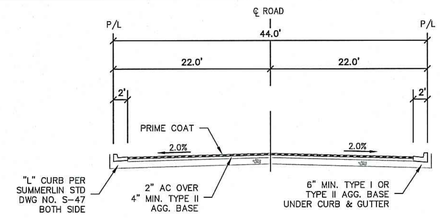
C **63.0' PRIVATE STREET SECTION** NTS



D **37.0' PRIVATE STREET SECTION** NTS



E **REVERENCE PARKWAY (PUBLIC)** NTS



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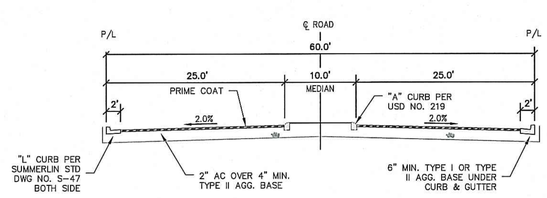
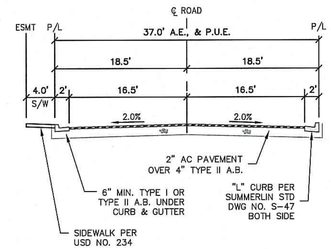
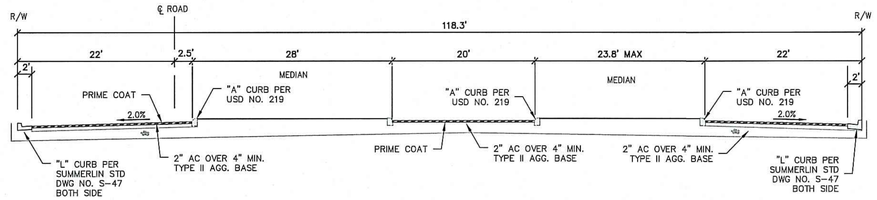


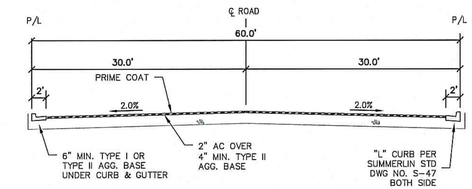
G **60.0' PRIVATE STREET SECTION** NTS



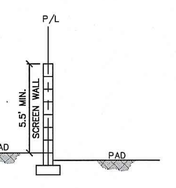
H **37.0' PRIVATE STREET SECTION** NTS



I **NATURAL ROCK DR (PUBLIC)** NTS



J **60.0' PRIVATE STREET SECTION** NTS



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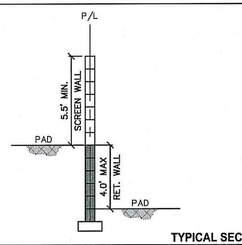

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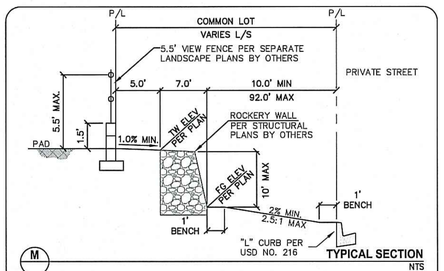

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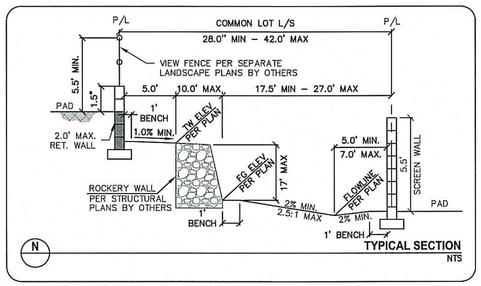

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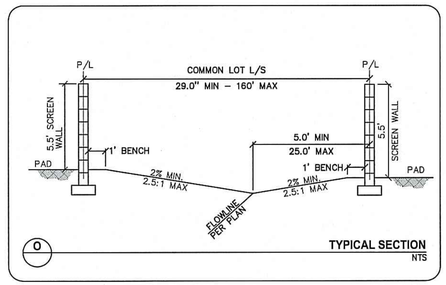

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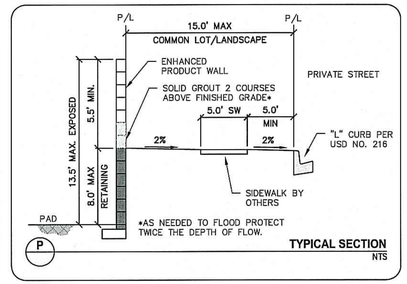

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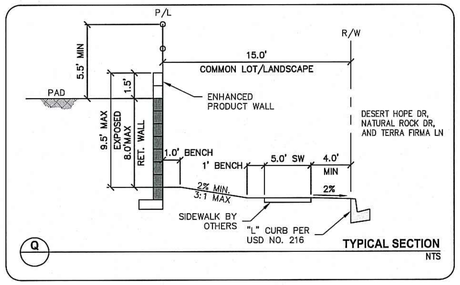

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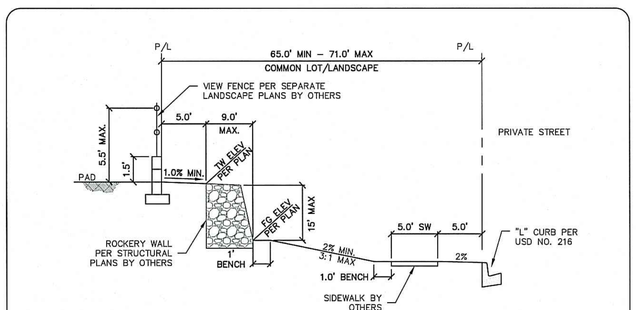

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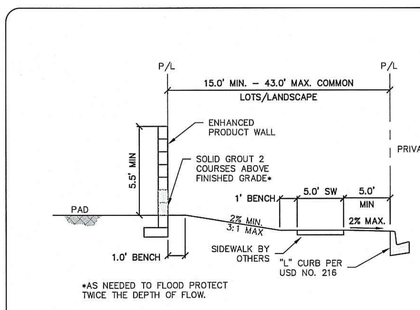

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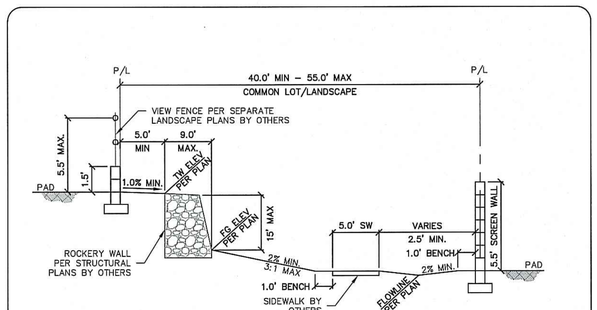

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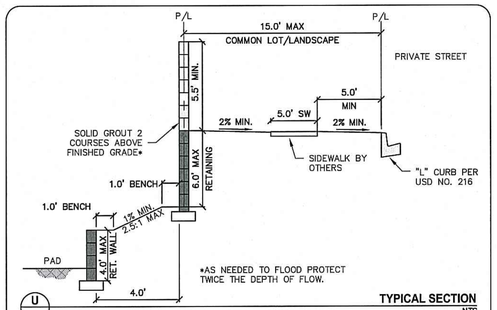


U **TYPICAL SECTION** NTS

H# _____ CLV DWG# _____

STATE OF NEVADA — REGISTERED ENGINEER — No. 19396 — HAO A. NGUYEN — Exp. 12/31/2017 — CIVIL — DATE: 4/6/17

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

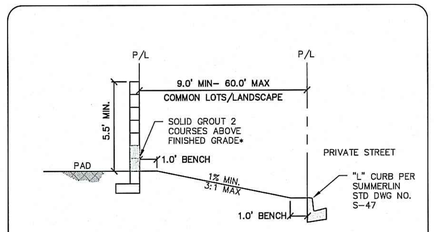
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:32:03

GCV
ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcvengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\01c3PH1-D1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
SECTIONS AND DETAILS I

DRAWING
D1
35 OF XX SHTS



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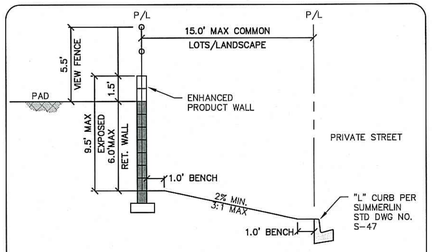

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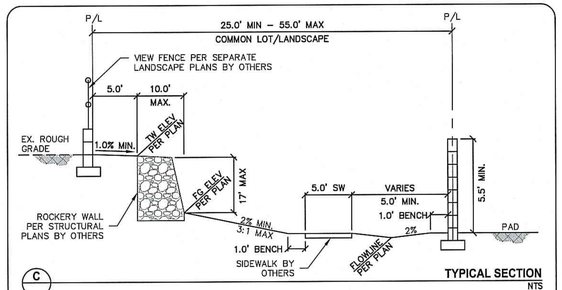

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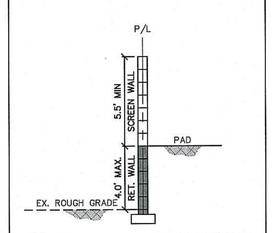

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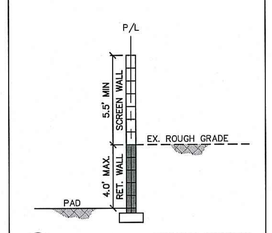

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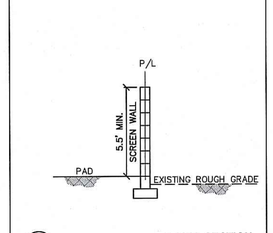

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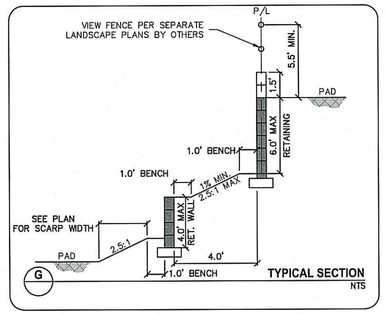

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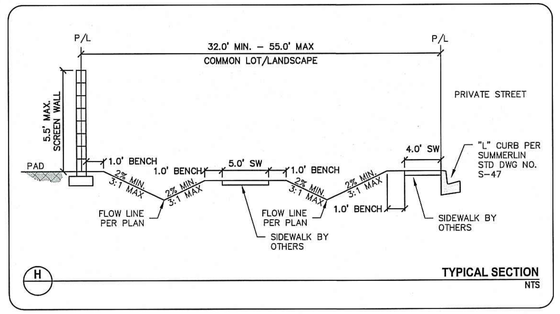

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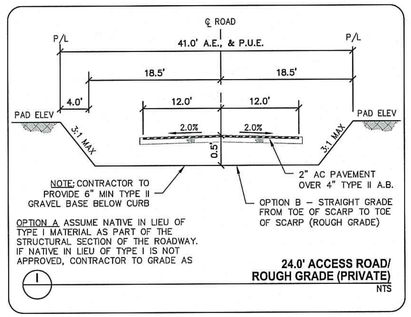
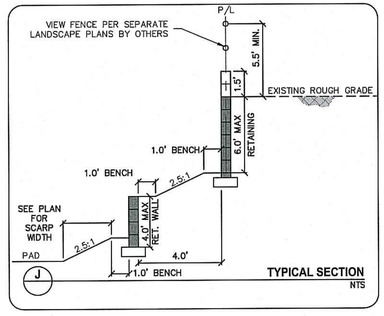


I 24.0' ACCESS ROAD/ ROUGH GRADE (PRIVATE) NTS



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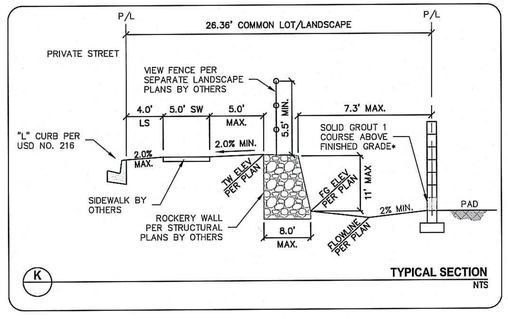

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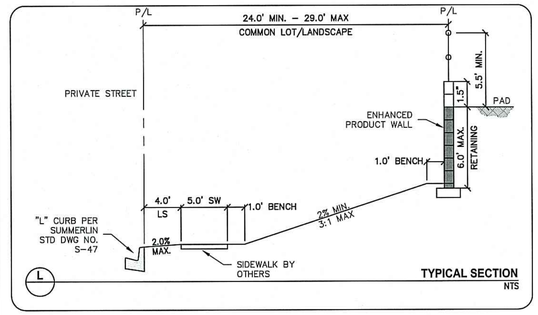

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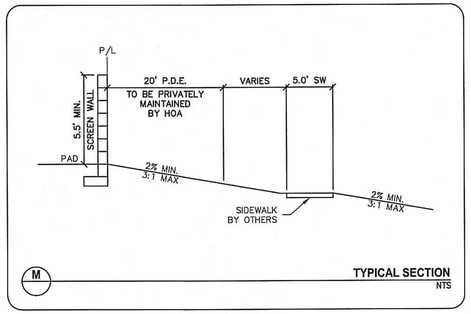

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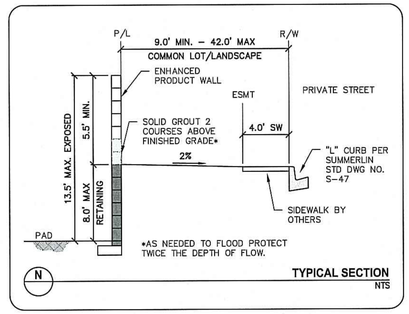

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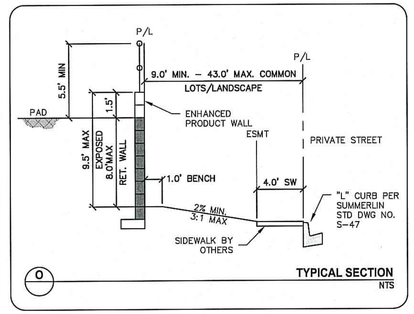

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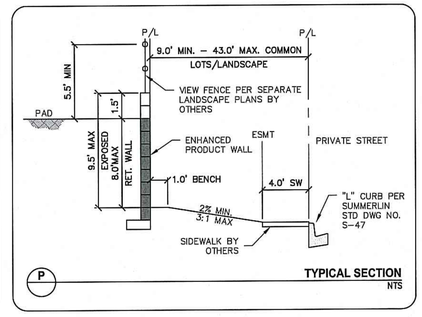

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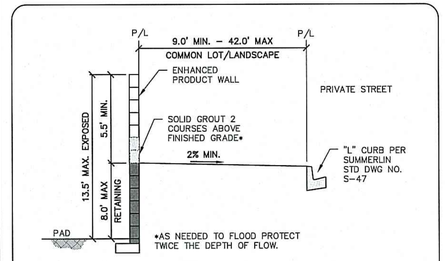

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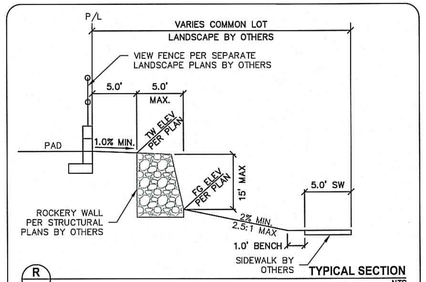

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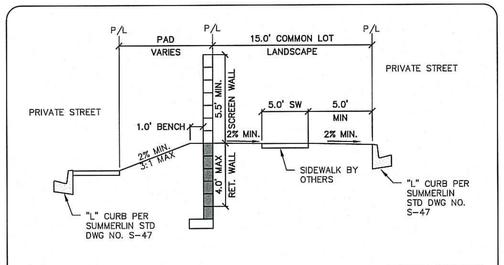

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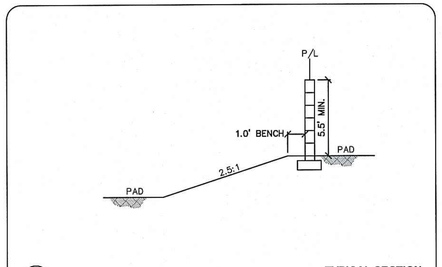

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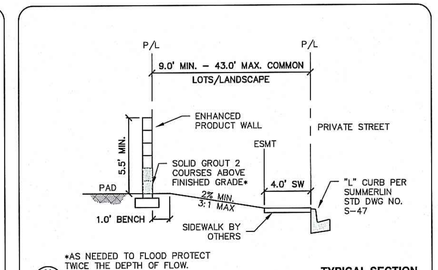

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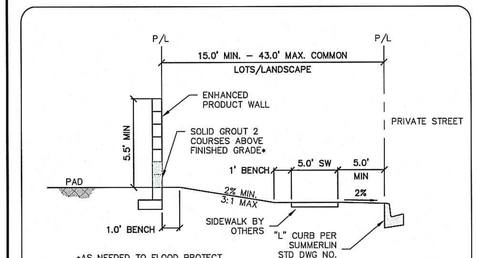

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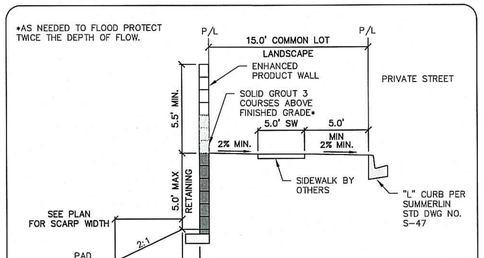
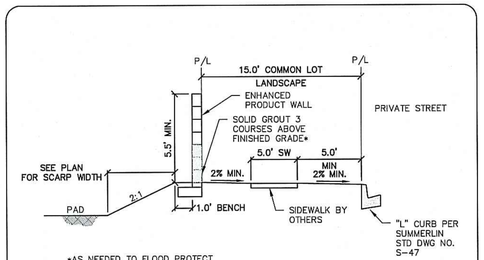


W TYPICAL SECTION NTS



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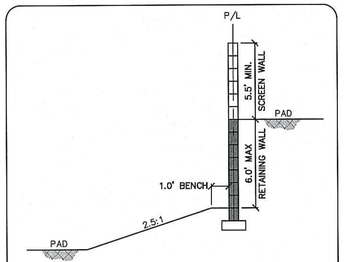

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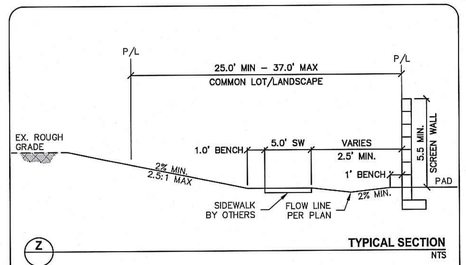

Z TYPICAL SECTION NTS

H# _____ CLV DWG# _____

STATE OF NEVADA PROFESSIONAL ENGINEER — HAO A. NGUYEN — No. 19396 — CIVIL — DATE: 4/28/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:31:59

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
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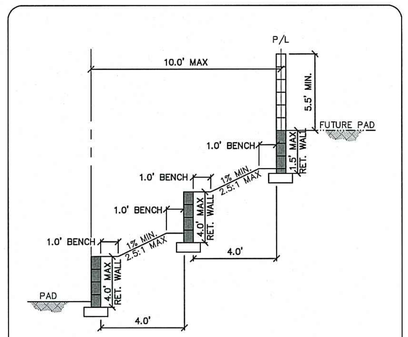
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\D13cPH1-D1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
SECTIONS AND DETAILS II

DRAWING D2
36 OF XX SHTS



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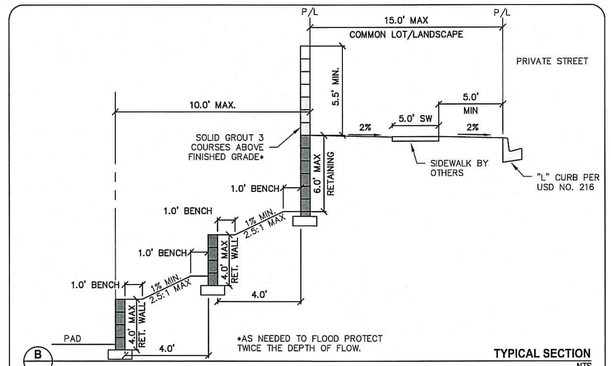

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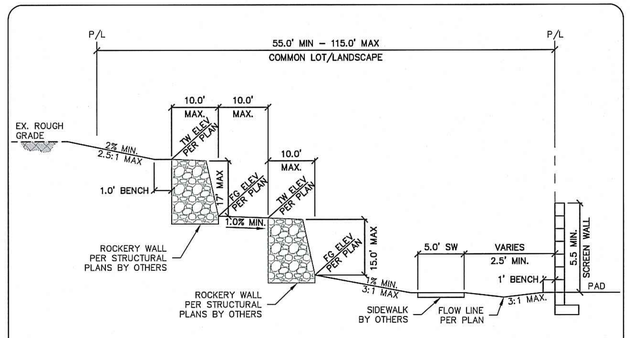

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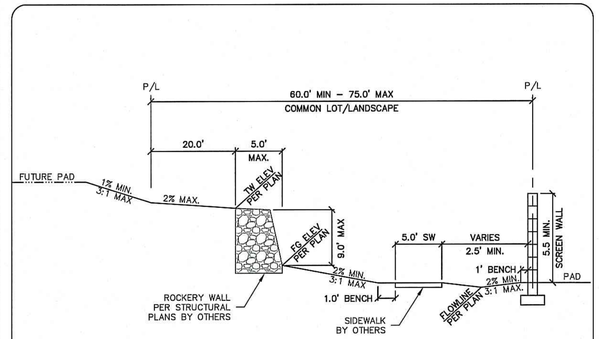

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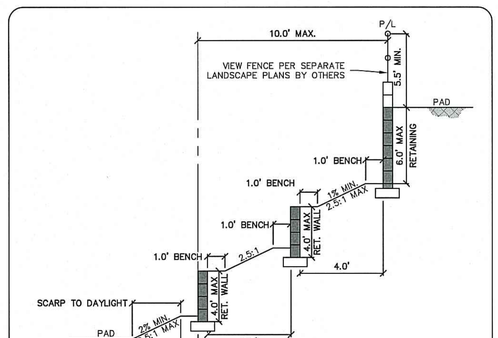

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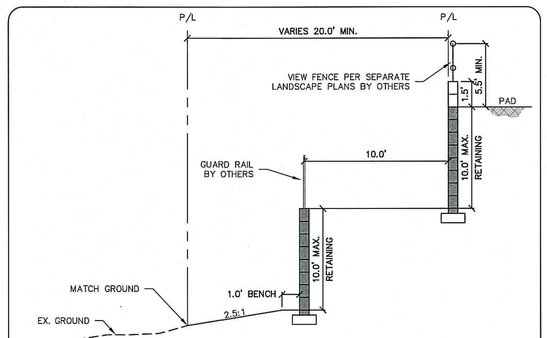

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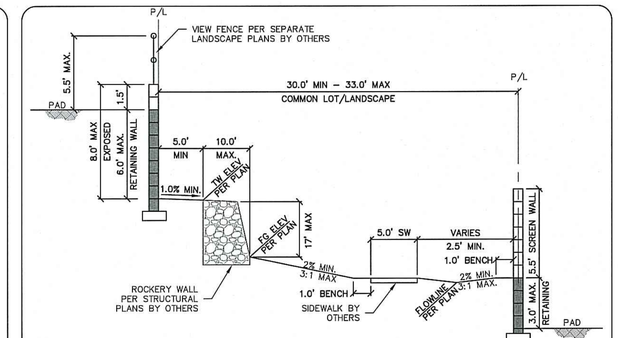

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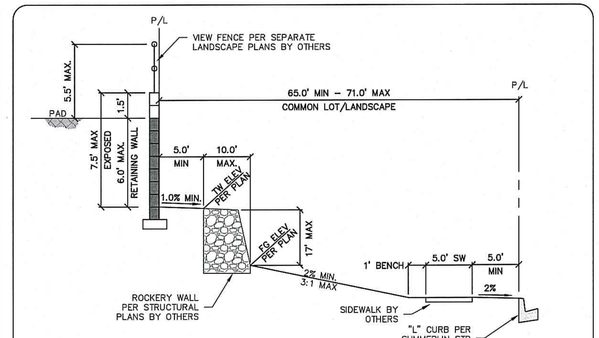

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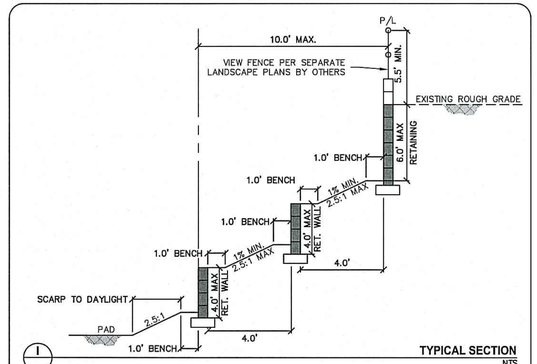

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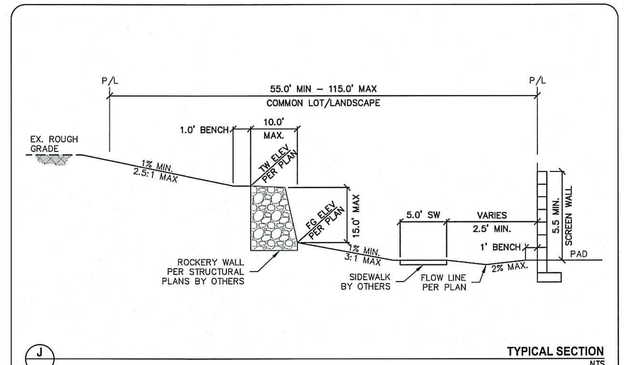

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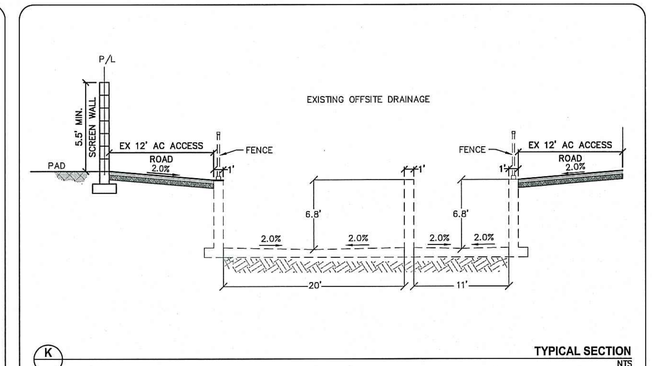

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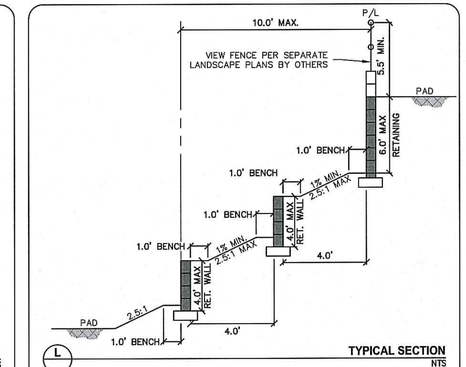

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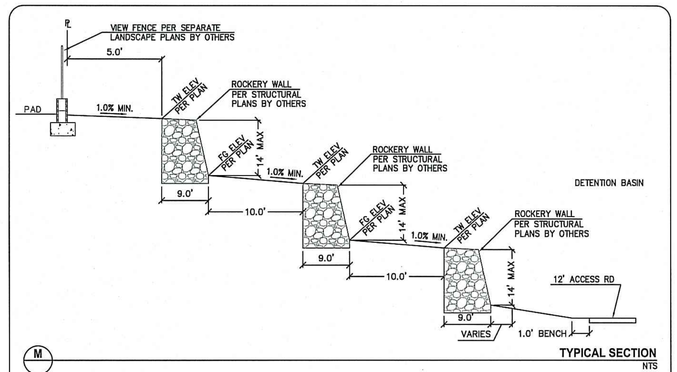

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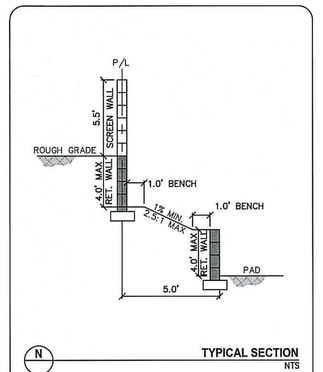

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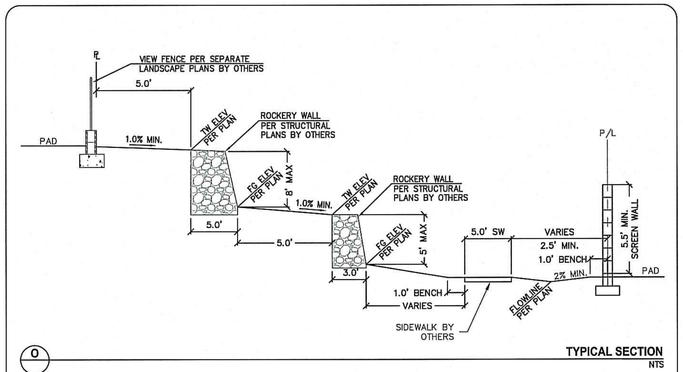

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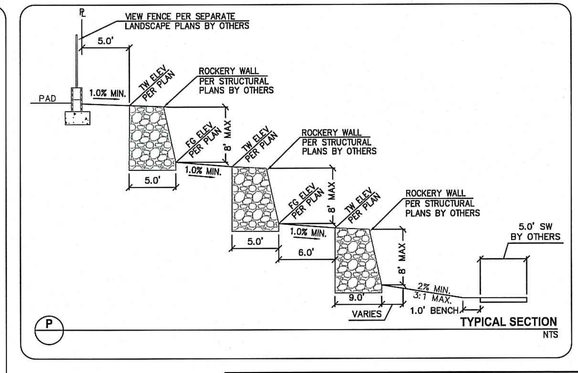

P TYPICAL SECTION NTS

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — No. 19396 — DATE: 4/16/18

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:31:55

GCV
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
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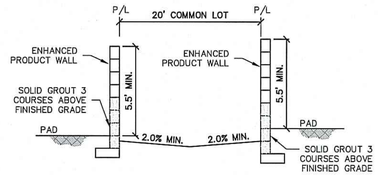
T: 702.804.2000
F: 702.804.2299
gcvengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-01.dwg
Hoo Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
SECTIONS AND DETAILS III

DRAWING
D3
37 OF XX SHTS



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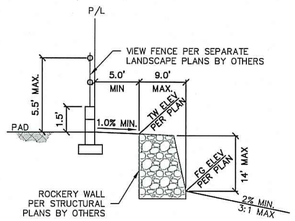

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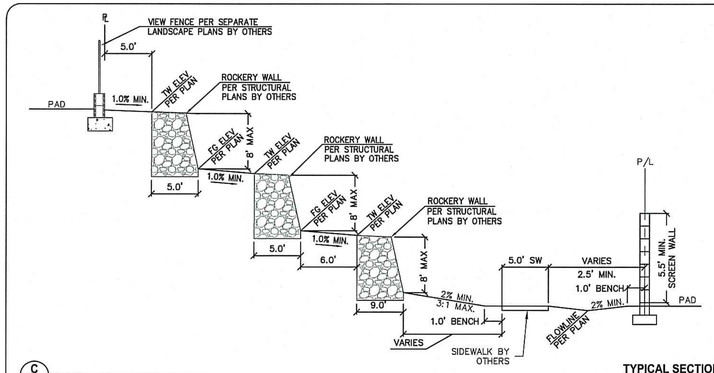

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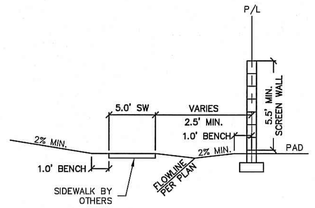

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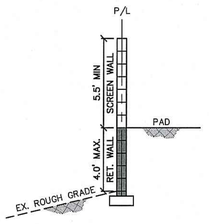

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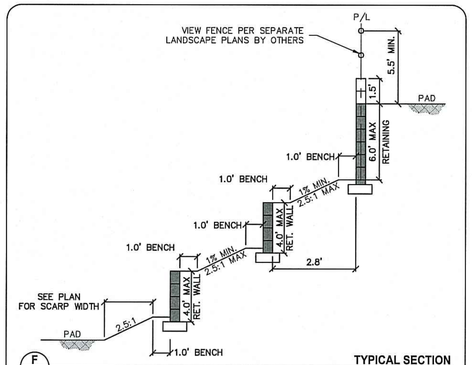

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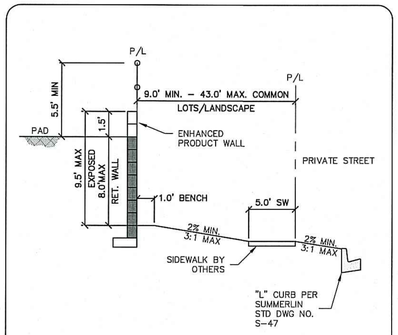

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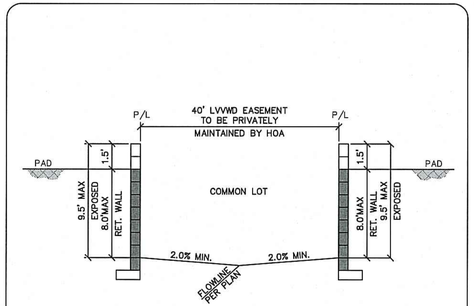

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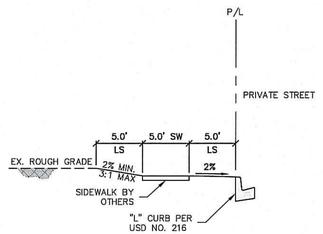

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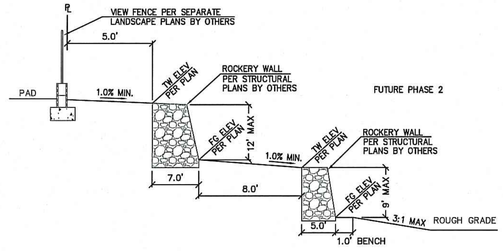

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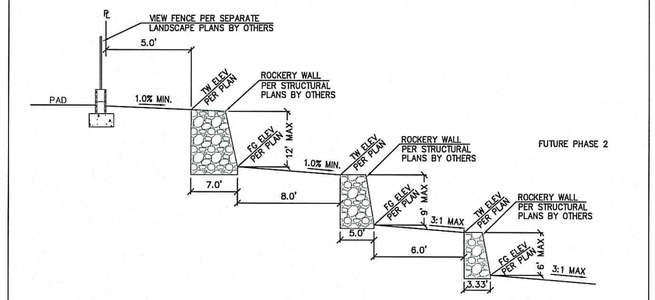

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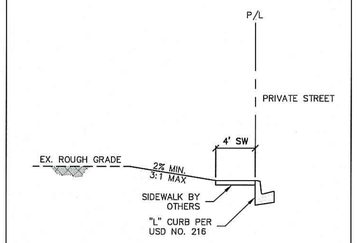

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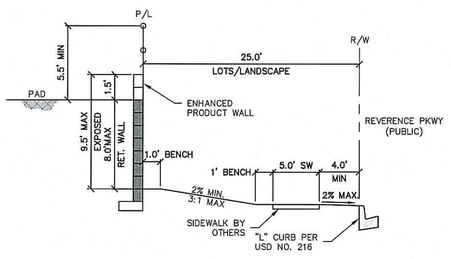

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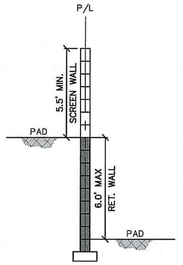

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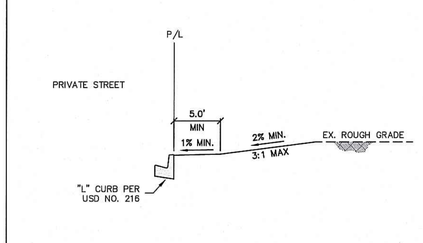

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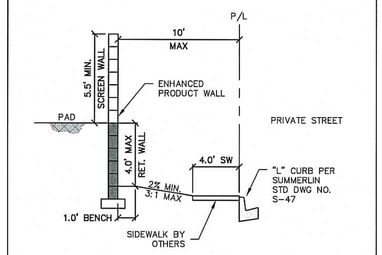

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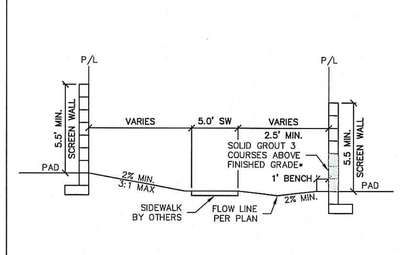

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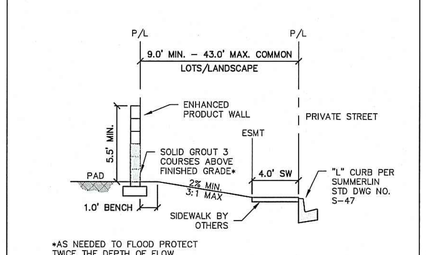

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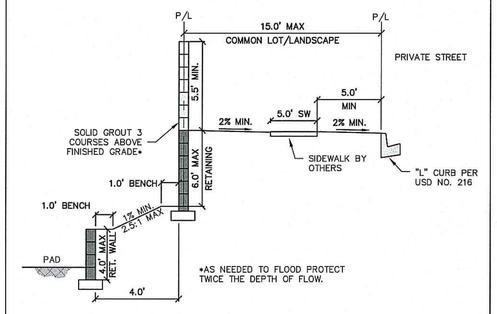

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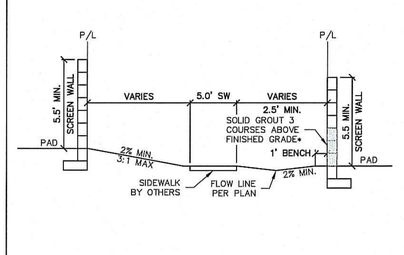


T TYPICAL SECTION NTS

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — HAO A. NGUYEN — No. 19398 — DATE: 4/26/16

REV	DATE	DESCRIPTION
	DATE	AGEN APP
	DATE	GCW APP

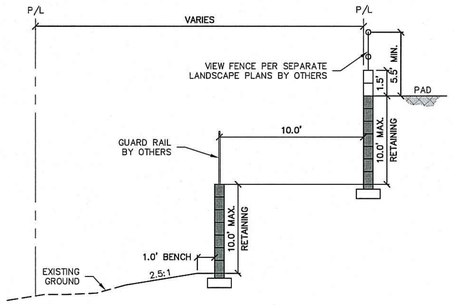
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:31:51

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-D1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
SECTIONS AND DETAILS IV

DRAWING
D4
38 OF XX SHTS



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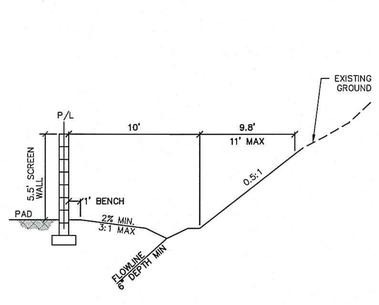

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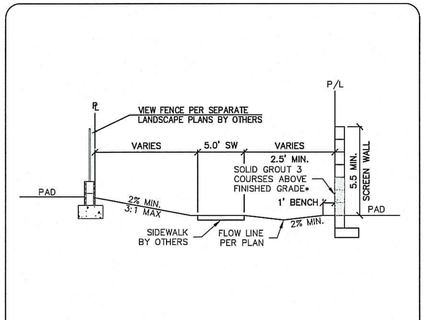

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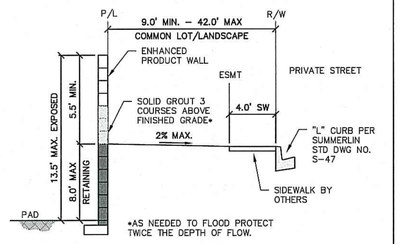

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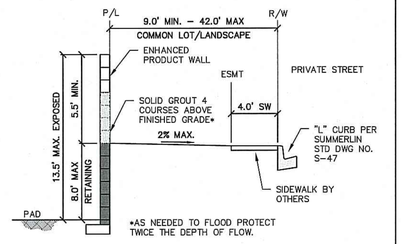

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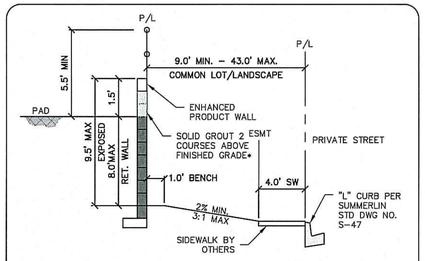

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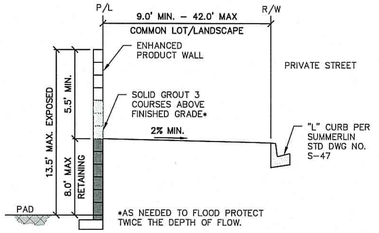

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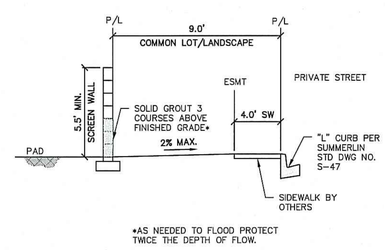

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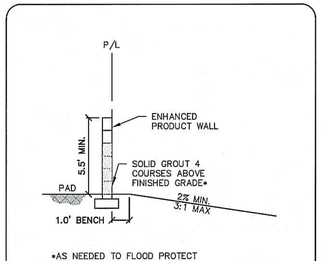
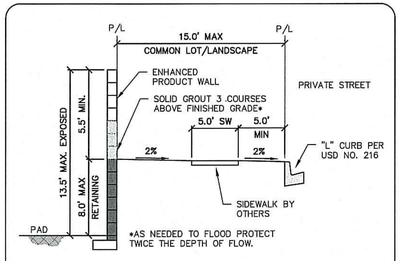


I **TYPICAL SECTION** NTS



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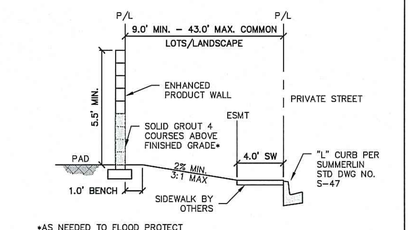

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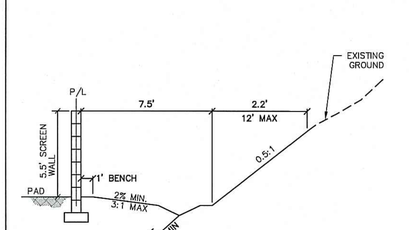

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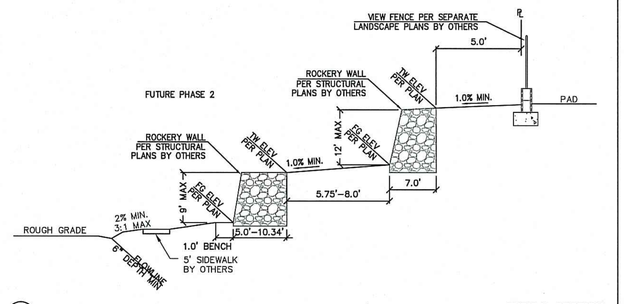

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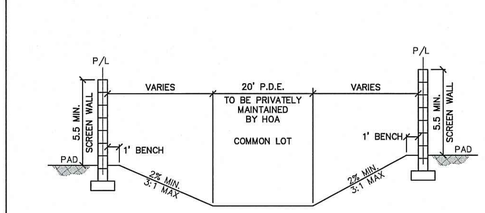


N **TYPICAL SECTION** NTS

R-42

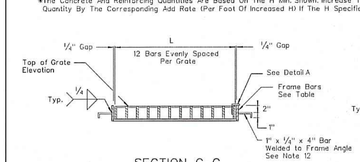
BILL OF MATERIALS (RCP HDPE CMP)

PIPE SIZE (INCH)	SINGLE (ONE GRATE)					DOUBLE (TWO GRATES)					TRIPLE (THREE GRATES)				
	* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)			* CONCRETE (CY)		* REINF. (LB.)		
	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	BASE QUAN. (H MIN.)	ADD RATE (CY/FT)	STR STEEL (LB)
≤ 15	0.71	0.19	36	10	211	1.06	0.26	50	13	397	1.41	0.33	70	17	583
18	0.89	0.20	40	10	306	1.31	0.28	56	13	574	1.72	0.35	77	18	842
24	1.08	0.22	58	12	349	1.56	0.30	80	15	652	2.04	0.37	105	20	956
30	1.28	0.24	63	12	390	1.83	0.31	86	16	729	2.38	0.39	113	20	1068
36	1.50	0.26	67	13	524	2.11	0.33	92	16	980	2.72	0.41	120	21	1435
42	1.71	0.28	90	15	575	2.39	0.35	120	18	1073	3.07	0.43	154	22	157'
48	1.94	0.30	95	15	707	2.68	0.37	127	18	1329	3.42	0.44	163	23	195'

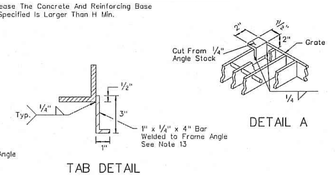
*The Concrete And Reinforcing Quantities Are Based On The H Min. Shown. Increase The Concrete And Reinforcing Base Quantity By The Corresponding Add Rate (Per Foot Of Increased H) If The H Specified Is Larger Than H Min.

TABLE OF DIMENSIONS (RCP HDPE CMP)

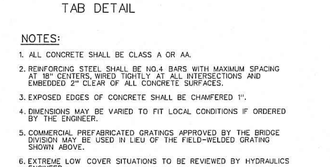
PIPE SIZE (INCH)	A	H Min. (FT)	MAIN BARS (INCH)	FRAME ANGLES (INCH)	FRAME BARS (INCH)	L (FT) SINGLE GRATE	L (FT) DOUBLE GRATE	L (FT) TRIPLE GRATE
≤ 15	2'	2.50	3½" x ⅜"	4 X 3 X ⅜"	4 X ¾"	2	4	6
18	2' 6"	3.00	4½" x ⅜"	5 X 3 X ⅜"	5 X ¾"	2	4	6
24	3'	3.50	4½" x ⅜"	5 X 3 X ⅜"	5 X ¾"	2	4	6
30	4'	4.00	4½" x ⅜"	5 X 3 X ⅜"	5 X ¾"	2	4	6
36	4'	4.50	5½" x ⅜"	6 X 3½" x ⅜"	6 X ¾"	2	4	6
42	5'	5.00	5½" x ⅜"	6 X 3½" x ⅜"	6 X ¾"	2	4	6
48	5'	5.50	5½" x ⅜"	6 X 3½" x ⅜"	6 X ¾"	2	4	6



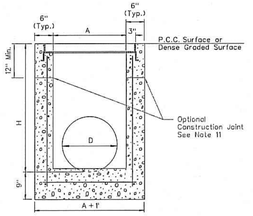
SECTION C–C



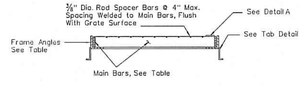
DETAIL A



TAB DETAIL



SECTION A–A



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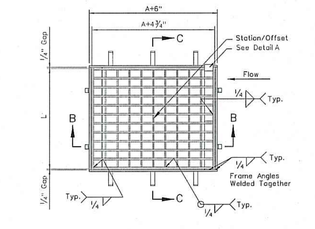
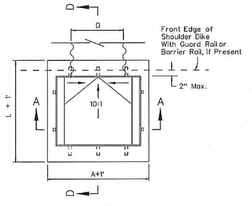


GRATE AND FRAME



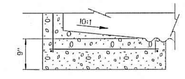
PLAN

NOTES:

1. ALL CONCRETE SHALL BE CLASS A OR AA.
2. REINFORCING STEEL SHALL BE NO.4 BARS WITH MAXIMUM SPACING AT 18" CENTERS, WIRED TIGHTLY AT ALL INTERSECTIONS AND EMBEDDED 2" CLEAR OF ALL CONCRETE SURFACES.
3. EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1".
4. DIMENSIONS MAY BE VARIED TO FIT LOCAL CONDITIONS IF ORDERED BY THE ENGINEER.
5. COMMERCIAL PREFABRICATED GRATINGS APPROVED BY THE BRIDGE DIVISION MAY BE USED IN LIEU OF THE FIELD-WELDED GRATING SHOWN ABOVE.
6. EXTREME LOW COVER SITUATIONS TO BE REVIEWED BY HYDRAULICS ENGINEER.
7. SLOPE CATCH BASIN FLOORS 10:1 FROM ALL DIRECTIONS TOWARD OUTLET PIPE. IF BASIN IS USED AS A JUNCTION, SHAPE FLOW LINE(S) TO OUTLET PIPE AND PROVIDE A 10:1 SLOPE TO FLOW LINE(S).
8. SEE SHEET R-2.9.1 FOR DETAILS IF CONNECTING HDPE PIPE.
9. A SINGLE TYPE 2 DROP INLET SHALL BE CONSTRUCTED UNLESS A DOUBLE OR TRIPLE IS SPECIFIED.
10. SINGLE GRATE CONFIGURATION SHOWN FOR CLARITY. OUTSIDE DIMENSIONS OF EACH GRATE SHALL MEASURE 2' BY A+4¾".
11. RUN REBAR CONTINUOUS THRU CONSTRUCTION JOINT. JOINT MUST BE A MINIMUM OF 3" FROM HORIZONTAL BARS.
12. WELD ONE TAB ON ¢ OF GRATE AND REMAINING TWO TABS 6" FROM EDGE OF FRAME. SIX TABS PER INLET, THREE TABS ON EACH SIDE
13. WELD TABS 6" FROM EDGE OF FRAME. FOUR TABS PER GRATE, TWO ON EACH SIDE.

DESIGN NOTES:

D1. ADDITIONAL PIPE PENETRATIONS MAY BE PLACED IN ANY WALL.



SECTION D–D

NEVADA DEPARTMENT OF TRANSPORTATION

TYPE 2 DROP INLET

Signed Original On File	R-4.2.1	(609)
CHIEF HYDRAULICS ENGINEER	ADOPTED 11/70	REVISION 5/09

H# _____ CLV DWG# _____

STATE OF NEVADA — 19858 — HAO N. NGUYEN — Exp. 12/31/2017 — CIVIL — PROFESSIONAL ENGINEER — DATE: 4/4/18

REV	DATE	DESCRIPTION
	AGEN APP	DATE
	GCW APP	DATE

PROJECT NO. 764-204-013

DESIGN: _____
DRAWN: _____
CHECK: _____
PLOT DATE: 04-04-16
PLOT TIME: 10:31:46

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\Plt 01\01sPH1-01.dwg
Hao Nguyen

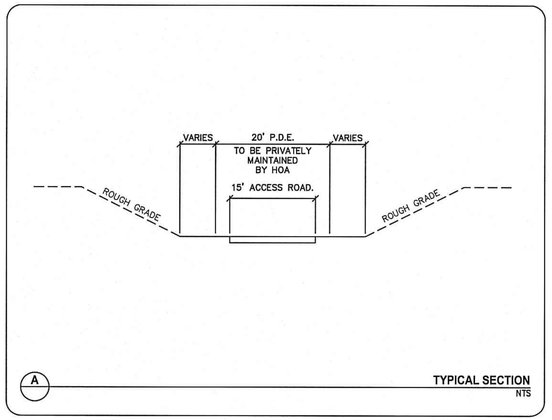
PULTE HOMES

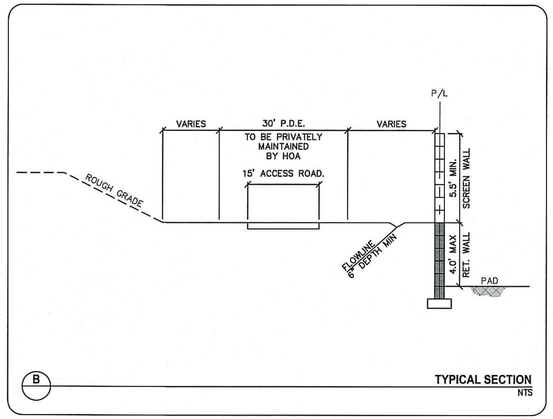
SUMMERLIN VILLAGE 26 – REVERENCE PHASE 1

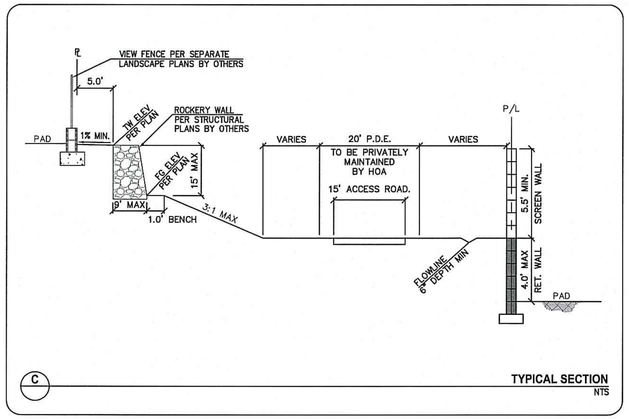
SECTIONS AND DETAILS V

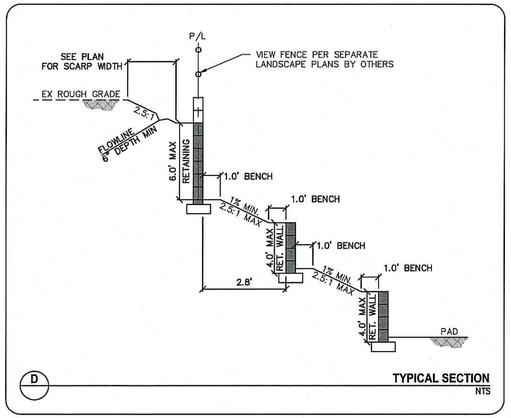
DRAWING D5

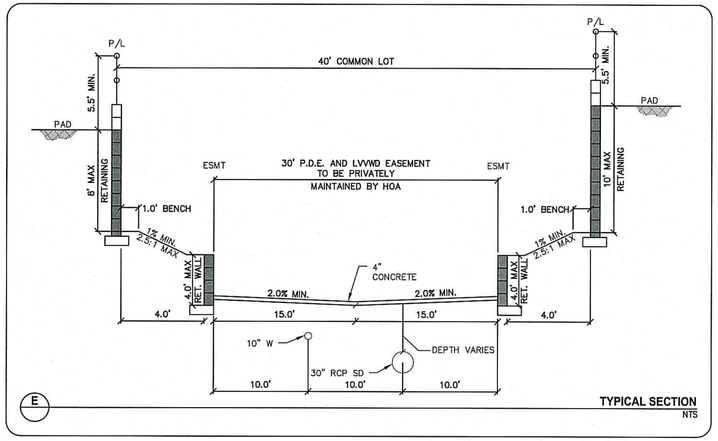
39 OF XX SHTS

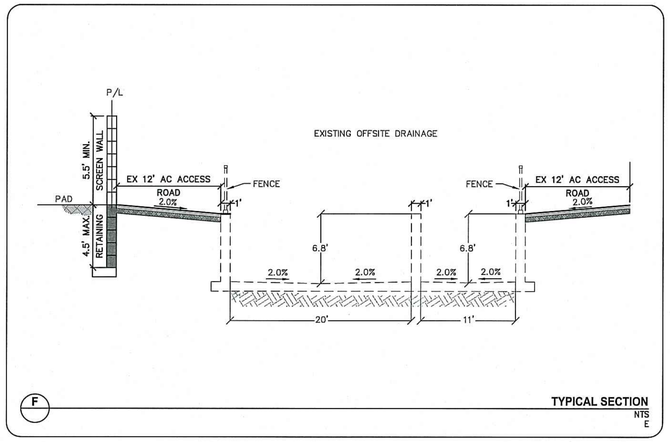












H# _____ CLV DWG# _____

PROJECT NO. 764-204-013

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:31:38

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-D1.dwg
Hao Nguyen

PULTE HOMES

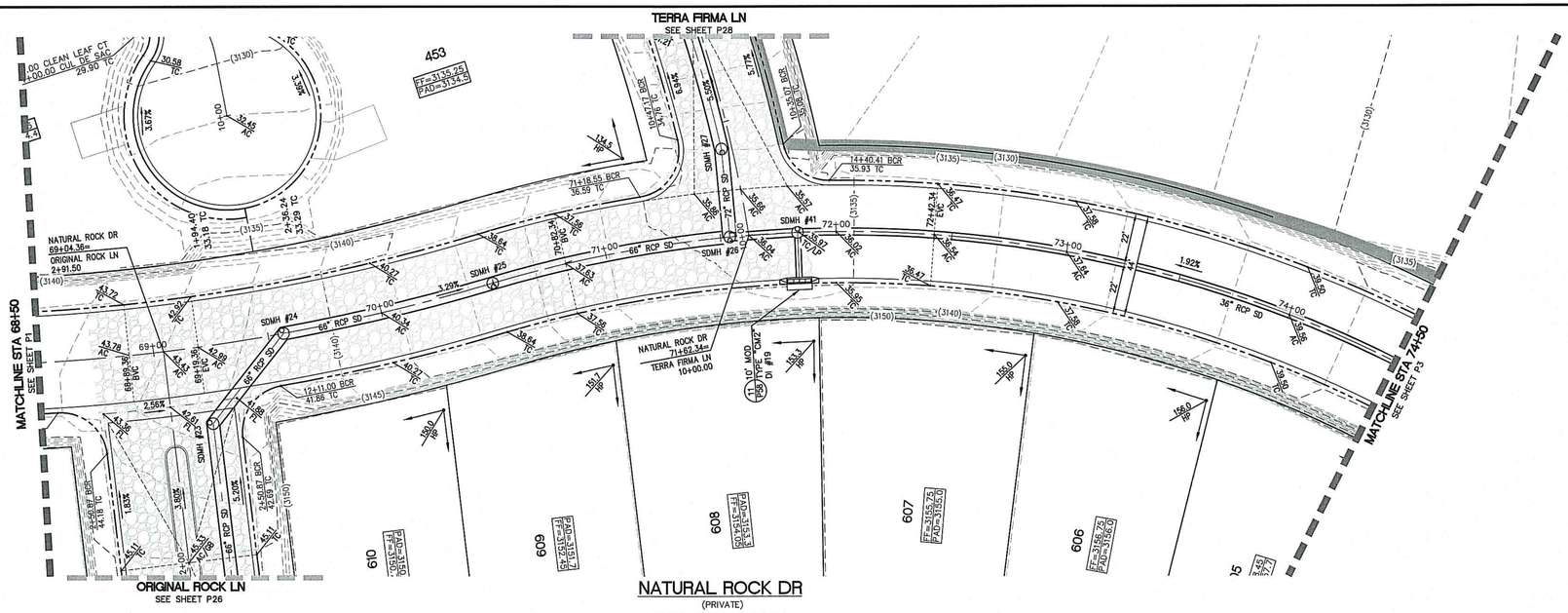
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

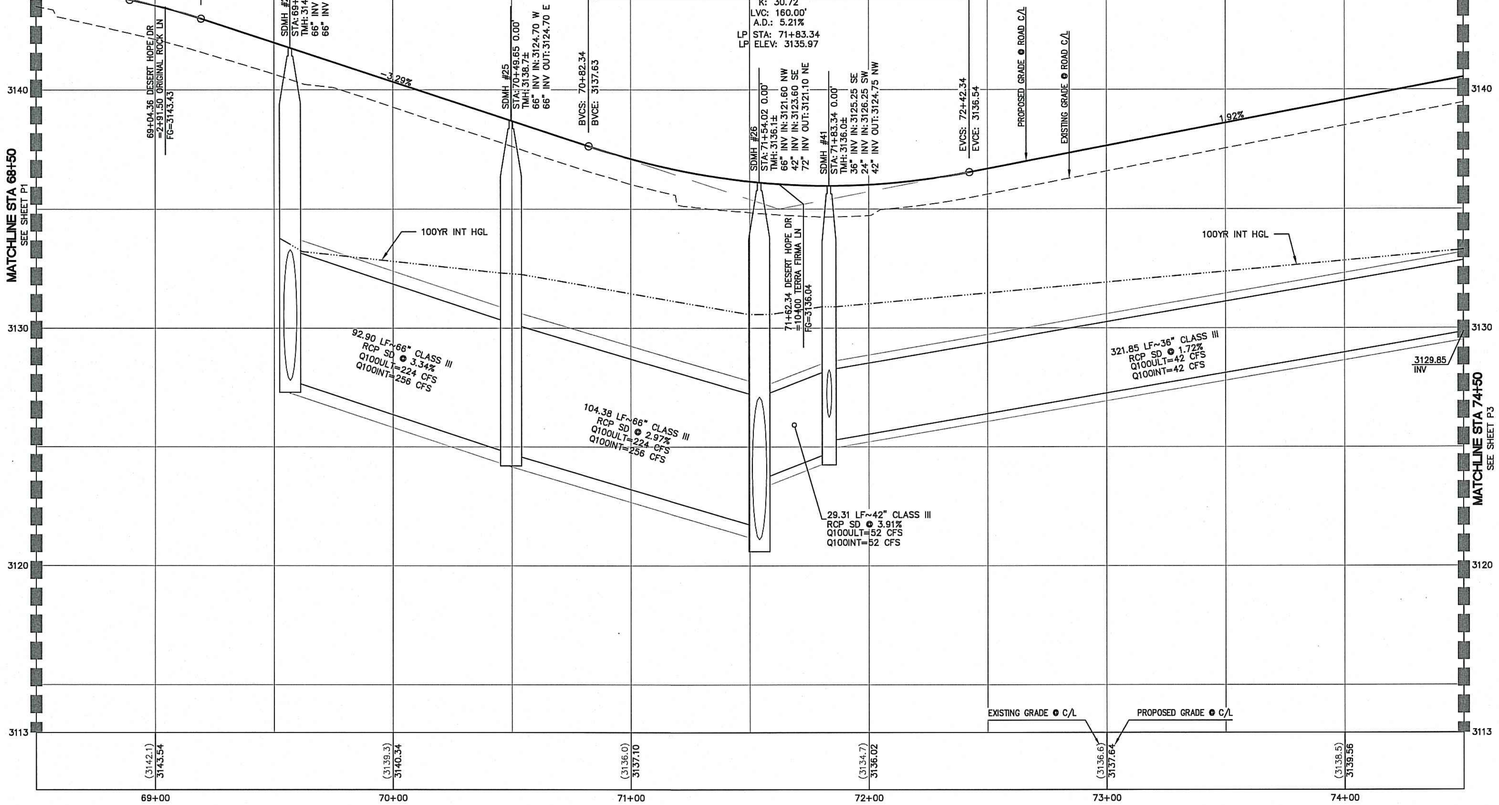
SECTIONS AND DETAILS VI

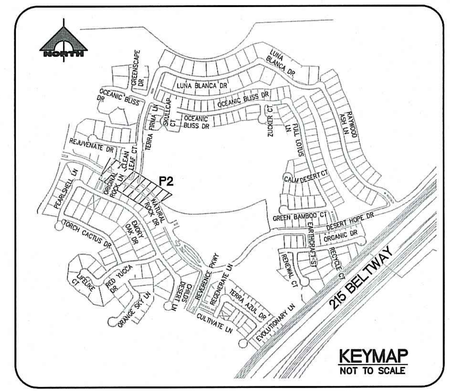
DRAWING
D6
40 OF XX SHTS

REV | DATE | DESCRIPTION | DATE | AGEN APP | DATE | GCW APP

HAO A. NGUYEN
Exp. 12/31/2017
CIVIL
No. 19396
STATE OF NEVADA
PROFESSIONAL ENGINEER
DATE: 4/4/16







KEYMAP
NOT TO SCALE



30' 0' 15' 30'
SCALE: 1" = 30'

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR
1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

NOTE TO CONTRACTOR

EXISTING UTILITY LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE EXACT VERTICAL AND HORIZONTAL LOCATION OF ALL EXISTING UNDERGROUND UTILITIES PRIOR TO COMMENCING CONSTRUCTION. NO REPRESENTATION IS MADE THAT ALL EXISTING UTILITIES ARE SHOWN HEREON. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITIES NOT SHOWN OR UTILITIES NOT SHOWN IN THEIR PROPER LOCATION.

BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ | CLV DWG# _____

ENGINEER - STATE OF NEVADA
No. 19359
PROFESSIONAL
HOA T. NGUYEN
Exp. 12/31/2017
CIVIL
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:31:06

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

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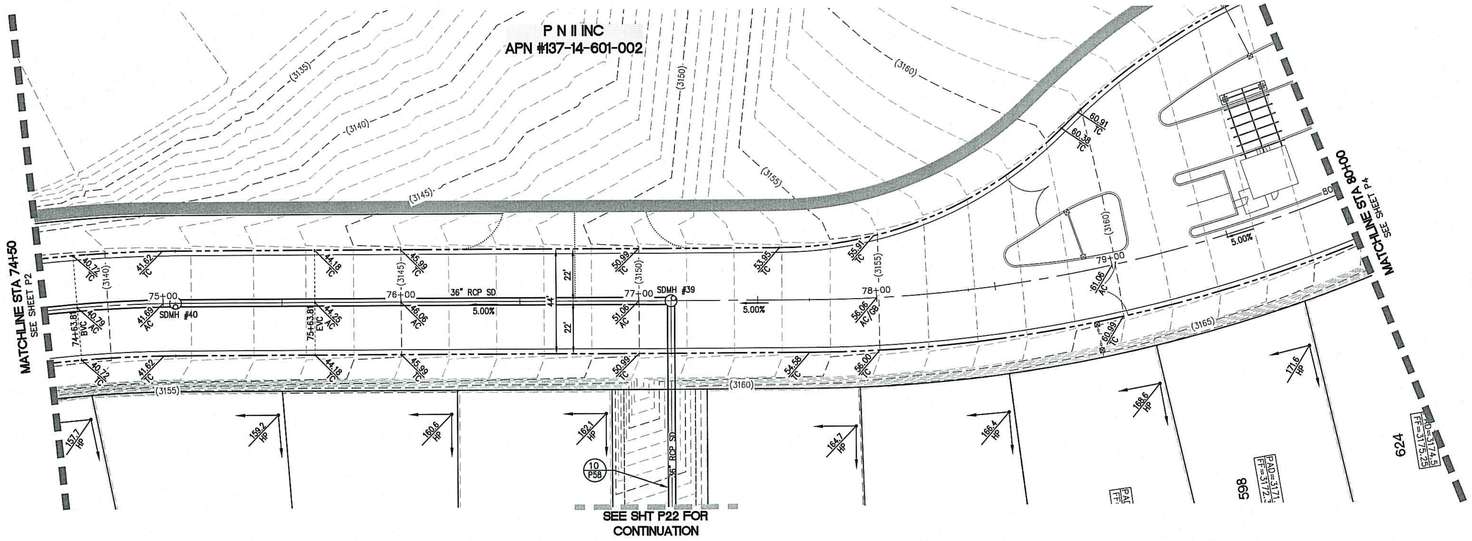
Hoa Nguyen

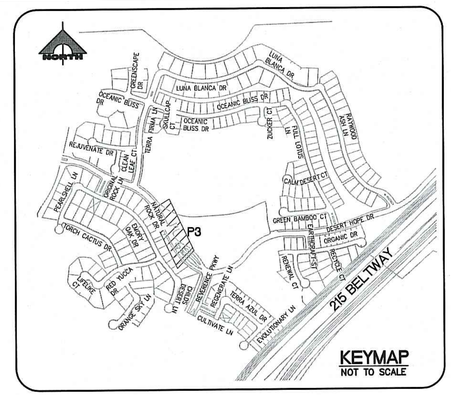
PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

NATURAL ROCK DR PLAN AND PROFILE
STA 68+50 TO STA 74+50

DRAWING
P2
42 OF XX SHTS







30' 0' 15' 30'

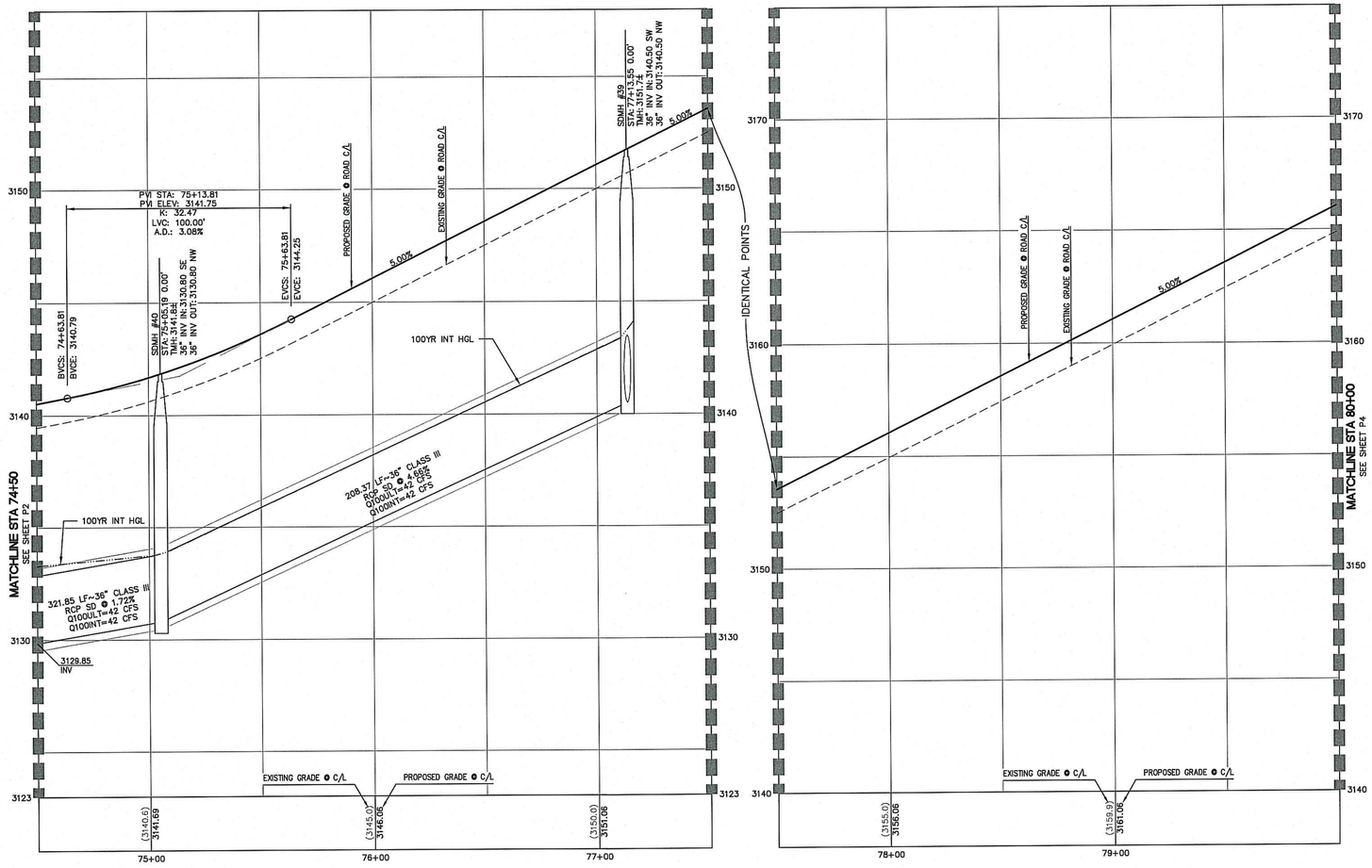
SCALE: 1" = 30'

NATURAL ROCK DR

(PRIVATE)

PLAN AND PROFILE

HORIZ. 1" = 30'
VERT. 1" = 3'



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CITY OF LAS VEGAS VERTICAL CONTROL POINT "5LV09 14S6", BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/–250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010)
BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA
PROFESSIONAL ENGINEER
No. 19367
HAO N. NGUYEN
Exp. 12/31/2017
CIVIL
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:30:46

GCW
ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
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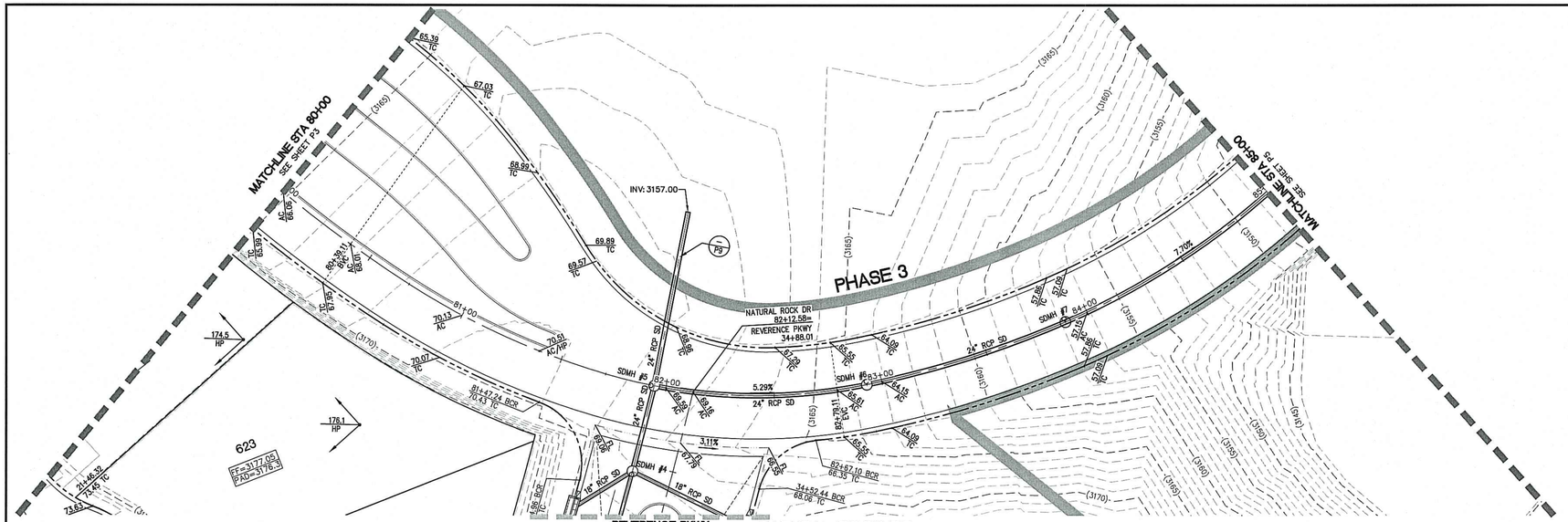
Hao Nguyen

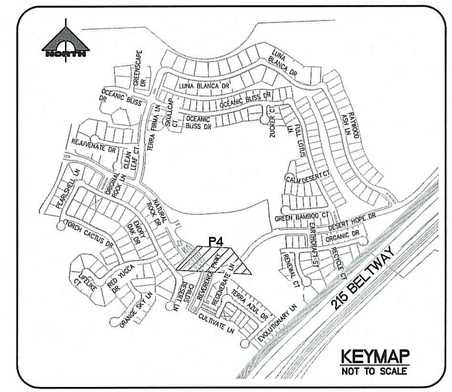
PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

NATURAL ROCK DR PLAN AND PROFILE
STA 74+50 TO STA 80+00

DRAWING
P3
43 OF XX SHTS

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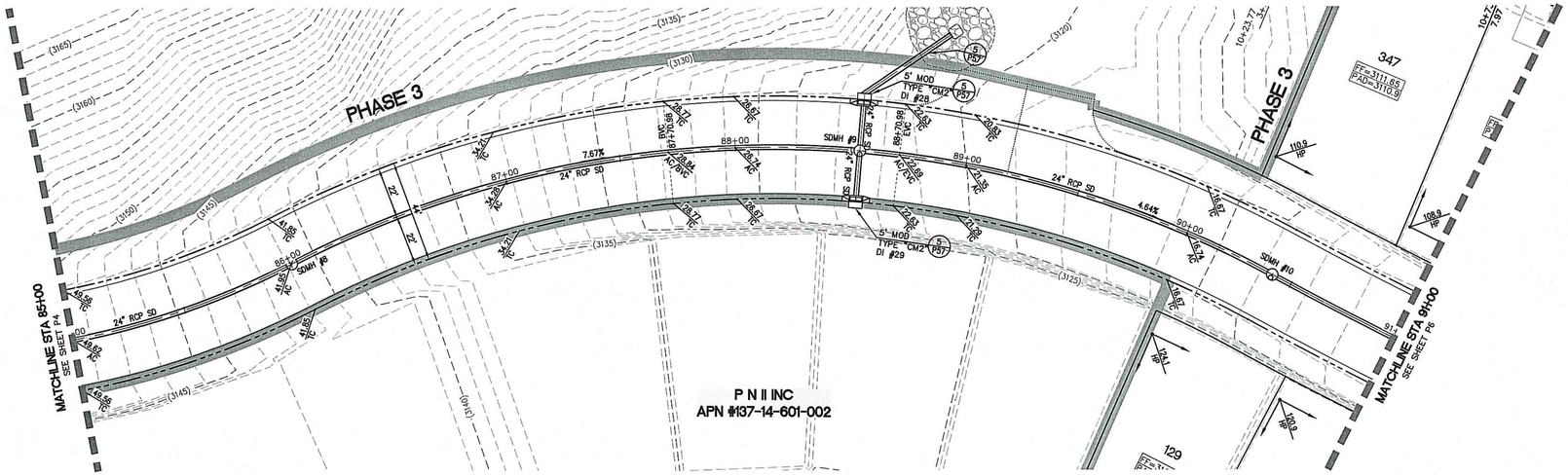
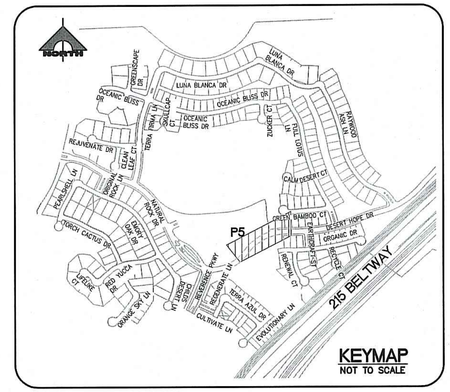
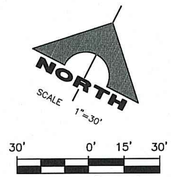
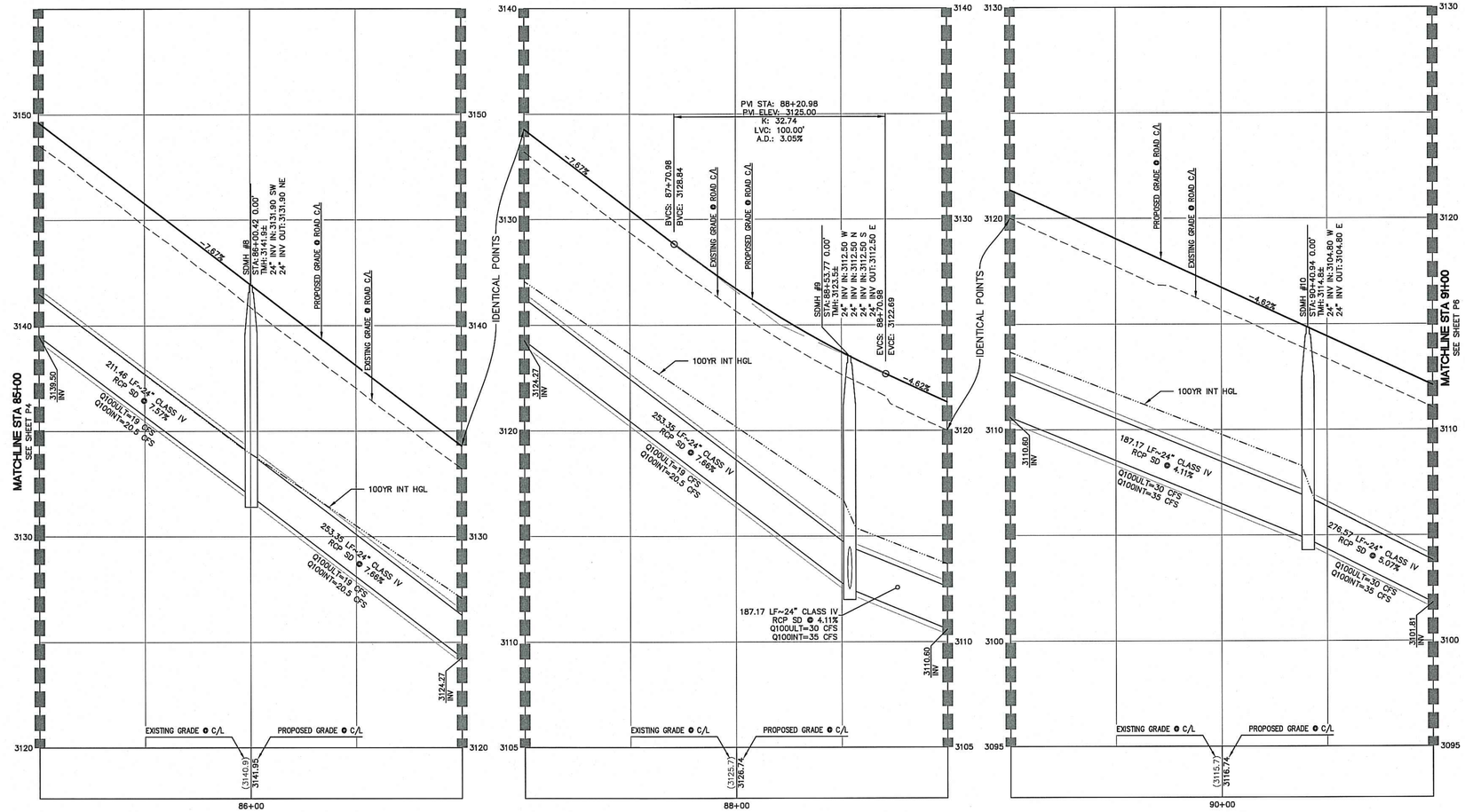
OCEANIC BLISS DR
OCEANIC BLISS CT
OCEANIC BLISS LN
TERRA FIRMA LN
BLANCHE DR
CLEAN DESERT CT
CALM DESERT CT
GREEN BAMBOO CT
DESERT HOPE DR
ORGANIC DR
ORGANIC CT
NATURAL CT
RED ROCK DR
RED ROCK CT
SHRINE SKY LN
SHRINE VALLEY DR
SHRINE ADZE DR
SHRINE CULTIVATE LN
SHRINE CULTIVATE CT
SHRINE CULTIVATE DR
SHRINE CULTIVATE WAY



DESERT HOPE DR
(PUBLIC)
PLAN AND PROFILE
HORIZ. 1" = 30'
VERT. 1" = 3'







Call before you Dig
Avoid cutting underground utility lines. It's easily.
Call 811 OR 1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

NOTE TO CONTRACTOR
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BENCHMARK
CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS
SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

ENGINEER - STATE OF NEVADA
HAU N. NGUYEN
No. 12,010 CIVIL
PROFESSIONAL ENGINEER
DATE: 4/6/16

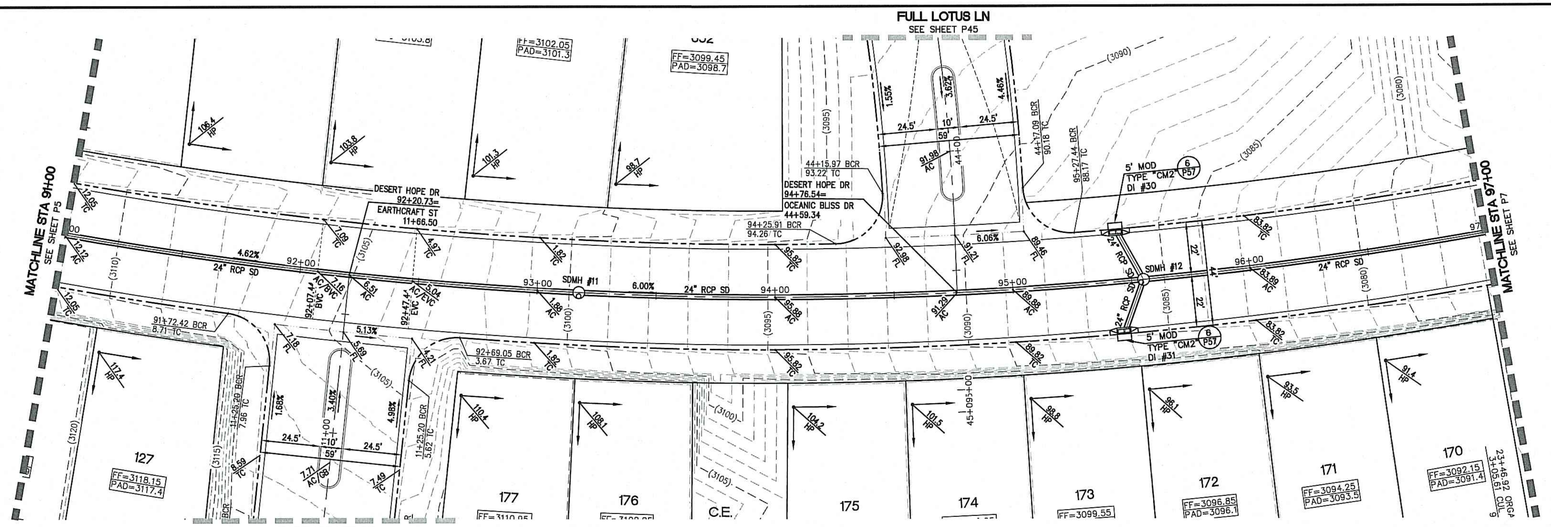
REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:30:21

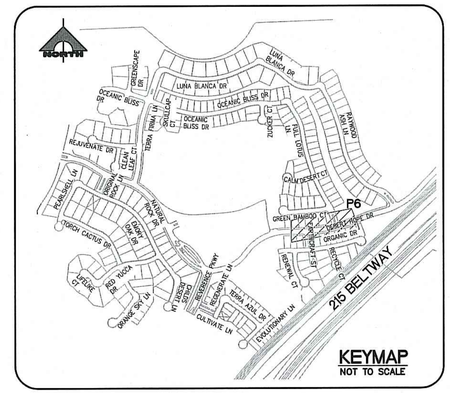
GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\700\764-204-013\DWG\Production\PH 01\13sPH1-P1.dwg
Hoa Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
DESERT HOPE DR PLAN AND PROFILE
STA 85+00 TO STA 91+00

DRAWING
P5
45 OF XX SHTS



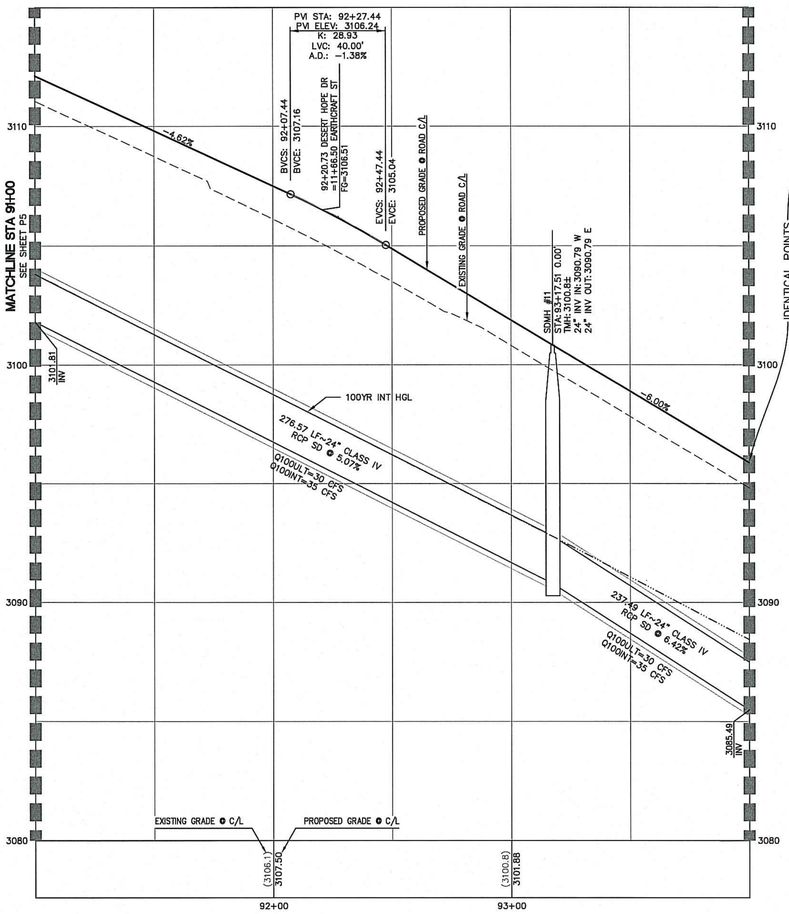
DESERT HOPE DR
(PUBLIC)
PLAN AND PROFILE
HORIZ. 1" = 30'
VERT. 1" = 3'



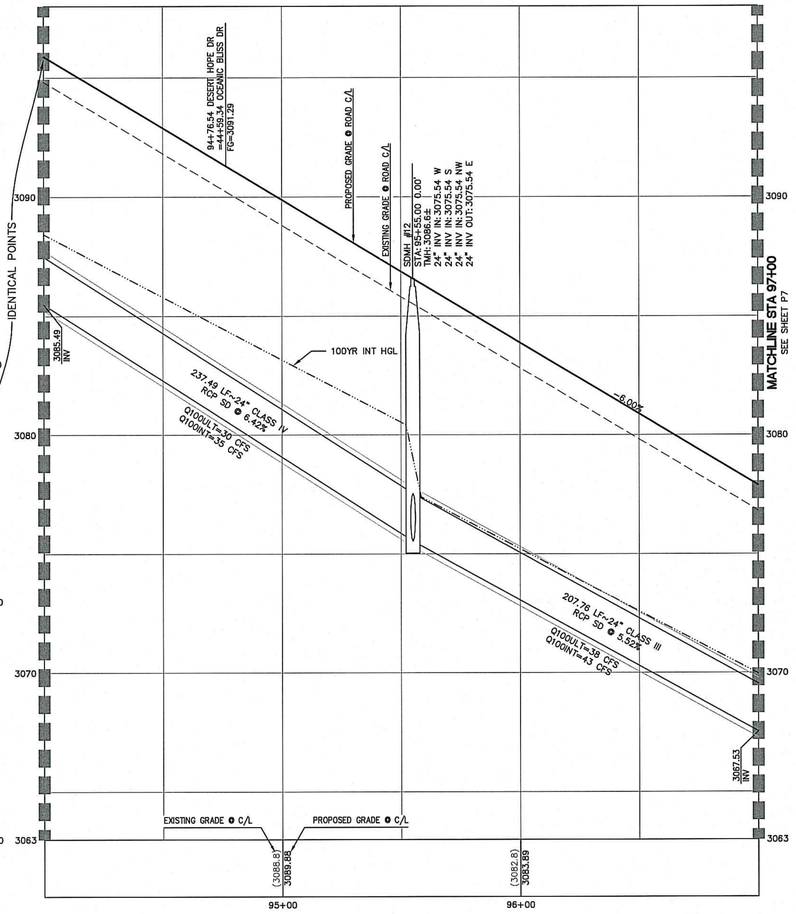
KEYMAP
NOT TO SCALE

NORTH
SCALE 1"=30'

30' 0' 15' 30'
SCALE: 1" = 30'



IDENTICAL POINTS



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OR
1-800-227-2600

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BENCHMARK
CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS
SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — No. 19359 — HOA V. NGUYEN — Exp. 12/31/2017 — CIVIL
DATE: 4/5/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	CGW APP

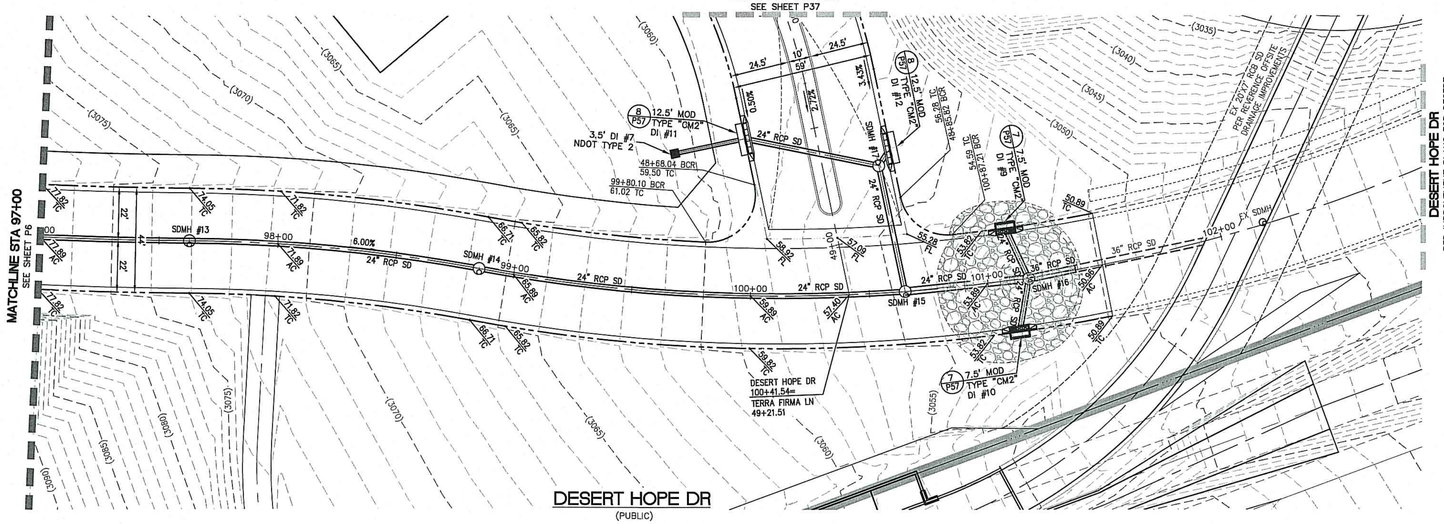
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:30:08

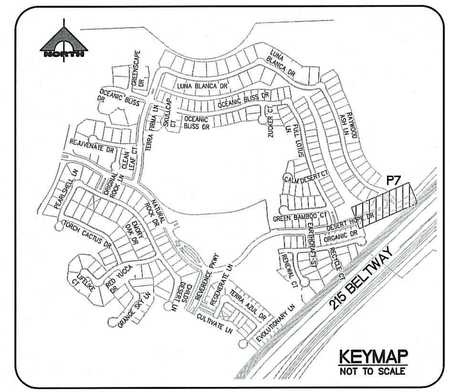
GCW ENGINEERS\ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\03cPH1-P1.dwg
Hoa Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
DESERT HOPE DR PLAN AND PROFILE
STA 9H+00 TO STA 97+00

DRAWING
P6
46 OF XX SHTS



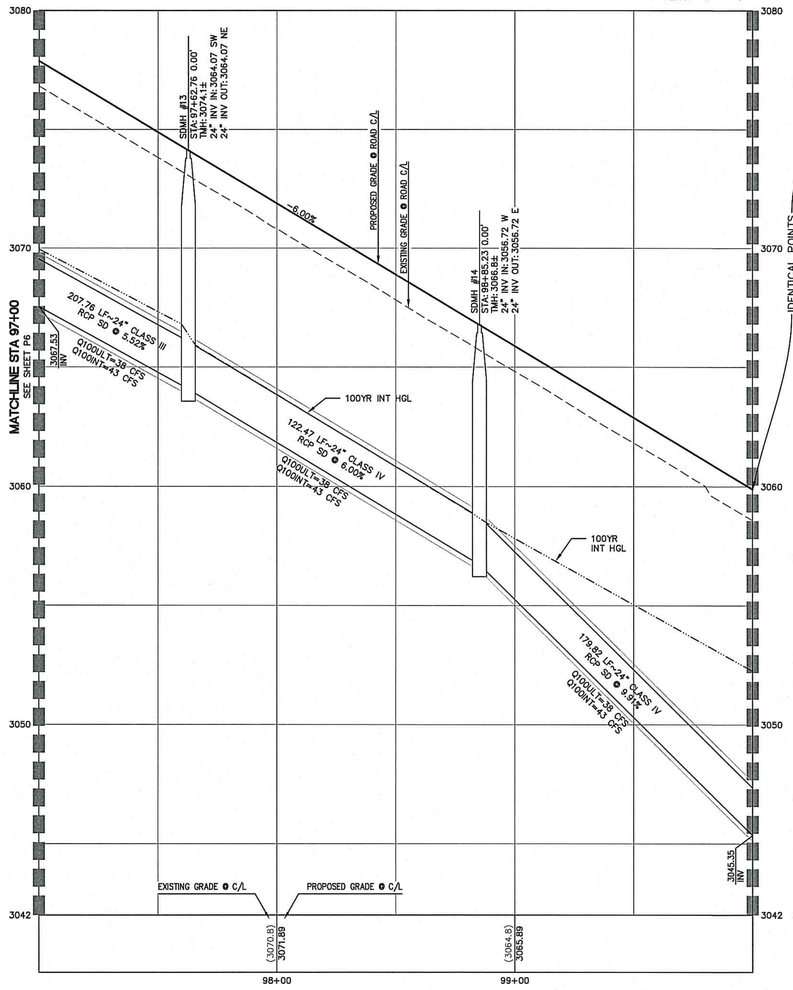


KEYMAP
NOT TO SCALE

NORTH
SCALE 1"=30'

30' 0' 15' 30'
SCALE: 1" = 30'

DESERT HOPE DR
(PUBLIC)
PLAN AND PROFILE
HORIZ. 1" = 30'
VERT. 1" = 3'



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Avoid cutting underground utility lines. It's costly.
Call 811 OR 1-800-227-2600

FAST
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1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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BENCHMARK
CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS
SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW _____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA PROFESSIONAL ENGINEER
HAO T. NGUYEN
No. 19359
CIVIL
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	CCW APP

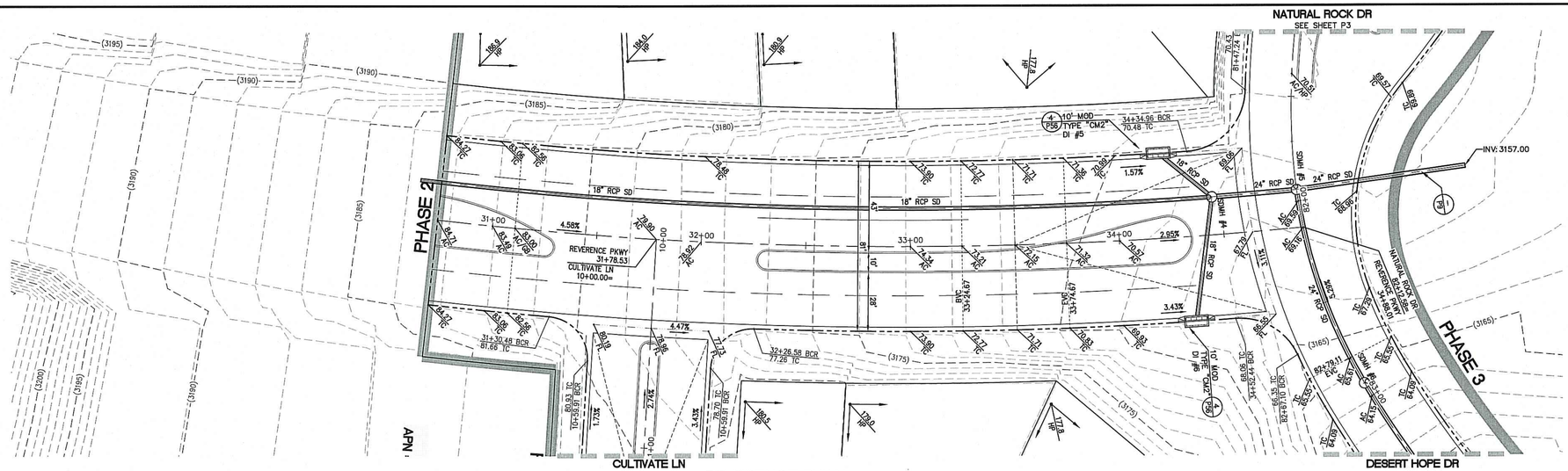
PROJECT NO. 764-204-018
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:30:01

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\013-PH1-P1.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
DESERT HOPE DR PLAN AND PROFILE STA 97+00 TO STA 103+00

DRAWING
P7
47 OF XX SHTS

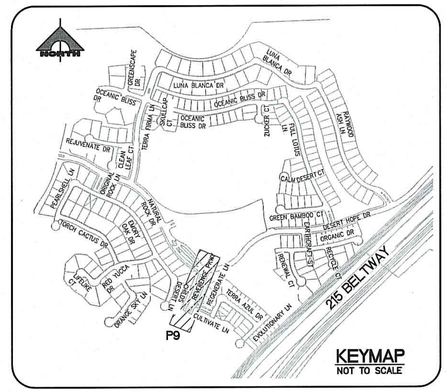


REVERENCE PKWY

(PUBLIC)

PLAN AND PROFILE

HORIZ. 1" = 30'
VERT. 1" = 3'

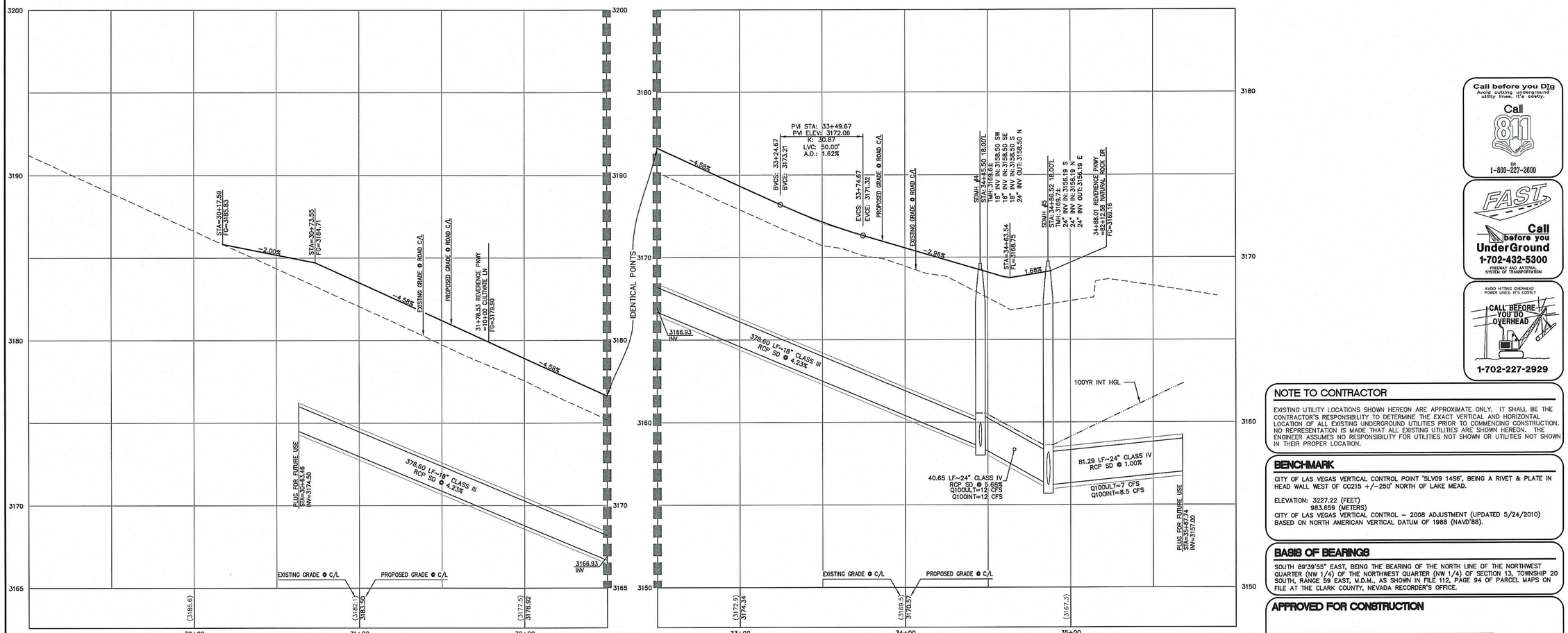


KEYMAP

NOT TO SCALE

NORTH
SCALE 1"=30'

30' 0' 15' 30'
SCALE: 1" = 30'



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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — No. 19959 — HOA NGUYEN — Exp. 12/31/2017 — CIVIL
DATE: 4/7/17

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

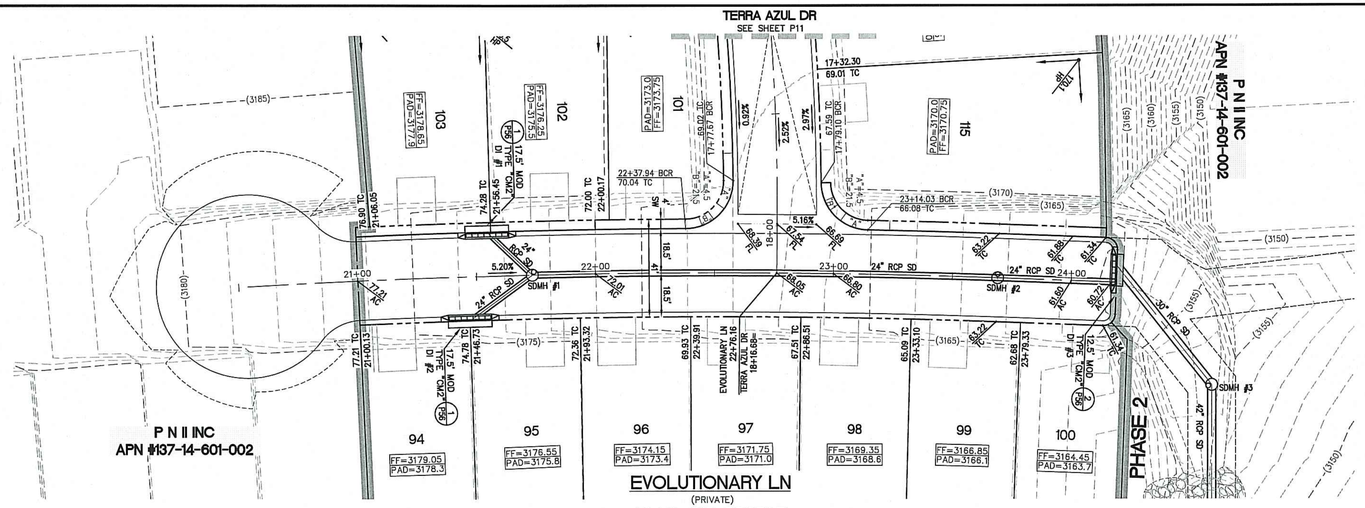
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:29:48

GCW ENGINEERS\ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\GWC\Production\PH 01\03cPH1-P1.dwg
Hoa Nguyen

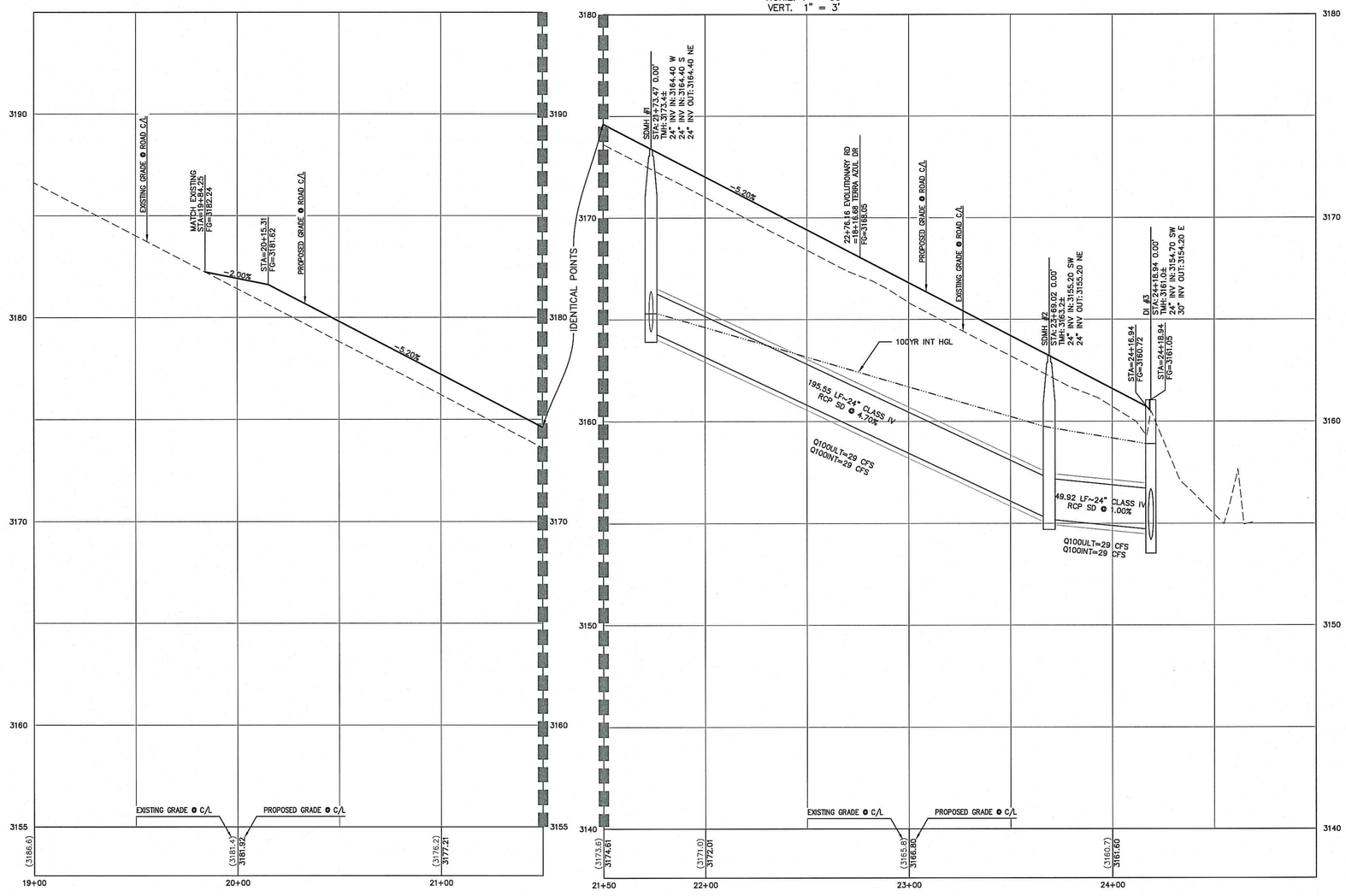
PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
REVERENCE PKWY PLAN AND PROFILE
STA 29+00 TO END

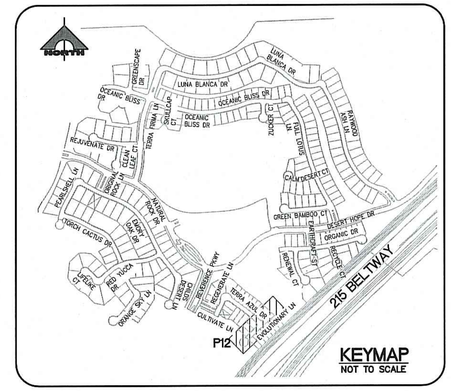
DRAWING
P9
49 OF XX SHTS



PLAN AND PROFILE

HORIZ. 1" = 30'
VERT. 1" = 3'





KEYMAP
NOT TO SCALE

NORTH
SCALE 1"=30'

30' 0' 15' 30'
SCALE: 1" = 30'

Call before you Dig
Avoid cutting underground utility lines. It's costly.
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OR
1-800-227-2600

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

ENGINEER - STATE OF NEVADA
HAO PHI NGUYEN
No. 12751
Exp. 12/31/2017
CIVIL
PROFESSIONAL ENGINEER
DATE: 4/4/16

REV	DATE	DESCRIPTION	AGEN APP	DATE	CGW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:29:29

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

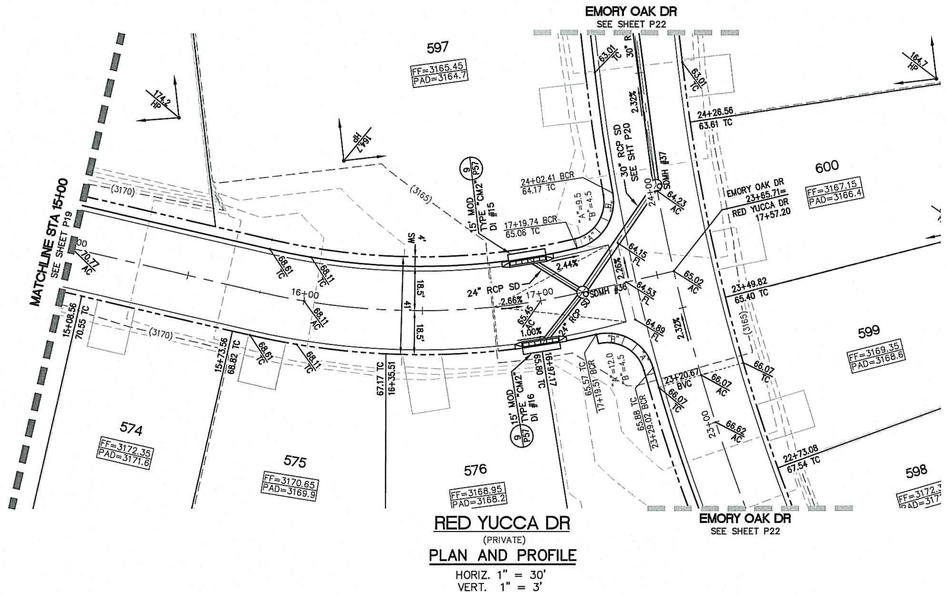
F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-P1.dwg
Hao Nguyen

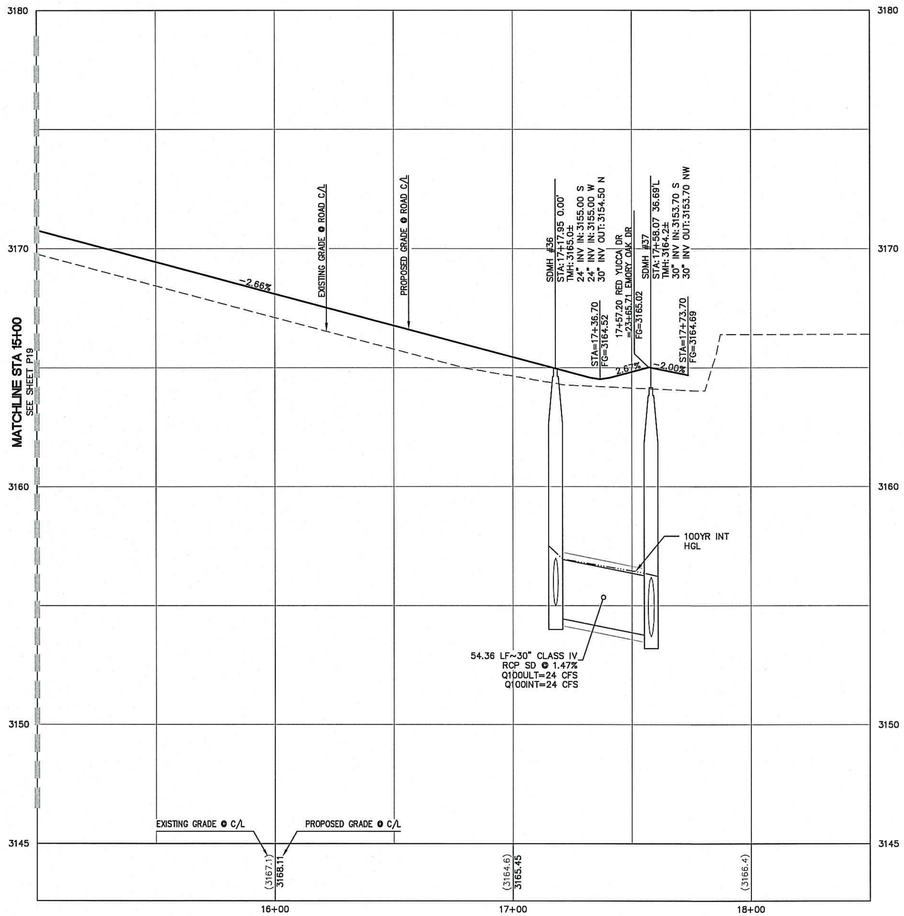
PULTE HOMES

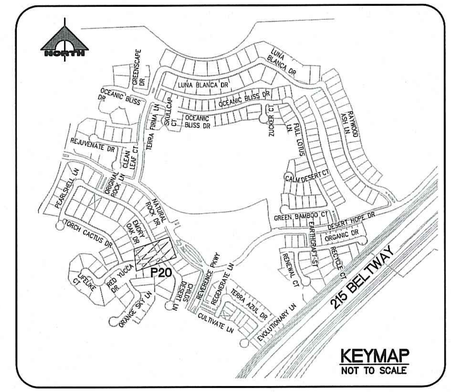
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

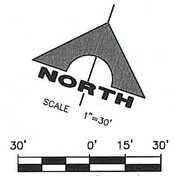
EVOLUTIONARY LN PLAN AND PROFILE
STA 19+00 TO END

DRAWING
P12
52 OF XX SHTS









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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT "SLV09 14S6", BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA
HAO A. NGUYEN
No. 19396
PROFESSIONAL ENGINEER
DATE 4/15/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:29:23

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

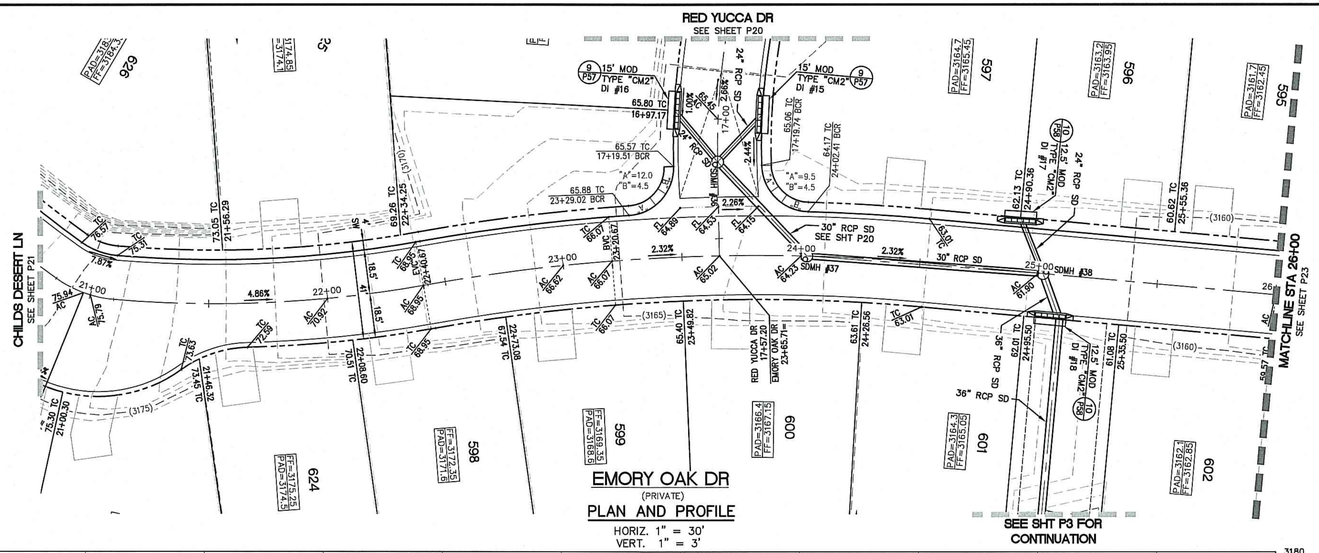
F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-P1.dwg
Hao Nguyen

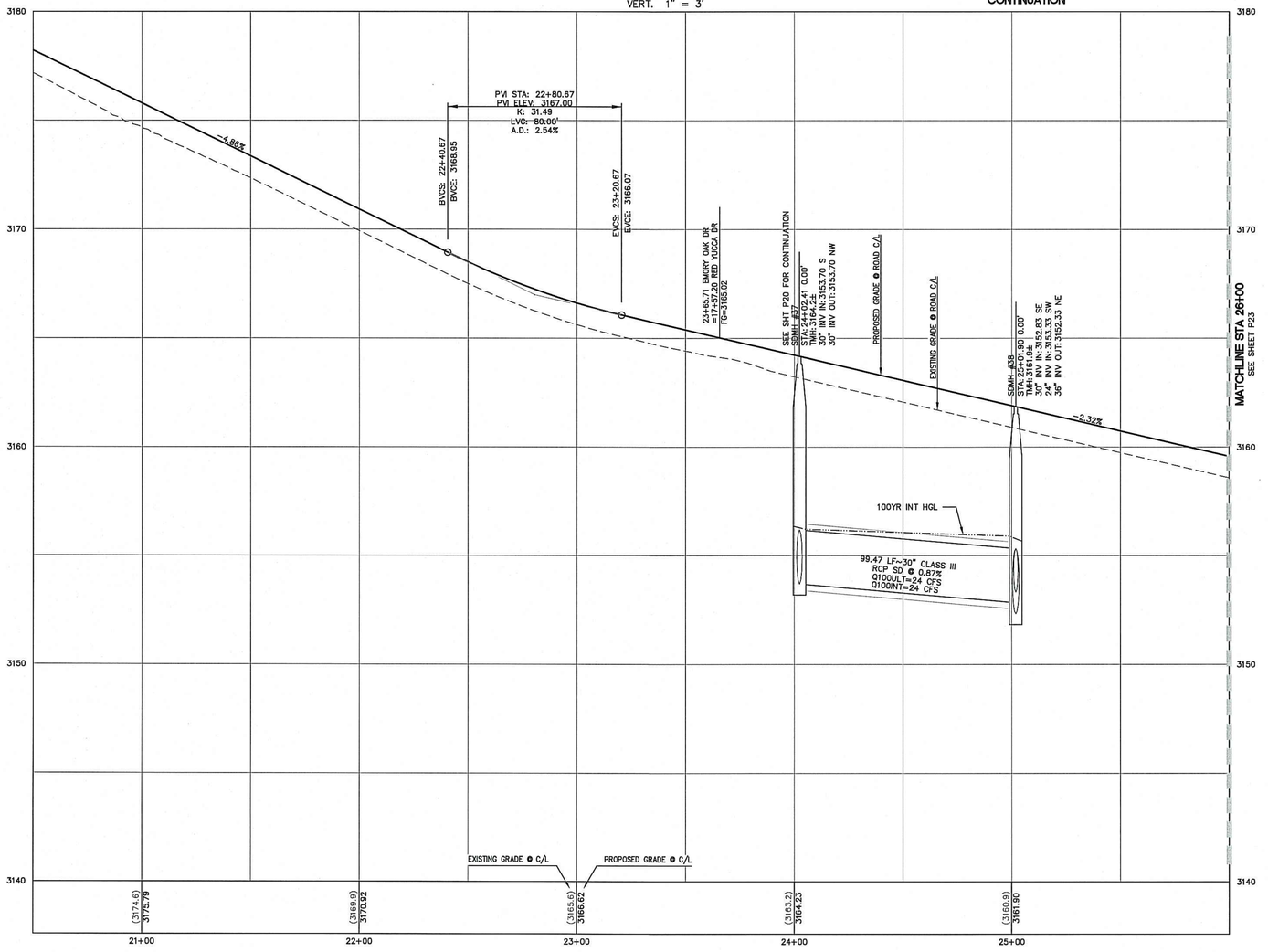
PULTE HOMES

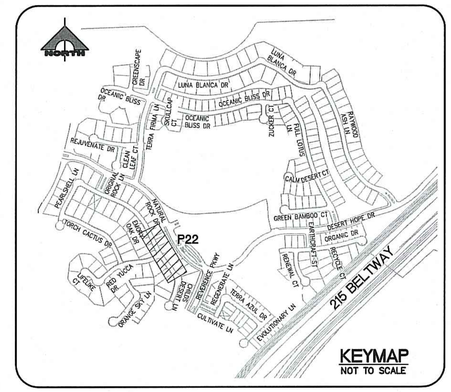
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

RED YUCCA DR PLAN AND PROFILE
STA 15+00 TO END

DRAWING
P20
60 OF XX SHTS









30' 0' 15' 30'

SCALE: 1" = 30'

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
OR
1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY.
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

NOTE TO CONTRACTOR

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — HAO A. NGUYEN — No. 19398 — DATE: 4/6/16

REV	DATE	DESCRIPTION	AGEN APP	DATE	CGW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:29:17

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

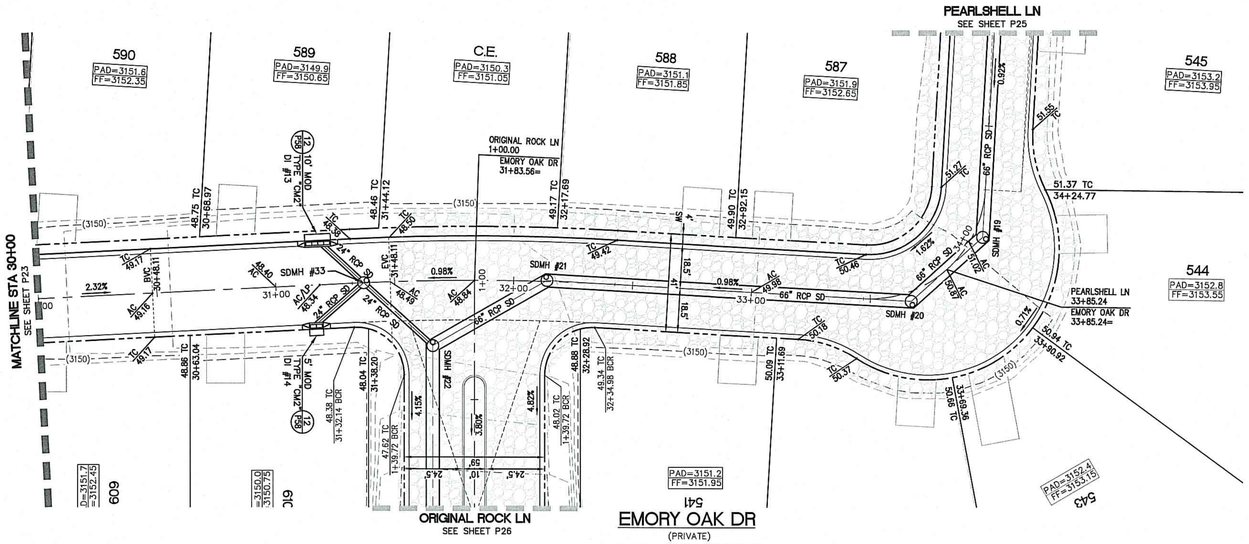
F:\Projects\700\764-204-013\DWG\Production\PH 01\03sPH1-P1.dwg
Hao Nguyen

PULTE HOMES

SUMMERLIN VILLAGE 26 – REVERENCE
PHASE 1

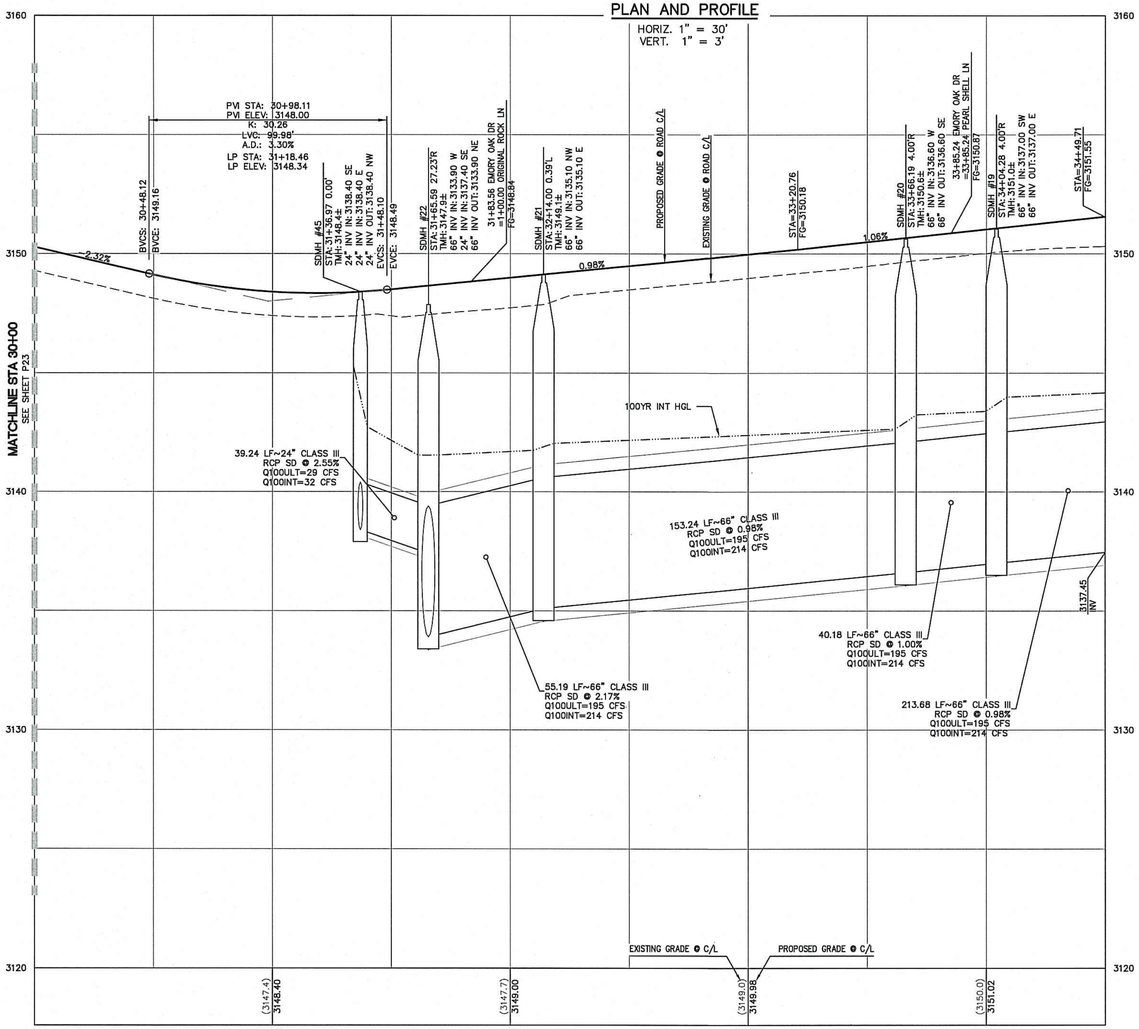
EMORY OAK DR PLAN AND PROFILE
STA 21H00 TO STA 26H00

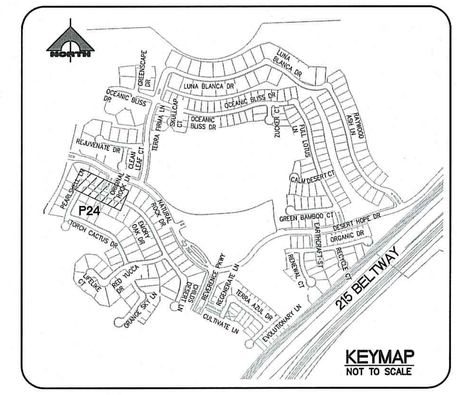
DRAWING
P22
62 OF XX SHTS



PLAN AND PROFILE

HORIZ. 1" = 30'
VERT. 1" = 3'







30' 0' 15' 30'

SCALE: 1" = 30'

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OR
1-800-227-2600

FAST
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1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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BENCHMARK

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ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010)
BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER
HAO A. NGUYEN
No. 19356
CIVIL
Exp. 12/31/2017
DATE: 4/9/18

REV	DATE	DESCRIPTION	DATE	AGEN. APP	DATE	GOV. APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE:04-04-16
PLOT TIME: 10:29:04

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

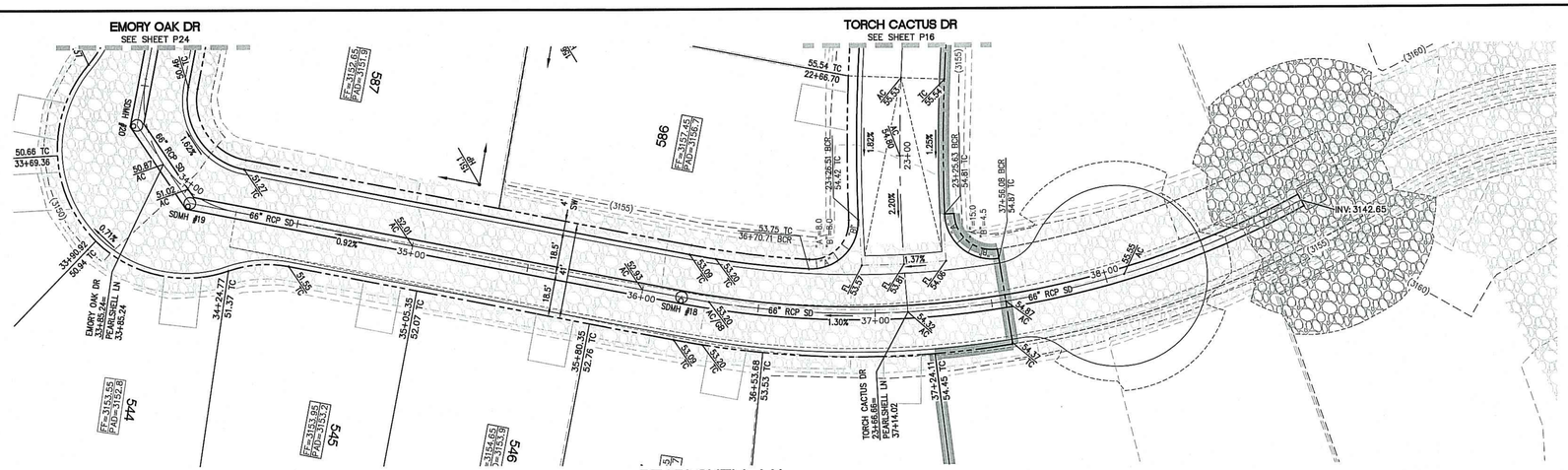
F:\Projects\700\764-204-013\DWG\Production\PH 01\01sPH1-P1.dwg
Hao Nguyen

PULTE HOMES

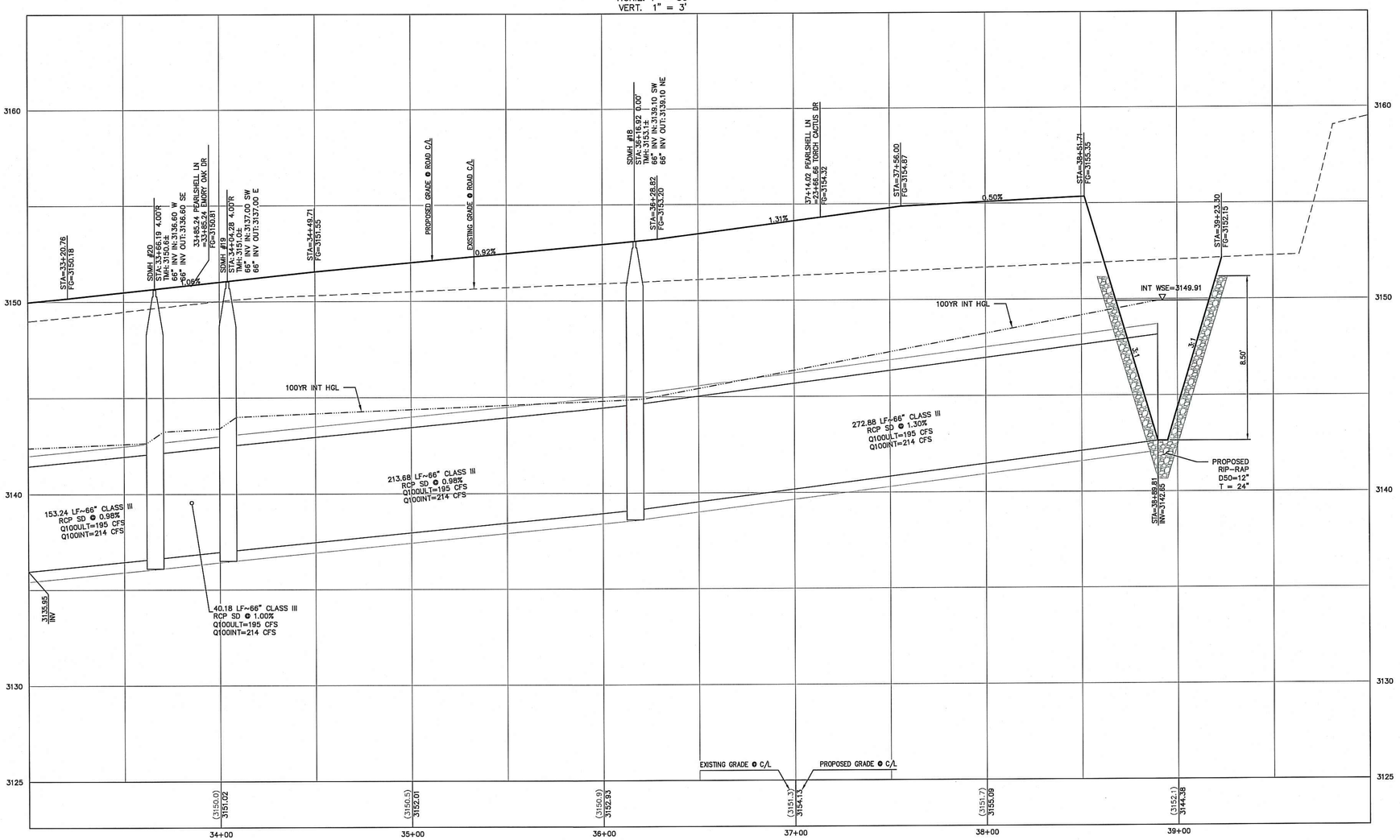
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

EMORY OAK DR PLAN AND PROFILE STA 30+00 TO STA 34+00

DRAWING
P24
64 OF XX SHTS



PEARLSHELL LN
(PRIVATE)
PLAN AND PROFILE
HORIZ. 1" = 30'
VERT. 1" = 3'



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Avoid cutting underground utility lines. It's costly.
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FAST Call before you UnderGround 1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA
HEIDI N. NGUYEN
No. 12/31/2017
CIVIL
PROFESSIONAL ENGINEER
DATE: 4/26/16

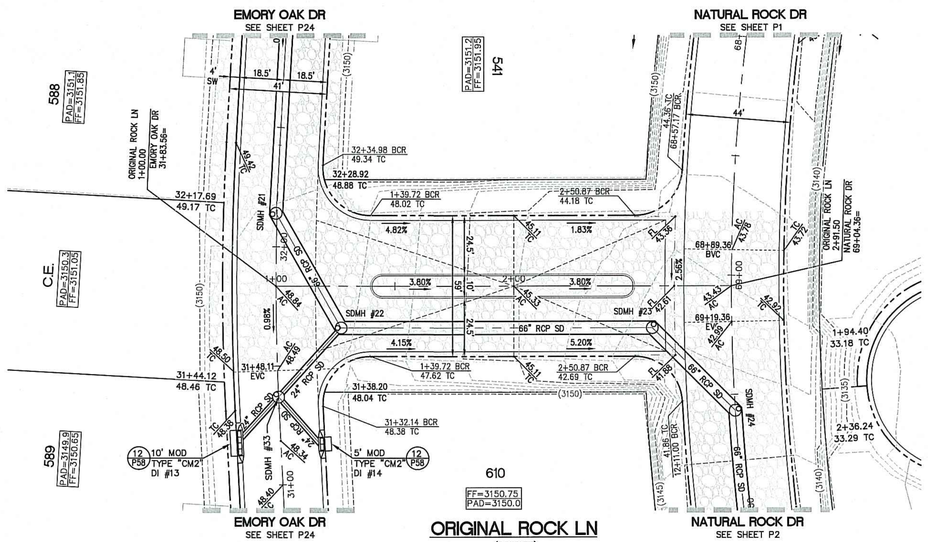
REV	DATE	DESCRIPTION	AGEN APP	DATE	CGW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:28:51

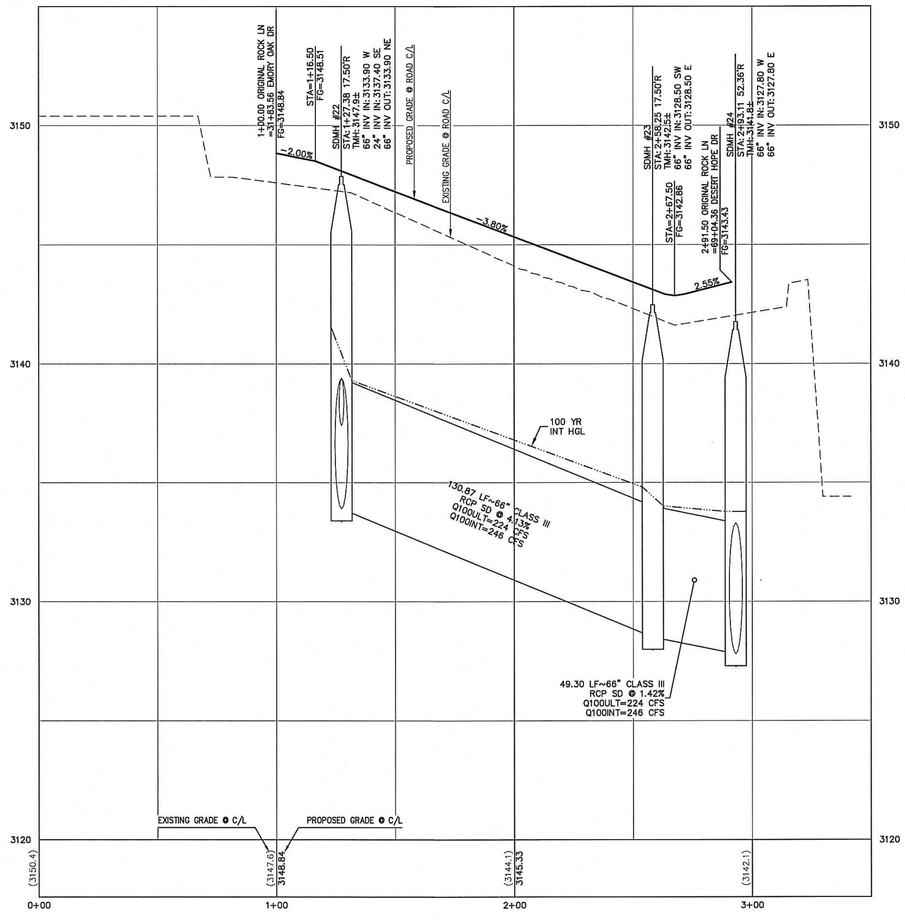
GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\700\764-204-013\DWG\Production\Ph1 01\13PH1-P1.dwg
Hoa Nguyen

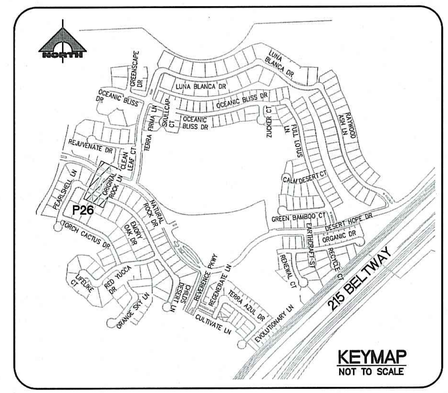
PULTE HOMES
SUMMERLIN VILLAGE 26 – REVERENCE
PHASE 1
PEARLSHELL LN PLAN AND PROFILE
STA 34+00 TO STA 39+00

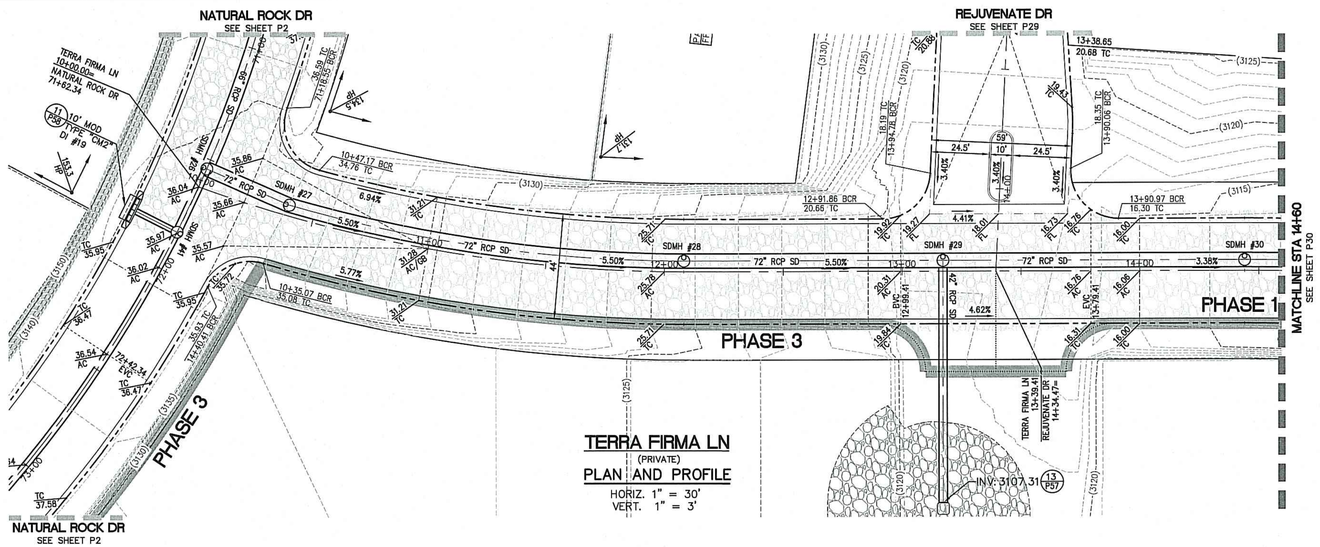
DRAWING
P25
65 OF XX SHTS

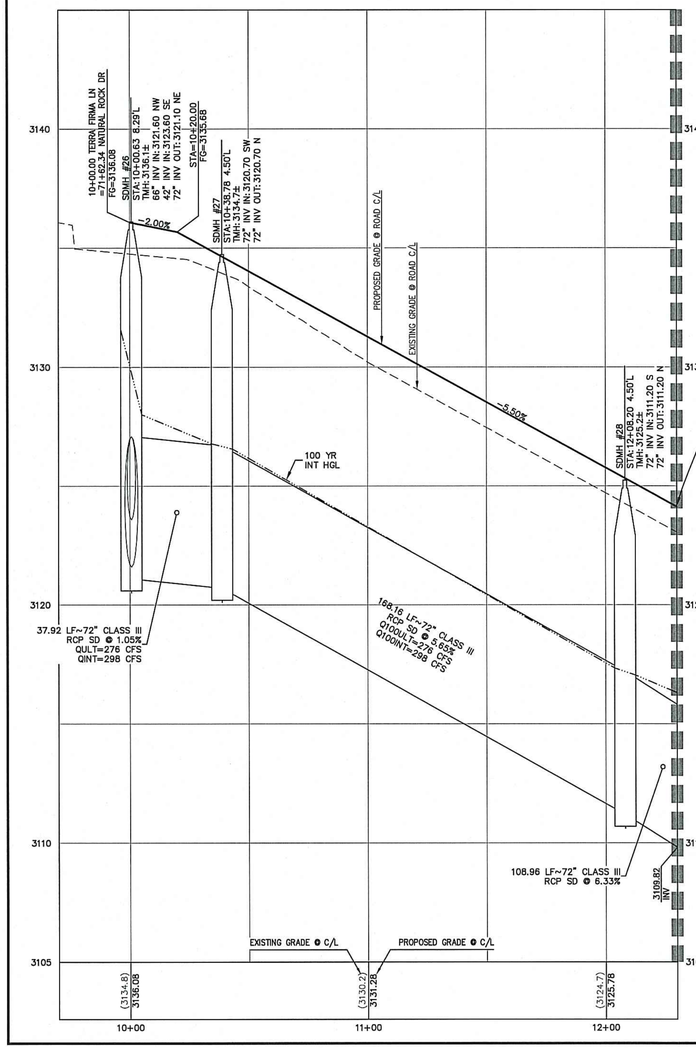


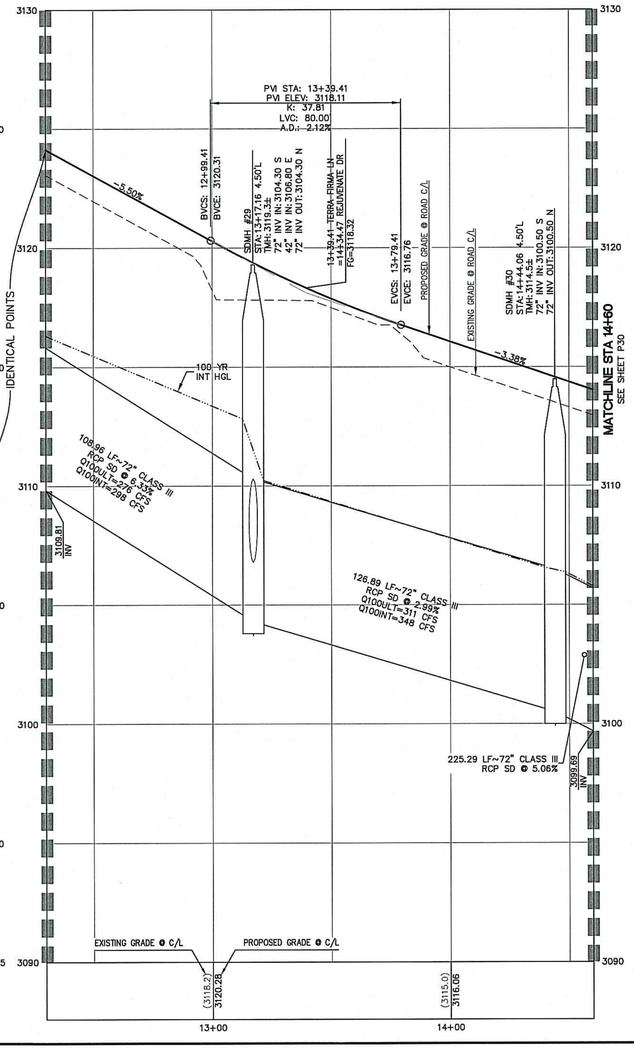
ORIGINAL ROCK LN
(PRIVATE)
PLAN AND PROFILE
HORIZ. 1" = 30'
VERT. 1" = 3'

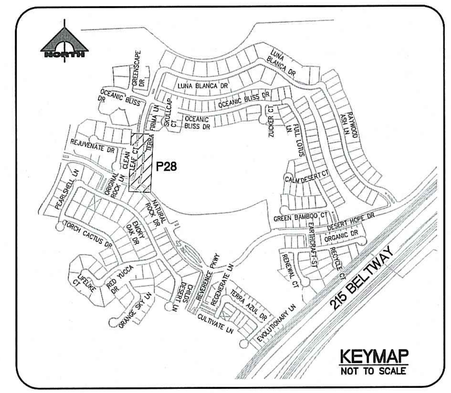



NORTH
LUNA BLANCA DR
OCEANIC BLISS DR
OCEANIC BLISS CT
ZYDECO CT
TEXAS TWIST LN
BLUEGRASS DR
CLEAR DESERT CT
GREEN BAMBOO CT
DESERT HOPE DR
ORGANIC DR
ORGANIC CT
ORGANIC PKWY
RESONATE LN
RESONATE CT
RESONANCE PKWY
RESONANCE LN
RESONANCE CT
RESONANCE CIR
RESONANCE CT
RESONANCE CIR
RESONANCE CT
RESONANCE CIR











30' 0' 15' 30'

SCALE: 1" = 30'

Call before you Dig
Avoid cutting underground utility lines. It's easily.
Call 811 or 1-800-227-2600

FAST
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BENCHMARK

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ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

PROFESSIONAL ENGINEER – STATE OF NEVADA
HAO N. NGUYEN
No. 12,751
CIVIL
DATE: 4/14/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GOV APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:26:10

GCW
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

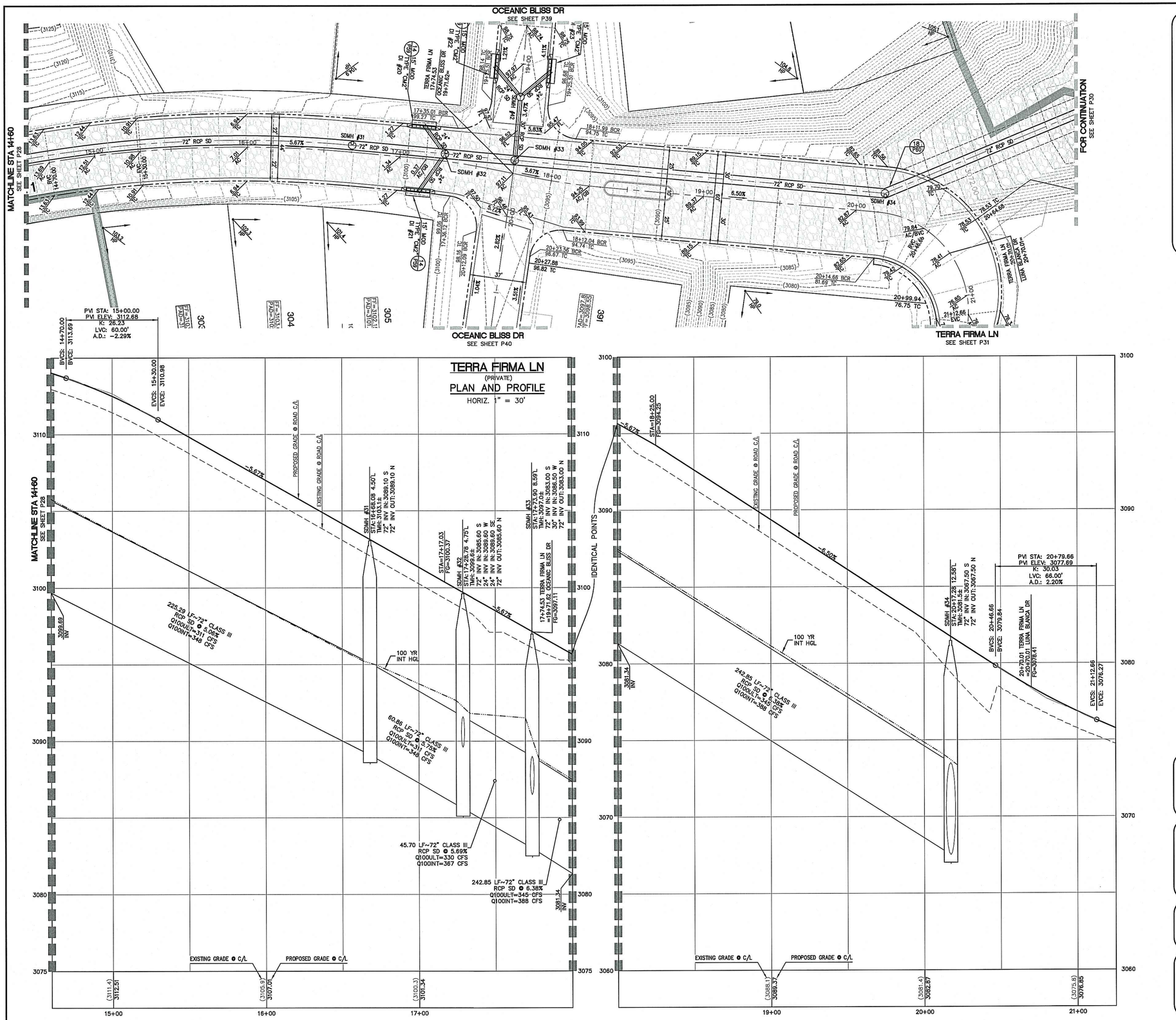
F:\Projects\764-204-013\DWG\Production\PH 01\01cPH1-P25.dwg
Hao Nguyen

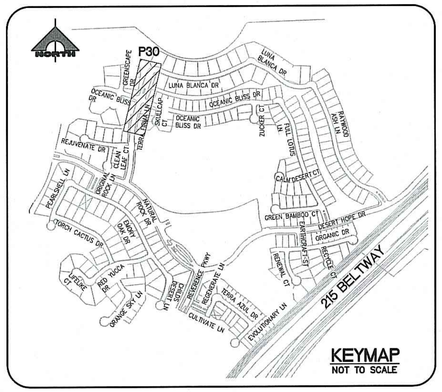
PULTE HOMES

SUMMERLIN VILLAGE 26 – REVERENCE
PHASE 1

TERRA FIRMA LN PLAN AND PROFILE
BEGIN TO STA 14+00

DRAWING
P28
68 OF XX SHTS





KEYMAP
NOT TO SCALE

NORTH
SCALE 1"=30'

30' 0' 15' 30'
SCALE: 1" = 30'

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

Call before you Dig
Avoid cutting underground utility lines. It's costly.
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OR 1-800-227-2600

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FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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PROFESSIONAL ENGINEER - STATE OF NEVADA
HAO A. NGUYEN
Exp. 12/31/2017
CIVIL
No. 19396
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

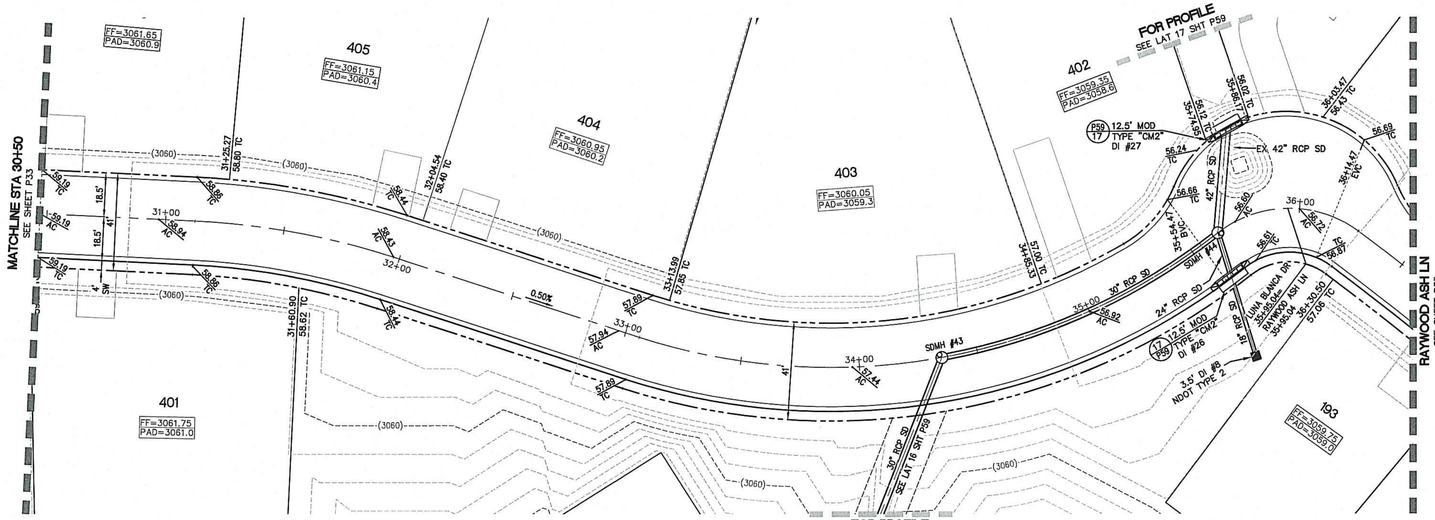
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:26:05

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

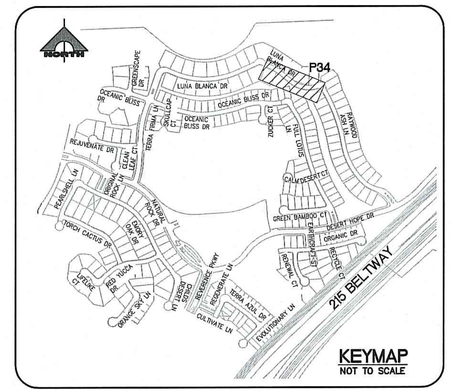
F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-P25.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
TERRA FIRMA LN PLAN AND PROFILE STA 14+50 TO STA 21+25

DRAWING
P30
70 OF XX SHTS



LUNA BLANCA DR
(PRIVATE)
PLAN AND PROFILE
HORIZ. 1" = 30'
VERT. 1" = 3'



KEYMAP
NOT TO SCALE



30' 0' 15' 30'
SCALE: 1" = 30'

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APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

ENGINEER: STATE OF NEVADA
KEVIN T. HOLDEN
No. 12701
CIVIL
PROFESSIONAL ENGINEER
No. 19359
DATE: 12/16/16

DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

REV	DATE

PROJECT NO. 764-204-018
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:25:57

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

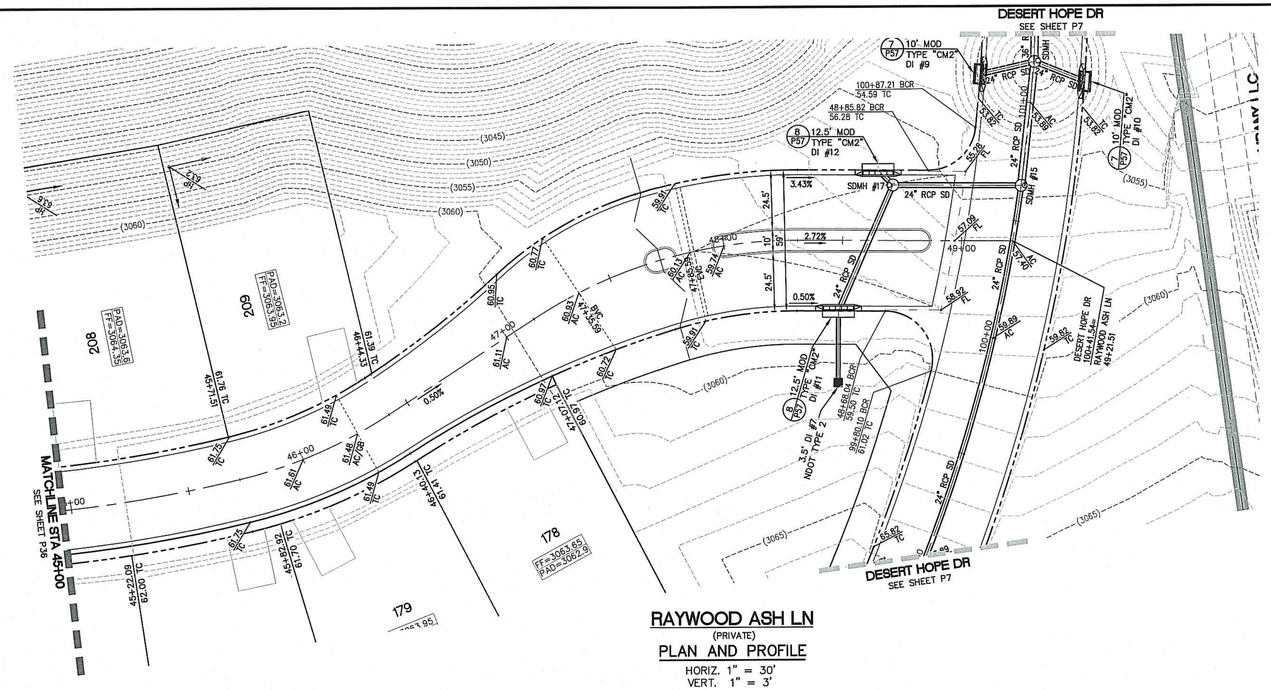
F:\Projects\Y00\Y64-204-01\3\DWG\Production\PH 01\013sPH1-P25.dwg
Hoa Nguyen

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

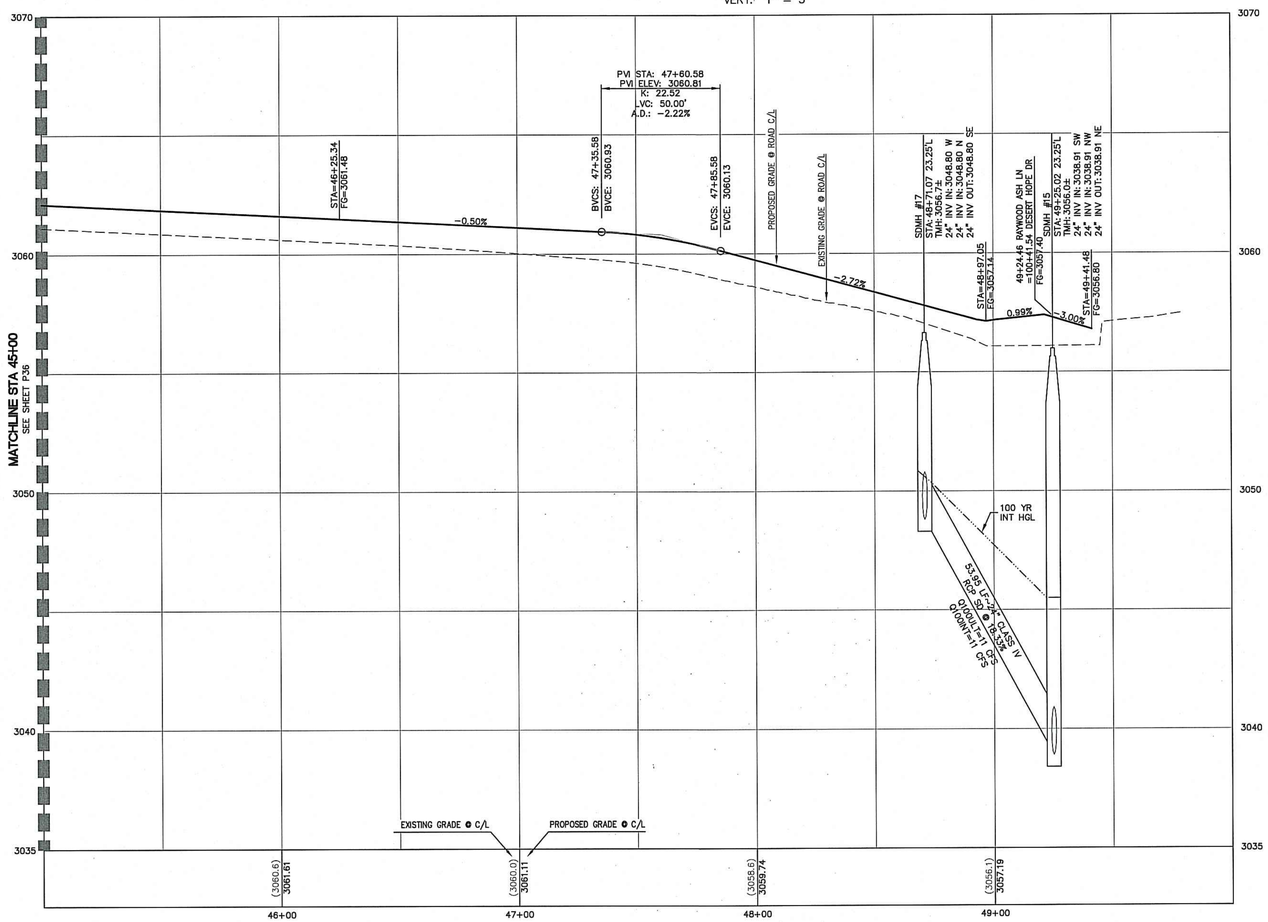
LUNA BLANCA DR PLAN AND PROFILE
STA 30+50 TO STA 36+50

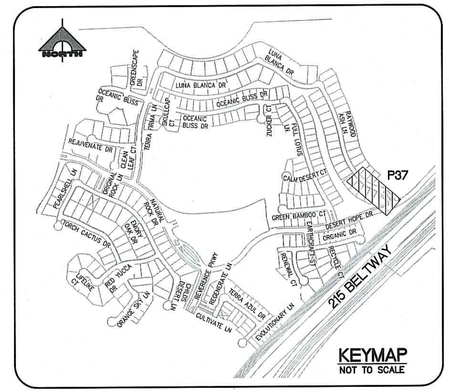
DRAWING
P34
74 OF XX SHTS



RAYWOOD ASH LN
(PRIVATE)

PLAN AND PROFILE
HORIZ. 1" = 30'
VERT. 1" = 3'







30' 0' 15' 30'

SCALE: 1" = 30'

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811
or
1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

NOTE TO CONTRACTOR
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BENCHMARK
CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/−250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS
SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION
LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

ENGINEER – STATE OF NEVADA
No. 19398
HAO A. NGUYEN
Exp. 12/31/2017
CIVIL
PROFESSIONAL ENGINEER
DATE: 4/6/16

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:25:52

GCV
ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
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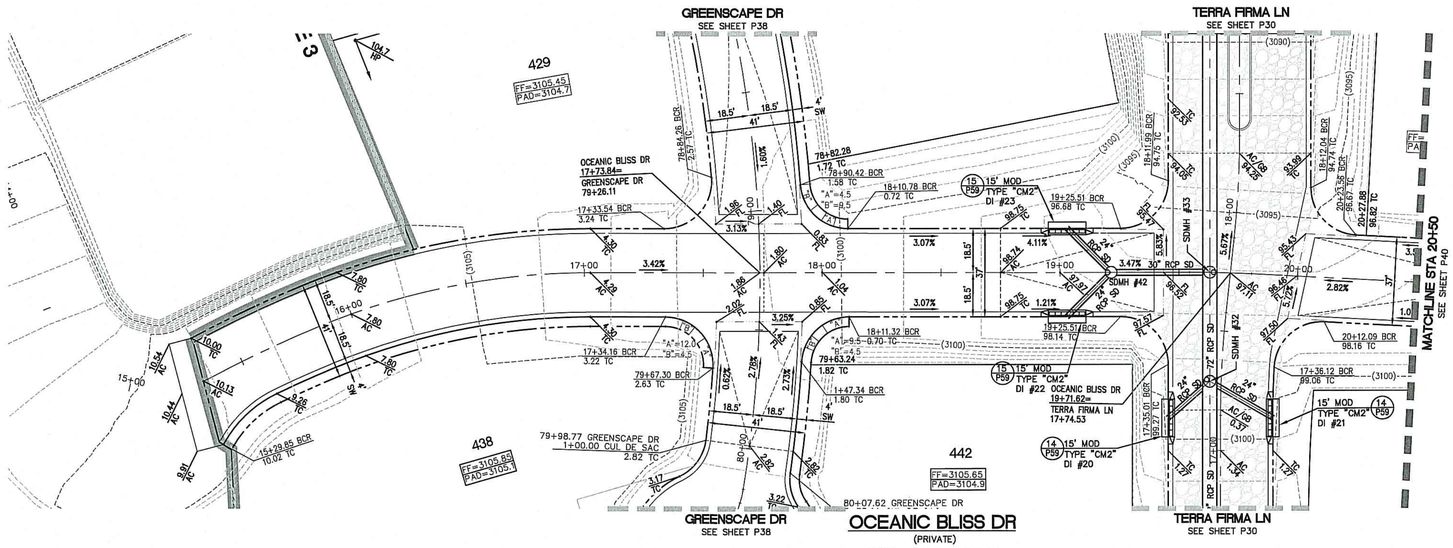
Hao Nguyen

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

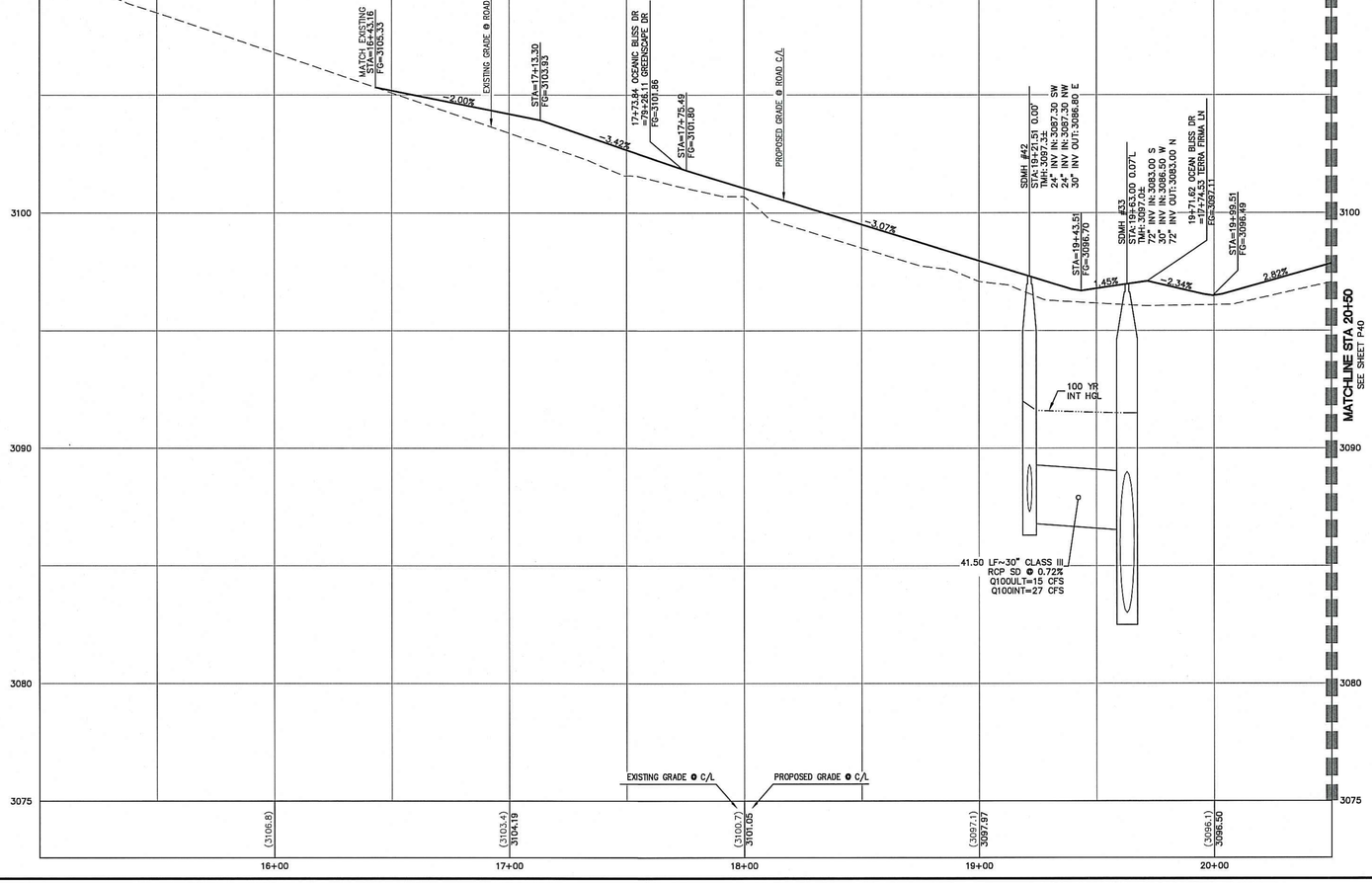
RAYWOOD ASH LN PLAN AND PROFILE STA 45+00 TO END

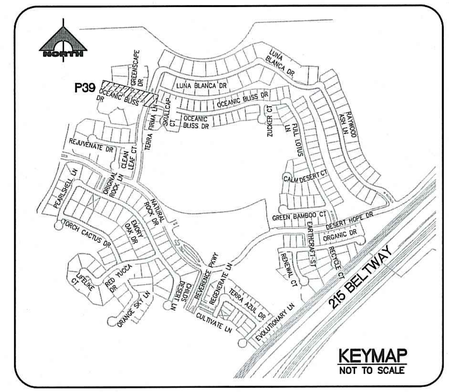
DRAWING
P37
77 OF XX SHTS



PLAN AND PROFILE

HORIZ. 1" = 30'
VERT. 1" = 3'







30' 0' 15' 30'

SCALE: 1" = 30'

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OR
1-800-227-2600

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1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE:_____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA – PROFESSIONAL ENGINEER
No. 19359
KHOI N. NGUYEN
Exp. 12/31/2017
CIVIL
DATE: 4/9/16

DESCRIPTION	REV	DATE	AGEN APP	DATE	GCW APP	DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:29:34

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

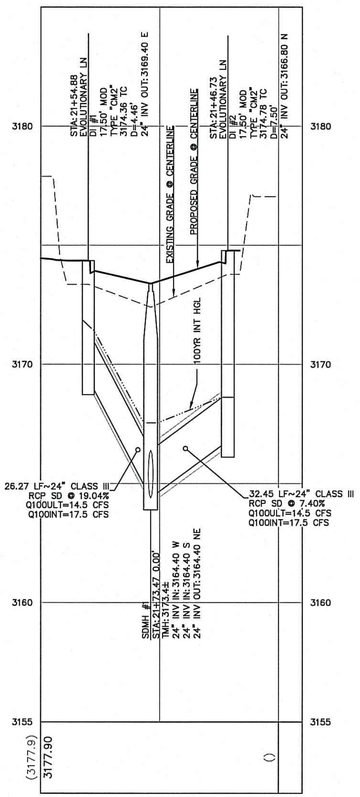
F:\Projects\700\764-204-013\DWG\Production\PH 01\013-PH1-P25.dwg
Hoa Nguyen

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

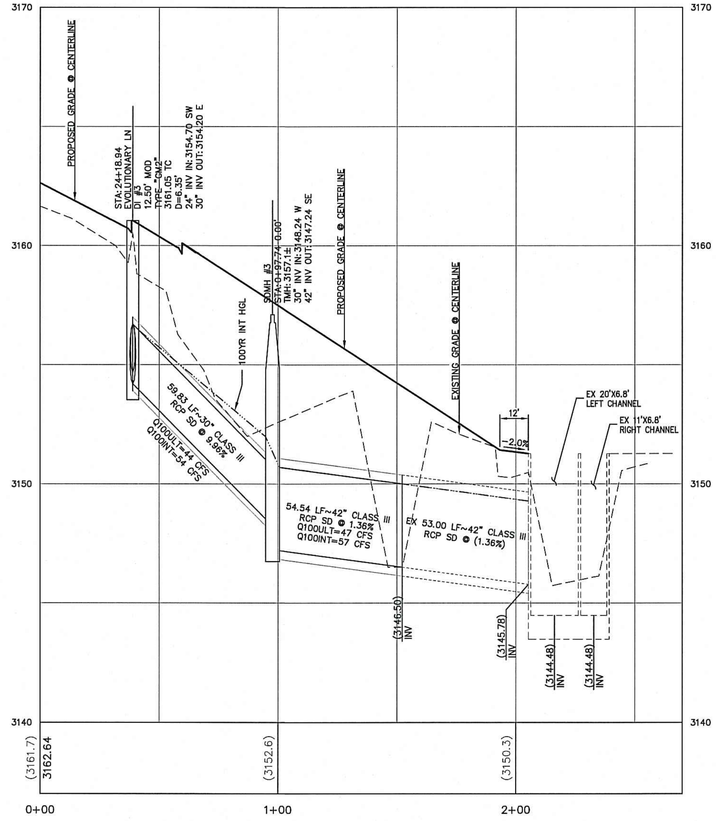
OCEANIC BLISS DR PLAN AND PROFILE
STA 15+31.44 TO 20+50

DRAWING
P39
79 OF XX SHTS



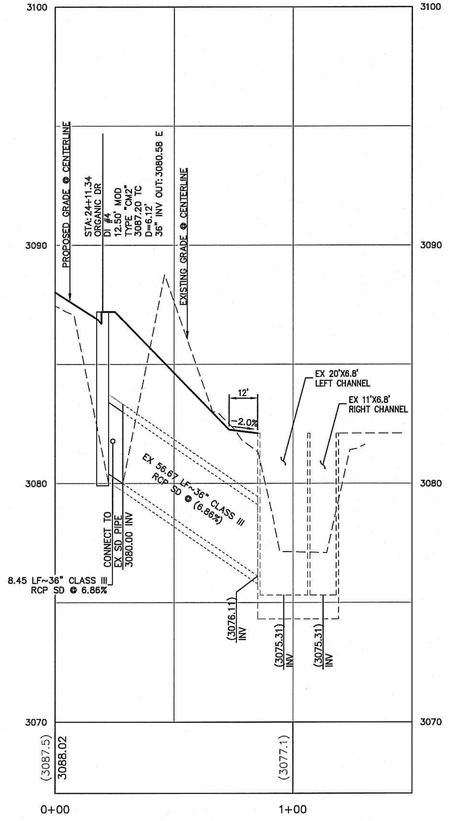
STORM DRAIN LATERAL 1 (1)

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'



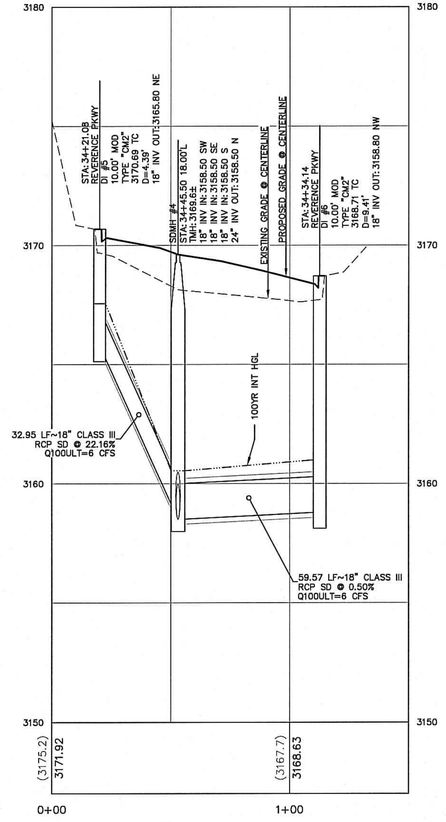
STORM DRAIN LATERAL 2 (2)

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'



STORM DRAIN LATERAL 3 (3)

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'



STORM DRAIN LATERAL 4 (4)

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

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Avoid cutting underground utility lines. It's costly.
Call 811
OR
1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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1-702-227-2929

NOTE TO CONTRACTOR

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. DATE:
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

NEVADA PROFESSIONAL ENGINEER
STATE OF NEVADA
No. 19398
HAO T. N. VO
Exp. 6/30/2017
CIVIL
DATE: 4/11/17

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:23:43

GCW
ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

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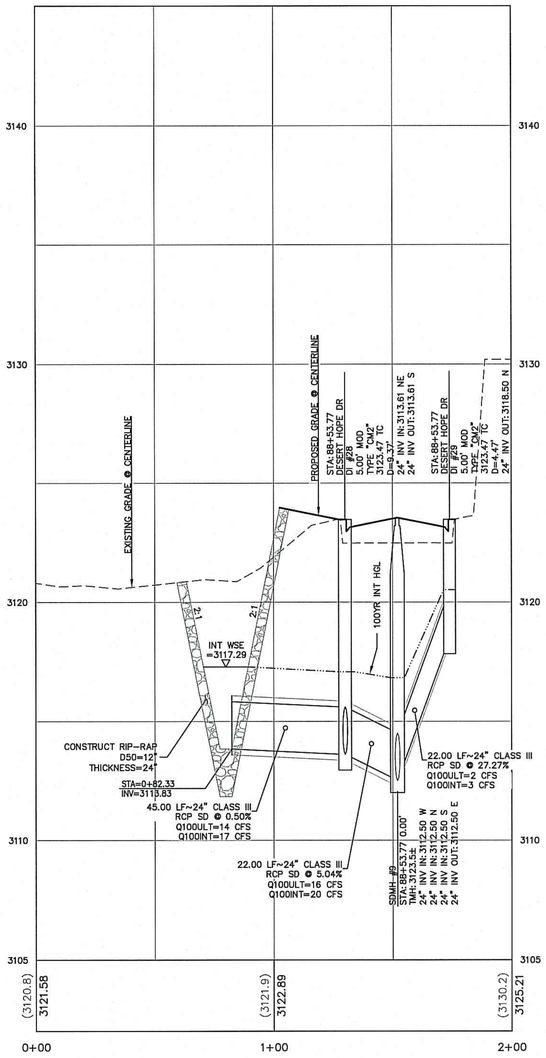
Hao Nguyen

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

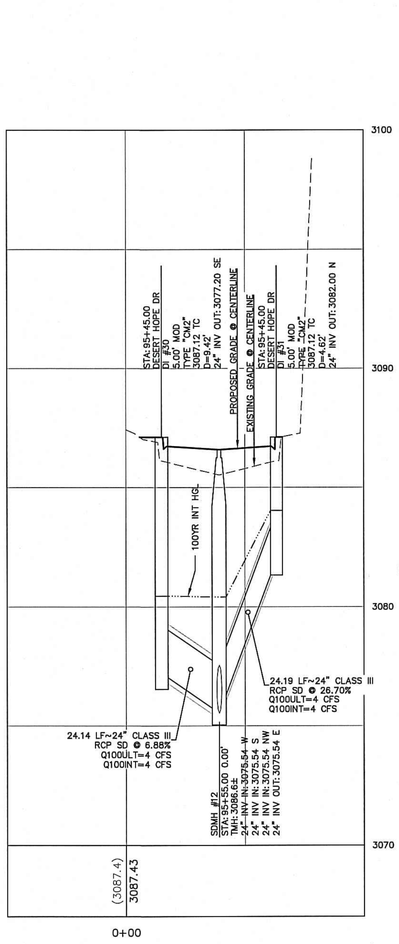
STORM DRAIN LATERAL I

DRAWING
P56
96 OF XX SHTS



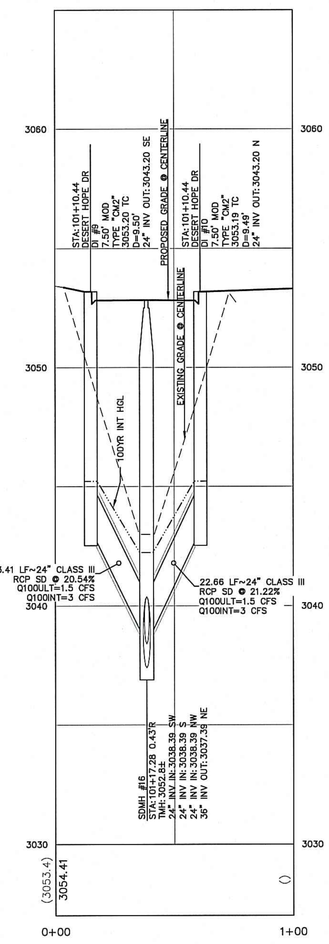
STORM DRAIN LATERAL 5 — 5

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'



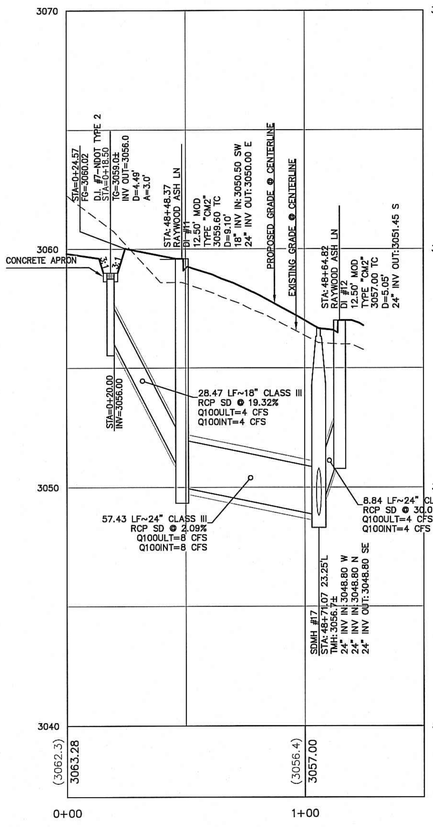
STORM DRAIN LATERAL 6 — 6

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'



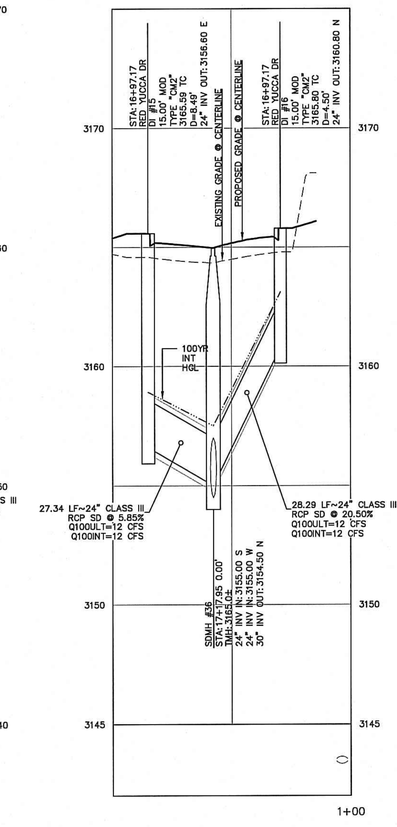
STORM DRAIN LATERAL 7 — 7

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'



STORM DRAIN LATERAL 8 — 8

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'



STORM DRAIN LATERAL 9 — 9

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

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Call 811
or
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1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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1-702-227-2929

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BENCHMARK

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ELEVATION: 3227.22 (FEET)
983.659 (METERS)

CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

REGISTERED PROFESSIONAL ENGINEER – STATE OF NEVADA – No. 19358 – HAO A. NGUYEN – Exp. 12/31/2017 – CIVIL
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	CCW APP

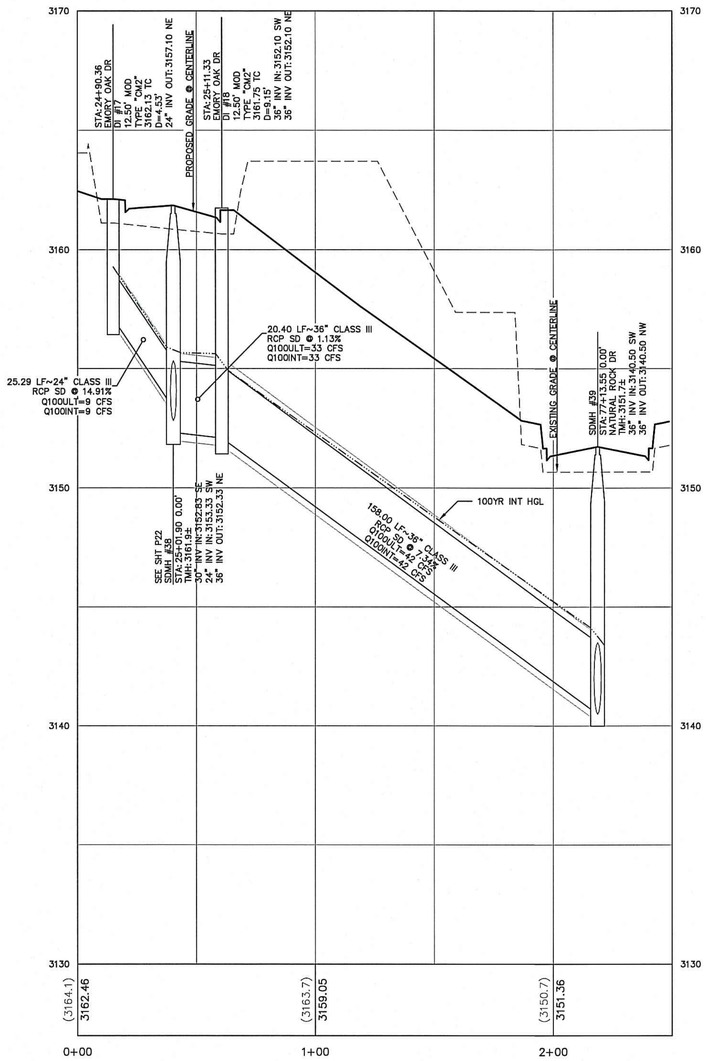
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:23:40

GCW
ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\764-204-013\DWG\Production\PH 01\013sPH1-P-LAT.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
STORM DRAIN LATERAL II

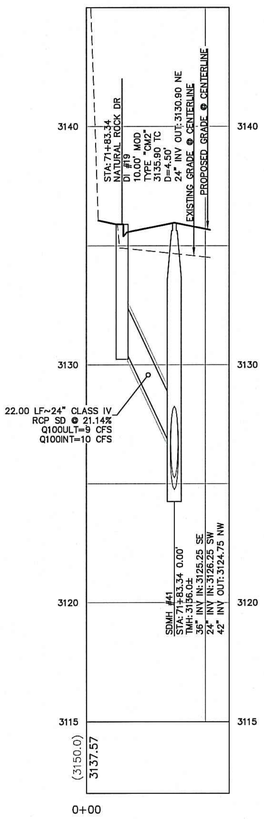
DRAWING
P57
97 OF XX SHTS



STORM DRAIN LATERAL 10

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

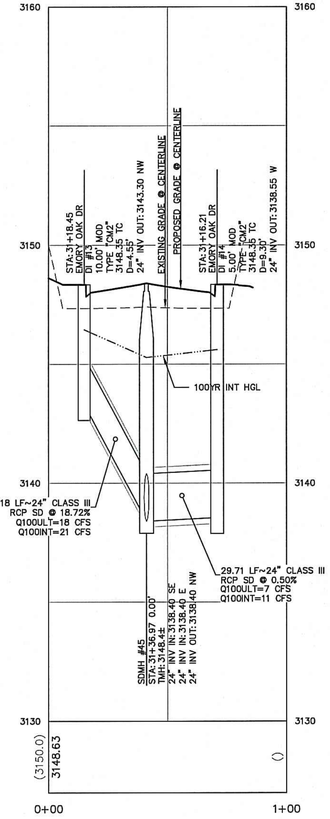
10 / –



STORM DRAIN LATERAL 11

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

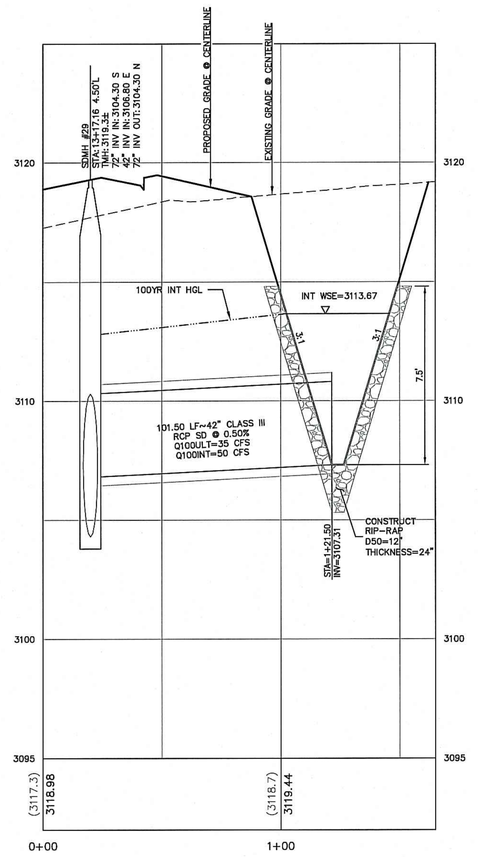
11 / –



STORM DRAIN LATERAL 12

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

12 / –



STORM DRAIN LATERAL 13

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

13 / –

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OR
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FAST
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1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/–250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW _____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

STATE OF NEVADA — PROFESSIONAL ENGINEER — No. 19398 — KHOI T. NGUYEN — Exp. 12/31/2017 — CIVIL
DATE: 4/6/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

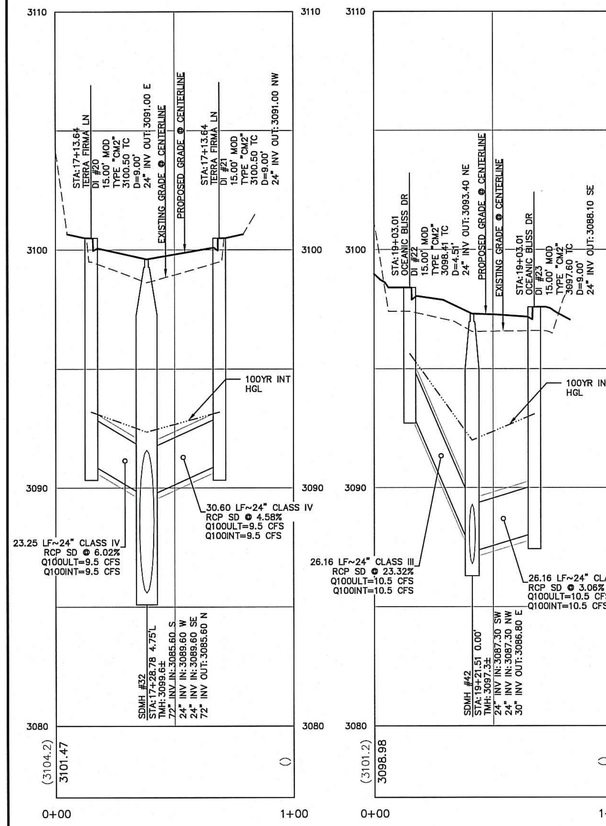
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:23:35

GCW ENGINEERS \ SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\01SPH1-P-LAT.dwg
Khoi Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 – REVERENCE
PHASE 1
STORM DRAIN LATERAL III

DRAWING
P58
98 OF XX SHTS



STORM DRAIN LATERAL 14

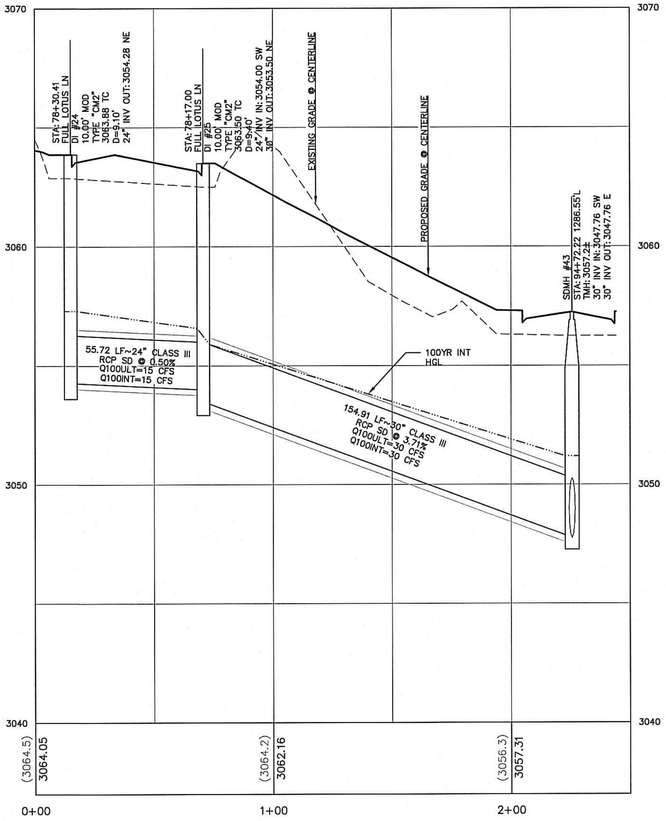
SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

14

STORM DRAIN LATERAL 15

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

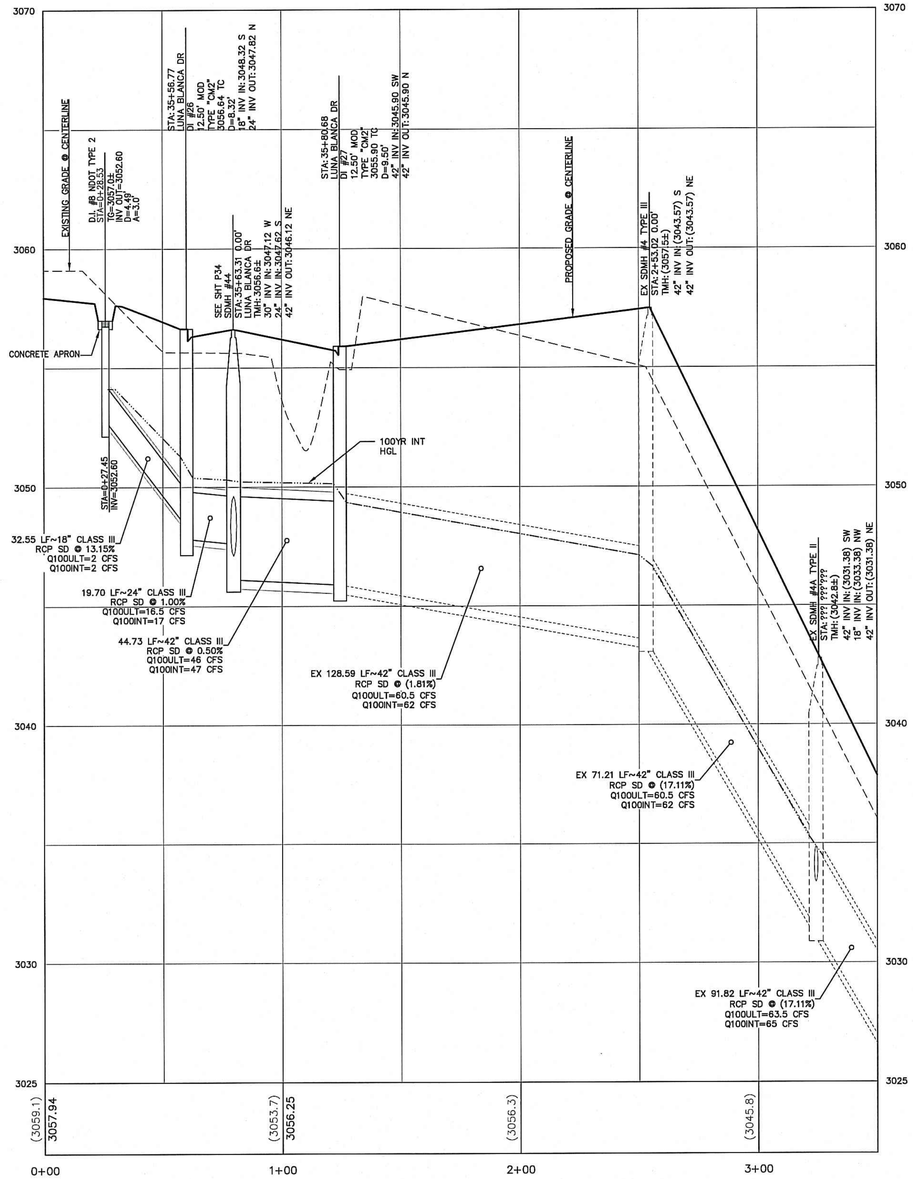
15



STORM DRAIN LATERAL 16

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

16



STORM DRAIN LATERAL 17

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

17

Call before you Dig
Avoid cutting underground utility lines. It's easy.
Call 811
OR
1-800-227-2600

FAST
Call before you UnderGround
1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

AVOID HITTING OVERHEAD POWER LINES. IT'S COSTLY
CALL BEFORE YOU DO OVERHEAD
1-702-227-2929

NOTE TO CONTRACTOR

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010)
BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

PROFESSIONAL ENGINEER – STATE OF NEVADA
HAO A. NGUYEN
No. 19396
Exp. 12/31/2017
CIVIL
DATE: 4/6/17

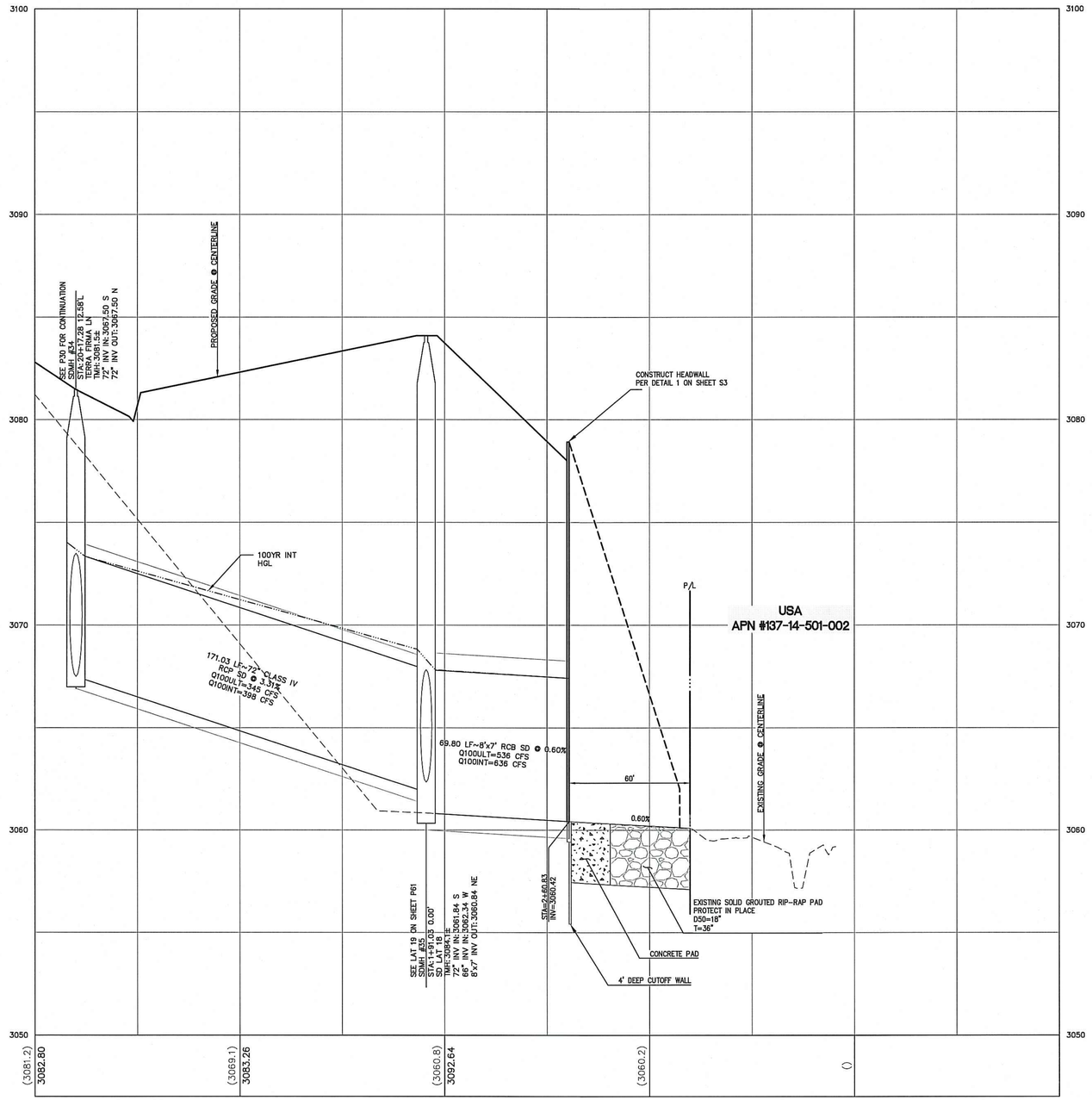
REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	CCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:23:30

GCW
ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com
F:\Projects\700\764-204-013\DWG\Production\PH 01\013ePH1-P-LAT.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
STORM DRAIN LATERAL IV

DRAWING
P59
99 OF XX SHTS



STORM DRAIN LATERAL 18 (18 / –)

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

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OR
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FAST
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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

SOUTH 89°39'55" EAST, BEING THE BEARING OF THE NORTH LINE OF THE NORTHWEST QUARTER (NW 1/4) OF THE NORTHWEST QUARTER (NW 1/4) OF SECTION 13, TOWNSHIP 20 SOUTH, RANGE 59 EAST, M.D.M., AS SHOWN IN FILE 112, PAGE 94 OF PARCEL MAPS ON FILE AT THE CLARK COUNTY, NEVADA RECORDER'S OFFICE.

APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO. _____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

PROFESSIONAL ENGINEER – STATE OF NEVADA
HAO A. NGUYEN
Exp. 12/31/2017
CIVIL
No. 19396
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

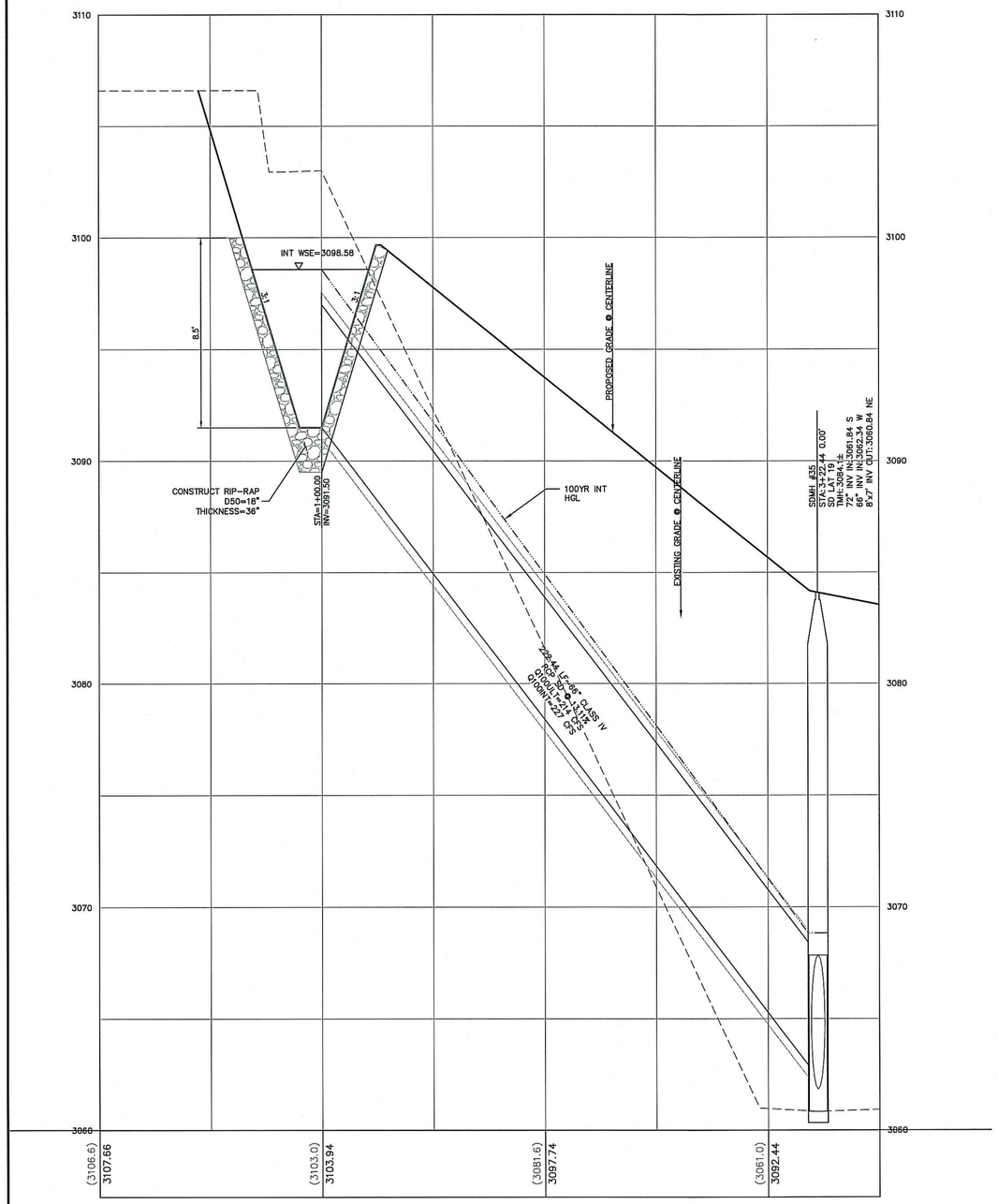
PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:23:24

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-P-LAT.dwg
Hao Nguyen

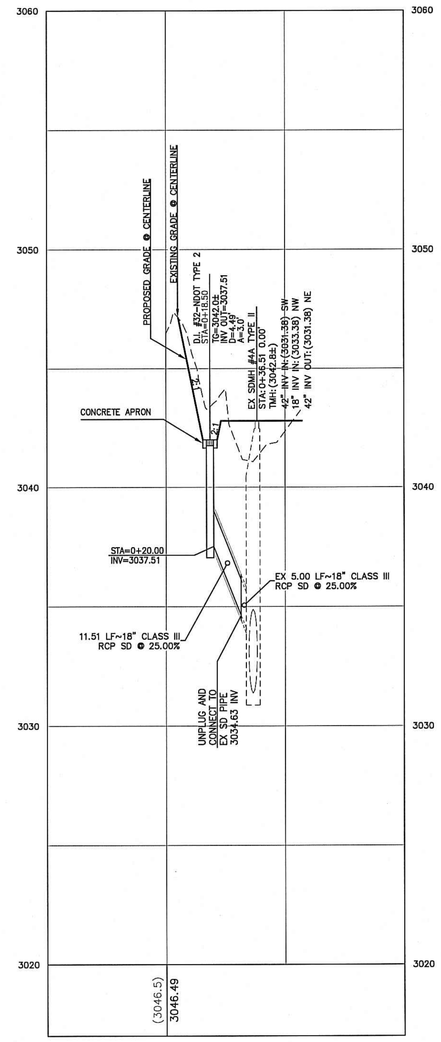
PULTE HOMES
SUMMERLIN VILLAGE 26 – REVERENCE
PHASE 1
STORM DRAIN LATERAL V

DRAWING
P60
100 OF XX SHTS



STORM DRAIN LATERAL 19 (19 / –)

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'



STORM DRAIN LATERAL 20 (20 / –)

SCALE: HORIZ. 1" = 30'
VERT. 1" = 1'

NOTE TO CONTRACTOR

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BENCHMARK

CITY OF LAS VEGAS VERTICAL CONTROL POINT '5LV09 14S6', BEING A RIVET & PLATE IN HEAD WALL WEST OF CC215 +/-250' NORTH OF LAKE MEAD.

ELEVATION: 3227.22 (FEET)
983.659 (METERS)
CITY OF LAS VEGAS VERTICAL CONTROL – 2008 ADJUSTMENT (UPDATED 5/24/2010) BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD'88).

BASIS OF BEARINGS

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APPROVED FOR CONSTRUCTION

LAS VEGAS VALLEY WATER DISTRICT ENGINEERING SERVICES MANAGER
PROJECT NO._____ DATE: _____
LVVWD APPROVED FIRE FLOW_____ GPM AT 20 PSI RESIDUAL

H# _____ CLV DWG# _____

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OR
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FAST
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1-702-432-5300
FREEWAY AND ARTERIAL SYSTEM OF TRANSPORTATION

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PROFESSIONAL ENGINEER – STATE OF NEVADA
HAO A. NGUYEN
Exp. 12/31/2017
CIVIL
No. 19396
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:23:21

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
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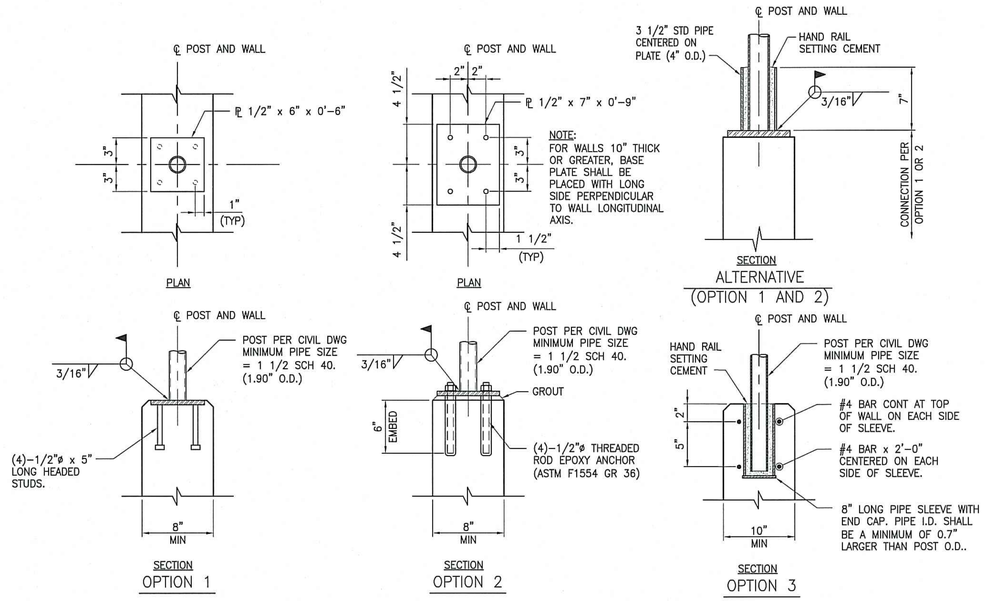
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

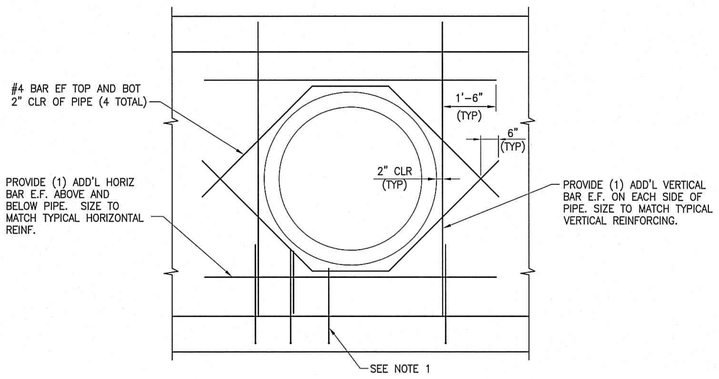
F:\Projects\700\764-204-013\DWG\Production\PH 01\013cPH1-P-LAT.dwg
Hao Nguyen

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
STORM DRAIN LATERAL VI

DRAWING
P61
101 OF XX SHTS



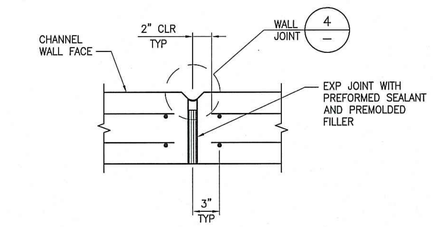
6 POST CONNECTION DETAIL
SCALE: NTS



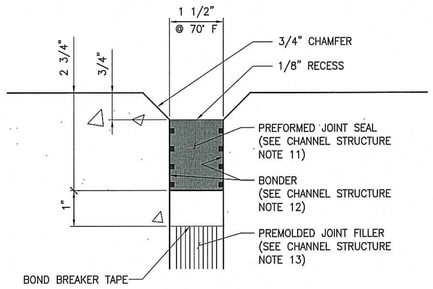
NOTES:

1. FIELD CUT TYPICAL WALL REINFORCING 2" CLR OF PIPE.
2. WHEN WALL IS LESS THAN 9" THICK REINFORCING DOES NOT NEED TO BE PLACED IN EACH FACE AS STATED ABOVE.
3. IF BARS CANNOT EXTEND BEYOND PIPE AS SHOWN, EXTEND AS FAR AS POSSIBLE AND PROVIDE STANDARD HOOK.

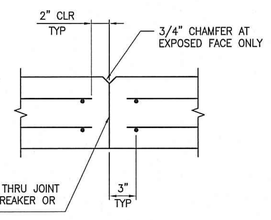
7 TYPICAL PIPE PENETRATION DETAIL
SCALE: NTS



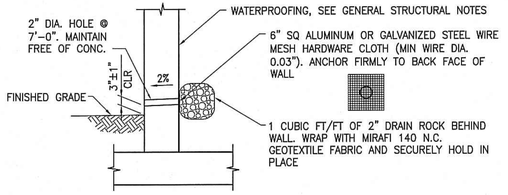
3 WALL EXPANSION JOINT DETAIL
SCALE: NTS



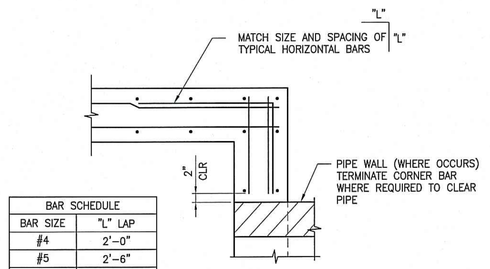
4 WALL JOINT SEALANT DETAIL
SCALE: NTS



5 WALL CONTRACTION JOINT DETAIL
SCALE: NTS



1 WEEPHOLE DETAIL
SCALE: NTS



BAR SCHEDULE	
BAR SIZE	"L" LAP
#4	2'-0"
#5	2'-6"
#6	3'-6"
#7	4'-6"
#8	5'-0"

2 TYPICAL CORNER REINFORCING DETAIL
SCALE: NTS

GENERAL STRUCTURAL NOTES

1. DESIGN SPECIFICATIONS: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SEVENTH EDITION, 2014.
2. CONSTRUCTION SPECIFICATIONS: CLARK COUNTY UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION EXCEPT AS NOTED BELOW AND IN THE SPECIAL PROVISIONS FOR THIS CONTRACT.
3. EXISTING UTILITIES: THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL EXISTING UTILITIES WITHIN THE WORK AREA, AND PROVIDING PROTECTION FOR THE VARIOUS UTILITIES AFFECTED PRIOR TO PROCEEDING WITH THE WORK.
4. CONCRETE: ALL CONCRETE SHALL BE CLASS D WITH A MINIMUM ULTIMATE COMPRESSIVE STRENGTH f'c = 4500psi AT 28 DAYS AND A MAXIMUM WATER/CEMENT RATIO BY WEIGHT OF 0.45. USE TYPE V CEMENT PER ASTM C-150.
5. REINFORCING STEEL: ALL REINFORCING STEEL SHALL BE ASTM A615 GRADE 60. DIMENSIONS ARE FROM OUT TO OUT OF BARS. MINIMUM CLEARANCE TO REINFORCING STEEL SHALL BE 3" WHERE CONCRETE IS CAST AGAINST SOIL AND 2" ELSEWHERE, UNLESS NOTED OTHERWISE. HOOKS MAY BE ROTATED OR TILTED AS NECESSARY TO PROVIDE THE PROPER CLEARANCES.
6. BEDDING MATERIAL: BEDDING MATERIAL SHALL BE 6-INCHES OF TYPE II AGGREGATE BASE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY. EXPOSED NATIVE SOILS IN BOTTOMS OF EXCAVATIONS SHALL BE SCARIFIED TO A DEPTH OF 6-INCHES, MOISTURE-CONDITIONED TO WITHIN 2% OF OPTIMUM MOISTURE CONTENT AND COMPACTED TO 95%.
7. EPOXY: EPOXY SHALL BE SIMPSON STRONG-TIE "SET-XP EPOXY-TIE ADHESIVE" PER ICC REPORT ESR-2508 OR APPROVED EQUAL. INSTALL IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
8. PROVIDE REINFORCING AT WALL CORNERS PER TYPICAL DETAIL.
9. BACKFILL SHALL BE PLACED IN ACCORDANCE WITH THE GEOTECHNICAL REPORT.
10. PROVIDE WEEPHOLE PER TYPICAL DETAIL.
11. INVERTS, SLOPES, BEARINGS, ALIGNMENTS, AND ELEVATIONS SHOWN ARE FOR "REFERENCE ONLY". INFORMATION ON CIVIL DRAWINGS SHALL GOVERN.
12. CONTRACTOR SHALL PROVIDE SLOPE STABILIZATION, SHEETING, BRACING, AND/OR SHORING AS REQUIRED TO PROTECT EXISTING EMBANKMENTS, STRUCTURES, AND UNDERGROUND ITEMS.

STATE OF NEVADA — ERIC G. GILES — No. 14477 — CIVIL / STRUCTURAL — PROFESSIONAL ENGINEER — DATE: 4/4/16

REV	DATE	DESCRIPTION	AGEN APP	DATE	CCW APP

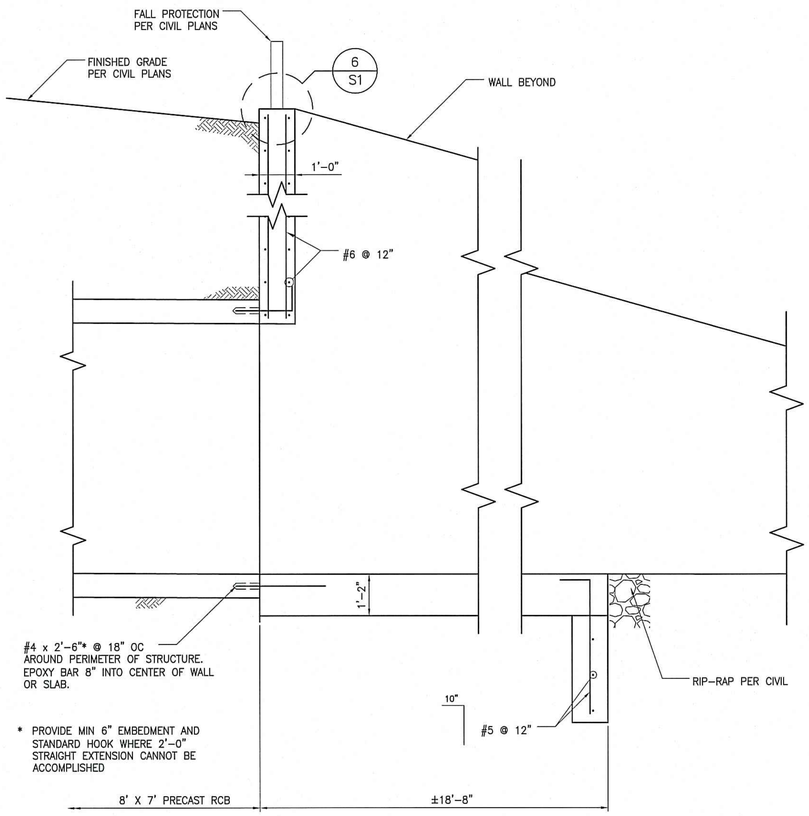
PROJECT NO. 764-204-013
DESIGN: BRR
DRAWN:
CHECK: WP
PLOT DATE: 04-04-16
PLOT TIME: 11:15:46
F:\Projects\700\764-204-013\DWG\Production\PH 01\STRUCTURAL\18ft high CIP HEADWALL.dwg
Brandon Richard

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

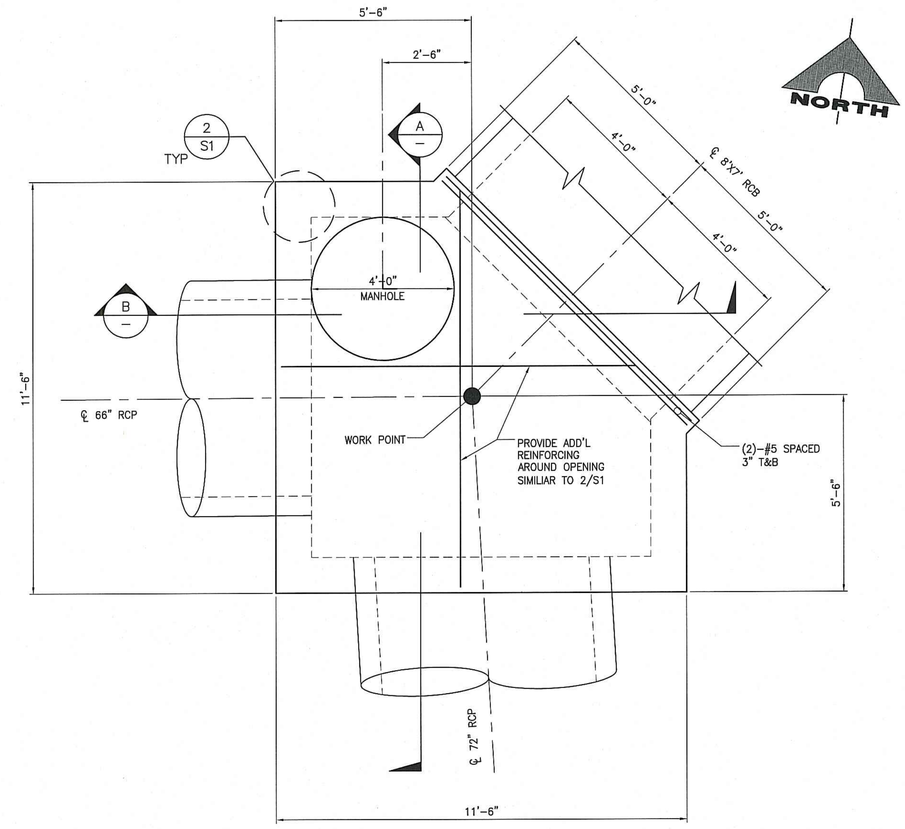
PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1
GENERAL NOTES AND TYPICAL DETAILS

DRAWING
S1
150 OF 152 SHTS

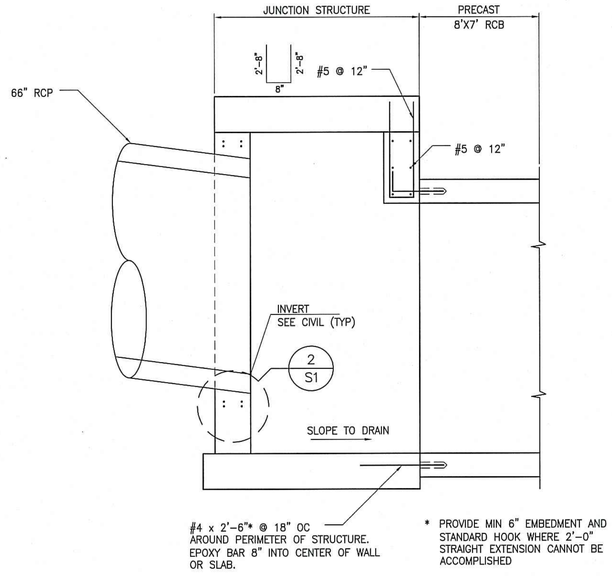
H# _____ CLV DWG# _____



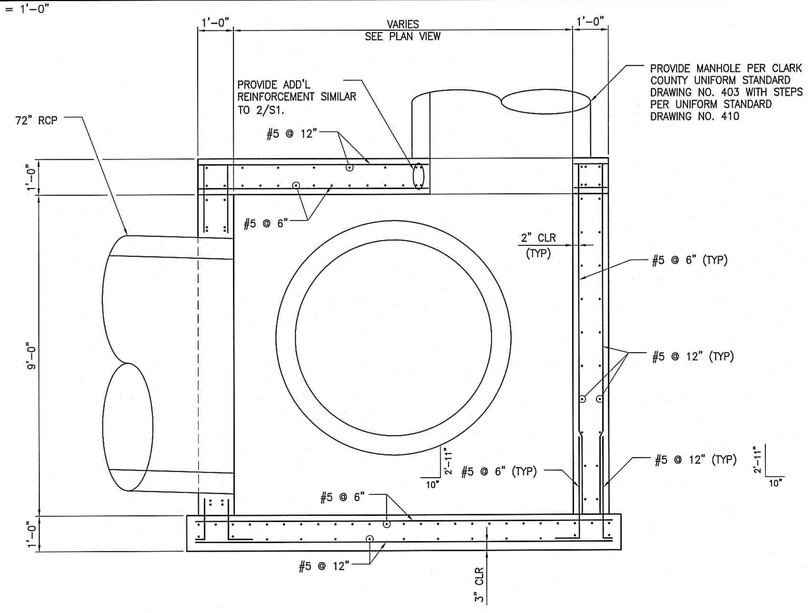
C SECTION
SCALE: 1/2" = 1'-0"



1 PLAN SDMH#35
SCALE: 1/2" = 1'-0"



B SECTION
SCALE: 1/2" = 1'-0"



A SECTION
SCALE: 1/2" = 1'-0"

H# _____ CLV DWG# _____

STATE OF NEVADA — REGISTERED PROFESSIONAL ENGINEER — ERIC G. GILES — No. 14477 — CIVIL — DATE: 4/4/17

REV	DATE	DESCRIPTION	AGEN APP	DATE	GCW APP	DATE
		junction structure\764-204-013-18ft HEADWALL.dwg				

PROJECT NO. 764-204-013
DESIGN: BRR
DRAWN: WP
CHECK:
PLOT DATE: 04-16
PLOT TIME: 11:16:28

GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

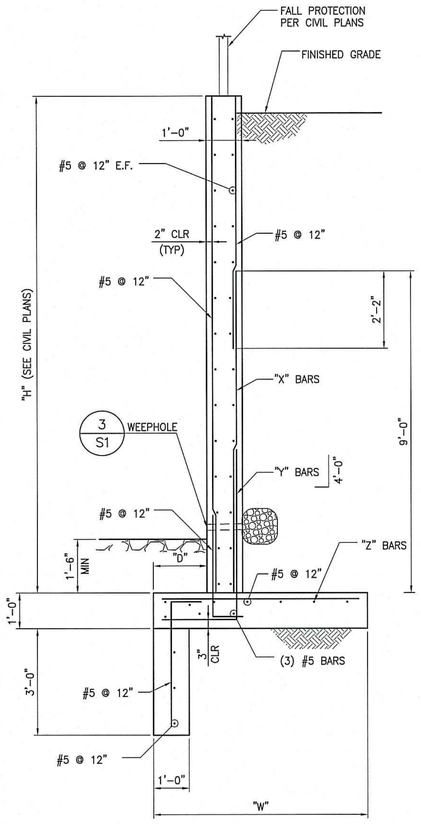
F:\Projects\700\764-204-013\DWG\Production\PH 01\STRUCTURAL\18ft high headwall.dwg
Brandon Richard

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

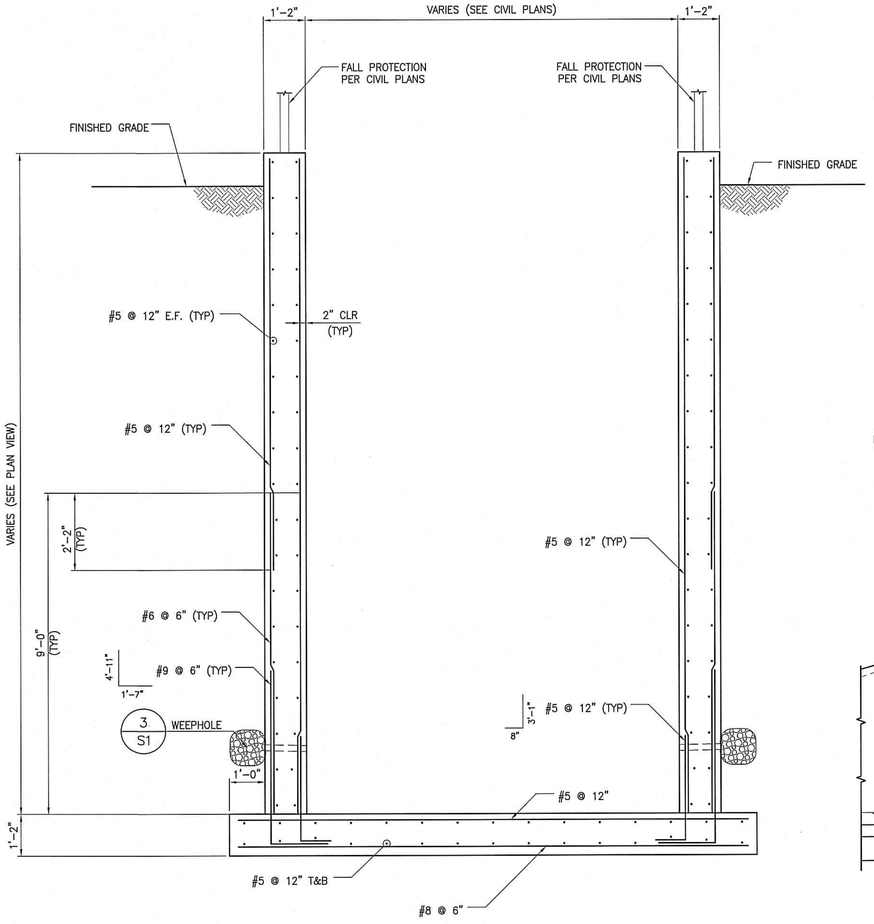
TRANSITION STRUCTURE AND WALL

DRAWING
S2
151 OF 152 SHTS

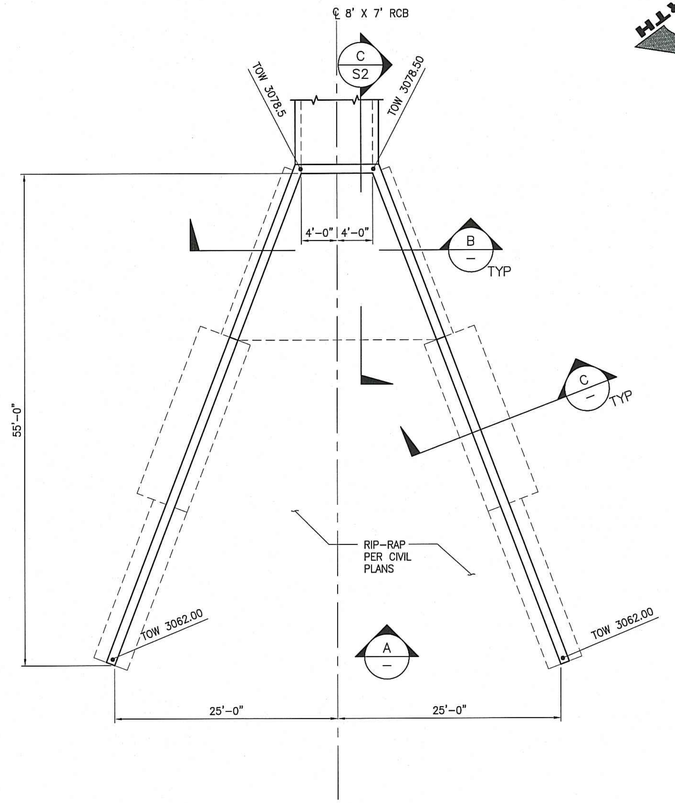


WALL #	DIMENSIONS "W"	DIMENSIONS "D"	"X" BARS	"Y" BARS	"Z" BARS
WALL 1	3'-6"	1'-0"	#5 @ 12"	#5 @ 12"	#5 @ 12"
WALL 2	6'-0"	1'-6"	#5 @ 12"	#5 @ 6"	#6 @ 12"

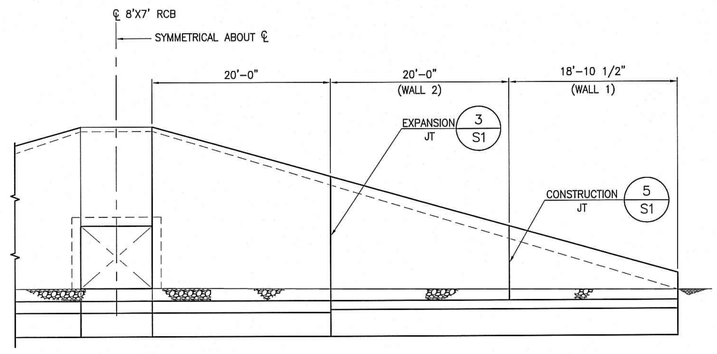
C SECTION
SCALE: 1/2" = 1'-0"



B SECTION
SCALE: 1/2" = 1'-0"



1 PLAN
SCALE: 1/8" = 1'-0"



A ELEVATION-UNFOLDER
SCALE: 1/8" = 1'-0"

NORTH

ENGINEER - STATE OF NEVADA
ERIC G. GILES
Exp. 06/30/2017
CIVIL/STRUCTURAL
PROFESSIONAL ENGINEER
No. 14570
DATE: 4/4/16

REV	DATE	DESCRIPTION	DATE	AGEN APP	DATE	GCW APP

PROJECT NO. 764-204-013
DESIGN: BRR
DRAWN:
CHECK: WP
PLOT DATE: 04-04-16
PLOT TIME: 11:16:49

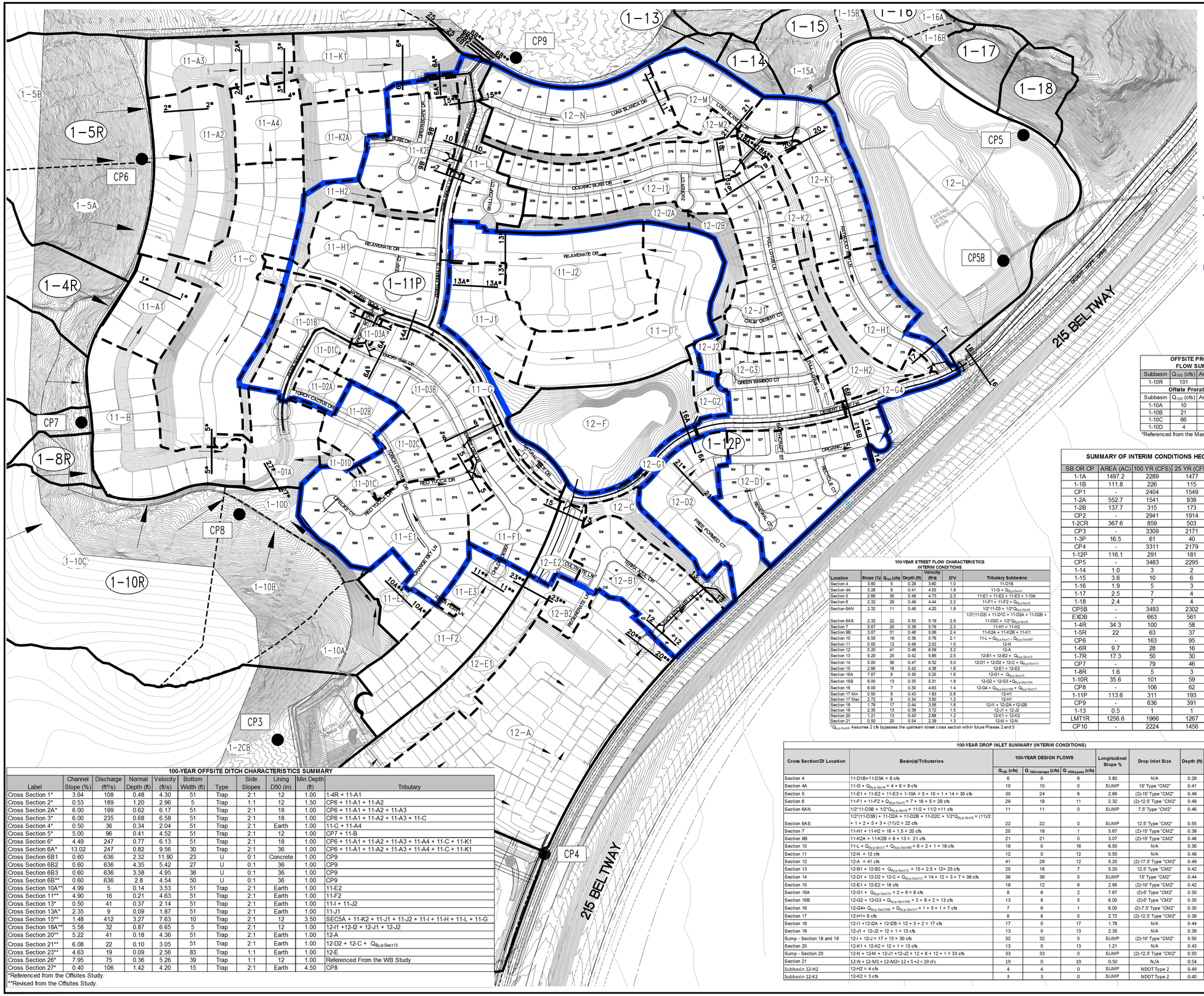
GCW ENGINEERS & SURVEYORS
1555 S. RAINBOW BLVD.
LAS VEGAS, NV 89146
T: 702.804.2000
F: 702.804.2299
gcwengineering.com

F:\Projects\700\764-204-013\DWG\Production\PH 01\STRUCTURAL\18ft high
Brandon Richard

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1
HEADWALL FOR 8'X7' RCB

DRAWING
S3
152 OF 152 SHTS

H# _____ CLV DWG# _____



LEGEND

- 1-3P — DRAINAGE BASIN
- 3-E — ⊠RORATED DRAINAGE BASIN
- CP3 ● — ⊠ON⊠ENTRATION ⊠OINT
- BASIN BO⊠NDAR⊠
- ⊠RORATE BASIN BO⊠NDAR⊠
- FLOW DIRE⊠TION
- 1 1 — STREET ⊠ROSS SE⊠TION
- ⊠⊠ASE 1 BO⊠NDAR⊠

OFFSITE PRORATED* FLOW SUMMARY

Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-10R	101	35.6	2.84
Offsite Prorated Basins			
Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-10A	10	3.5	2.84
1-10B	21	7.4	2.84
1-10C	66	23.2	2.84
1-10D	4	1.5	2.84

*Referenced from the Master Study

SUMMARY OF INTERIM CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	25 YR (CFS)	10 YR (CFS)
1-1A	1497.2	2289	1477	942
1-1B	111.8	226	115	63
CP1	-	2404	1549	986
1-2A	552.7	1541	938	608
1-2B	137.7	315	173	103
CP2	-	2941	1914	1209
1-2CR	367.6	859	503	313
CP3	-	3309	2171	1365
1-3P	16.5	61	40	29
CP4	-	3311	2179	1368
1-12P	116.1	291	181	124
CP5	-	3483	2295	1443
1-14	1.0	3	2	1
1-15	3.6	10	6	4
1-16	1.9	5	3	2
1-17	2.5	7	4	2
1-18	2.4	7	4	2
CP5B	-	3493	2302	1448
EXDB	-	663	561	461
1-4R	34.3	100	58	37
1-5R	22	63	37	24
CP6	-	163	95	61
1-6R	9.7	28	16	11
1-7R	17.3	50	30	19
CP7	-	79	46	29
1-8R	1.6	5	3	2
1-10R	35.6	101	59	38
CP8	-	106	62	39
1-11P	113.6	311	193	132
CP9	-	636	391	261
1-13	0.5	1	1	1
LMT1R	1256.6	1966	1267	821
CP10	-	2224	1456	945

INTERIM CONDITIONS PRORATED FLOW SUMMARY

Offsite

Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-11P*	311	113.6	2.74
1-12P*	291	116.1	2.51
Offsite Prorated Basins			
Subbasin	Q_{100} (cfs)	New Area (acres)	cfs/acre
11-A1	8	3.0	2.74
11-A2	18	6.5	2.74
11-A3	10	3.5	2.74
11-A4	7	2.5	2.74
11-B	17	6.3	2.74
11-C	29	10.7	2.74
11-D1A	9	3.4	2.74
11-D1D	2	0.8	2.74
11-D2B	5	1.8	2.74
11-E2	5	1.6	2.74
11-E3	<1	0.1	2.74
11-F2	16	5.8	2.74
11-I	20	7.4	2.74
11-J1	9	3.3	2.74
11-J2	21	7.5	2.74
11-K1	13	4.6	2.74
11-K2A	9	3.4	2.74
12-A	41	16.5	2.51
12-B2	3	0.9	2.51
12-D2	12	4.8	2.51
12-E1	16	6.2	2.51
12-F	17	7.0	2.51
12-G2	2	0.7	2.51
12-L	54	21.5	2.51

*Referenced from the Offsites Study

INTERIM CONDITIONS PRORATED FLOW SUMMARY

Onsite

Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-11P*	219	113.6	1.93
1-12P*	230	116.1	1.98
Onsite Prorated Basins			
Subbasin	Q_{100} (cfs)	New Area (acres)	cfs/acre
11-A	30	15.6	1.93
11-B	12	6.3	1.93
11-C	21	10.7	1.93
11-D1B	5	2.5	1.93
11-D1C	<1	0.1	1.93
11-D1D	2	0.8	1.93
11-D2A	2	0.9	1.93
11-D2C	3	1.7	1.93
11-D3A	1	0.3	1.93
11-D3B	12	6.0	1.93
11-E1	14	7.4	1.93
11-F1	7	3.4	1.93
11-G	4	2.3	1.93
11-H1	16	8.4	1.93
11-H2	3	1.4	1.93
11-J1	6	3.3	1.93
11-J2	15	7.5	1.93
11-K2B	8	4.2	1.93
11-L	7	3.4	1.93
12-A	33	16.5	1.98
12-B1	10	4.9	1.98
12-C	3	1.7*	1.98
12-D1	14	7.2	1.98
12-E2	2	1.2	1.98
12-F	14	7.0	1.98
12-G1	2	0.9	1.98
12-G3	9	4.3	1.98
12-G4	1	0.7	1.98
12-H1	7	3.8	1.98
12-H2	4	2.2	1.98
12-I1	12	6.2	1.98
12-I2A	3	1.4	1.98
12-I2B	2	1.2	1.98
12-J1	12	6.2	1.98
12-J2	1	0.5	1.98
12-K1	10	5.2	1.98
12-K2	2	1.2	1.98
12-L	43	21.5	1.98
12-M2	2	1.2	1.98
12-M1	5	2.6	1.98
12-N	12	6.0	1.98

*Referenced Subbasins from Master Study

100-YEAR STREET FLOW CHARACTERISTICS
INTERIM CONDITIONS

Location	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (ft/s)	D*V	Tributary Subbasins
Section 4	3.80	6	0.29	3.60	1.0	11-D1B
Section 4A	3.28	9	0.41	4.55	1.9	11-G + $Q_{By\text{-}Sect4}$
Section 5	2.66	30	0.49	4.73	2.3	11-E1 + 11-E2 + 11-E3 + 1-10A
Section 6	2.32	29	0.49	4.44	2.2	11-F1 + 11-F2 + $Q_{By\text{-}Sect5}$
Section 6AN	2.32	11	0.46	4.20	1.9	1/2*(11-D3 + 1/2*$Q_{By\text{-}Sect6}$
Section 6AS	2.32	22	0.55	5.19	2.9	1/2*(11-D3) + 11-D1C + 11-D2A + 11-D2B + 11-D2C + 1/2*$Q_{By\text{-}Sect6}$
Section 7	5.67	20	0.39	5.76	2.2	11-H1 + 11-H2
Section 9B	3.07	31	0.48	5.06	2.4	11-K2A + 11-K2B + 11-K1
Section 10	6.50	16	0.36	5.76	2.1	11-L + $Q_{By\text{-}Sect7}$ + $Q_{By\text{-}Sect9B}$*
Section 11	0.50	12	0.48	2.02	1.0	12-N
Section 12	5.20	41	0.49	6.59	3.2	12-A
Section 13	5.20	25	0.42	5.86	2.5	12-B1 + 12-B2 + $Q_{By\text{-}Sect12}$
Section 14	6.00	36	0.47	6.32	3.0	12-D1 + 12-D2 + 12-C + $Q_{By\text{-}Sect13}$
Section 15	2.56	18	0.42	4.38	1.8	12-E1 + 12-E2
Section 16A	7.67	8	0.30	5.25	1.6	12-G1 + $Q_{By\text{-}Sect15}$
Section 16B	6.00	13	0.35	5.31	1.9	12-G2 + 12-G3 + $Q_{By\text{-}Sect16A}$
Section 16	6.00	7	0.30	4.63	1.4	12-G4 + $Q_{By\text{-}Sect16B}$ + $Q_{By\text{-}Sect17}$
Section 17 Min	0.50	8	0.43	1.83	0.8	12-H1
Section 17 Max	2.72	8	0.34	3.50	1.2	12-H1
Section 18	1.78	17	0.44	3.56	1.6	12-I1 + 12-I2A + 12-I2B
Section 19	2.35	13	0.39	3.72	1.5	12-J1 + 12-J2
Section 20	1.21	13	0.43	2.88	1.2	12-K1 + 12-K2
Section 21	0.50	20	0.54	2.39	1.3	12-M1 + 12-N

*$Q_{By\text{-}Sect9}$: Assumes 2 cfs bypasses the upstream street cross section within future Phases 2 and 3

100-YEAR DROP INLET SUMMARY (INTERIM CONDITIONS)

Cross Section/DI Location	Basin(s)/Tributaries	100-YEAR DESIGN FLOWS: 2>11 Q_{100} (cfs)	100-YEAR DESIGN FLOWS: $Q_{100intercept}$ (cfs)	100-YEAR DESIGN FLOWS: $Q_{100bypass}$ (cfs)	Longitudinal Slope %	Drop Inlet Size	Depth (ft)	Velocity (ft/s)	DXV
Section 4	11-D1B+11-D3A = 6 cfs	6	0	6	3.80	N/A	0.29	3.60	1.04
Section 4A	11-G + $Q_{By\text{-}Sect4}$ = 4 + 6 = 9 cfs	10	10	0	SUMP	10' Type "CM2"	0.41	4.55	1.87
Section 5	11-E1 + 11-E2 + 11-E3 + 1-10A = 5 + 10 + 1 + 14 = 30 cfs	30	24	6	2.66	(2)-15' Type "CM2"	0.49	4.73	2.32
Section 6	11-F1 + 11-F2 + $Q_{By\text{-}Sect5}$ = 7 + 16 + 5 = 29 cfs	29	18	11	2.32	(2)-12.5' Type "CM2"	0.49	4.44	2.18
Section 6AN	1/2*11-D3B + 1/2*$Q_{By\text{-}Sect6}$ = 11/2 + 11/2 =11 cfs	11	11	0	SUMP	7.5' Type "CM2"	0.46	4.20	1.93
Section 6AS	1/2*(11-D3B) + 11-D2A + 11-D2B + 11-D2C + 1/2*$Q_{By\text{-}Sect6}$ = (11)/2 + 1 + 2 + 5 + 3 + (11)/2 = 22 cfs	22	22	0	SUMP	12.5' Type "CM2"	0.55	5.19	2.85
Section 7	11-H1 + 11-H2 = 18 + 1.5 = 20 cfs	20	19	1	5.67	(2)-15' Type "CM2"	0.39	5.76	2.25
Section 9B	11-K2A + 11-K2B = 8 + 13 = 21 cfs	21	21	0	3.07	(2)-15' Type "CM2"	0.48	5.06	2.43
Section 10	11-L + $Q_{By\text{-}Sect7}$ + $Q_{By\text{-}Sect9B}$ = 6 + 2 + 1 = 16 cfs	16	0	16	6.50	N/A	0.36	5.76	2.07
Section 11	12-N = 12 cfs	12	0	12	0.50	N/A	0.48	2.02	0.97
Section 12	12-A = 41 cfs	41	29	12	5.20	(2)-17.5' Type "CM2"	0.49	6.59	3.23
Section 13	12-B1 + 12-B2 + $Q_{By\text{-}Sect12}$ = 10 + 2.5 + 12= 25 cfs	25	18	7	5.20	12.5' Type "CM2"	0.42	5.86	2.46
Section 14	12-D1 + 12-D2 + 12-C + $Q_{By\text{-}Sect13}$ = 14 + 12 + 3 + 7 = 36 cfs	36	36	0	SUMP	15' Type "CM2"	0.44	5.98	2.63
Section 15	12-E1 + 12-E2 = 18 cfs	18	12	6	2.95	(2)-10' Type "CM2"	0.42	4.38	1.84
Section 16A	12-G1 + $Q_{By\text{-}Sect15}$ = 2 + 6 = 8 cfs	8	6	2	7.67	(2)-5' Type "CM2"	0.30	5.25	1.58
Section 16B	12-G2 + 12-G3 + $Q_{By\text{-}Sect16A}$ = 2 + 9 + 2 = 13 cfs	13	8	5	6.00	(2)-5' Type "CM2"	0.35	5.31	1.86
Section 16	12-G4+ $Q_{By\text{-}Sect16B}$ + $Q_{By\text{-}Sect17}$ = 1 + 5 + 1 = 7 cfs	7	6	1	6.00	(2)-7.5' Type "CM2"	0.30	4.63	1.4
Section 17	12-H1= 8 cfs	8	8	0	2.72	(2)-12.5' Type "CM2"	0.38	3.85	1.46
Section 18	12-I1 +12-I2A + 12-I2B = 12 + 3 + 2 = 17 cfs	17	0	17	1.78	N/A	0.44	3.56	1.57
Section 19	12-J1 + 12-J2 = 12 + 1 = 13 cfs	13	0	13	2.35	N/A	0.39	3.72	1.45
Sump - Section 18 and 19	12-I + 12-J = 17 + 13 = 30 cfs	32	32	0	SUMP	(2)-10' Type "CM2"	0.50	-	-
Section 20	12-K1 + 12-K2 = 12 + 1 = 13 cfs	13	0	13	1.21	N/A	0.43	2.88	1.24
Sump - Section 20	12-N + 12-M + 12-I1 +12-J2 = 12 + 8 + 12 + 1 = 33 cfs	33	33	0	SUMP	(2)-12.5' Type "CM2"	0.50	-	-
Section 21	12-N + 12-M1 + 12-M2= 12 + 5 +2 = 19 cfs	19	0	19	0.50	N/A	0.54	2.39	1.29
Subbasin 12-H2	12-H2 = 4 cfs	4	4	0	SUMP	NDOT Type 2	0.49	-	-
Subbasin 12-K2	12-K2 = 3 cfs	3	3	0	SUMP	NDOT Type 2	0.40	-	-

100-YEAR OFFSITE DITCH CHARACTERISTICS SUMMARY

Label	Channel Slope (%)	Discharge (ft³/s)	Normal Depth (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Cross Section 1*	3.64	108	0.48	4.30	51	Trap	2:1	12	1.00	1-4R + 11-A1
Cross Section 2*	0.53	189	1.20	2.96	5	Trap	1:1	12	1.50	CP6 + 11-A1 + 11-A2
Cross Section 2A*	6.00	199	0.62	6.17	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3
Cross Section 3*	6.00	235	0.68	6.58	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-C
Cross Section 4*	0.50	36	0.34	2.04	51	Trap	2:1	Earth	1.00	11-C + 11-A4
Cross Section 5*	5.00	96	0.41	4.52	51	Trap	2:1	12	1.00	CP7 + 11-B
Cross Section 6*	4.49	247	0.77	6.13	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-A4 + 11-C + 11-K1
Cross Section 6A*	13.02	247	0.82	9.56	30	Trap	2:1	36	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-A4 + 11-C + 11-K1
Cross Section 6B1	0.60	636	2.32	11.90	23	U	0:1	Concrete	1.00	CP9
Cross Section 6B2	0.60	636	4.35	5.42	27	U	0:1	36	1.00	CP9
Cross Section 6B3	0.60	636	3.38	4.95	38	U	0:1	36	1.00	CP9
Cross Section 6B**	0.60	636	2.8	4.54	50	U	0:1	36	1.00	CP9
Cross Section 10A**	4.99	5	0.14	3.53	51	Trap	2:1	Earth	1.00	11-E2
Cross Section 11**	4.90	16	0.21	4.63	51	Trap	2:1	Earth	1.00	11-F2
Cross Section 13*	0.50	41	0.37	2.14	51	Trap	2:1	Earth	1.00	11-I + 11-J2
Cross Section 13A*	2.35	9	0.09	1.87	51	Trap	2:1	Earth	1.00	11-I1
Cross Section 15**	1.48	412	3.27	7.63	10	Trap	2:1	12	3.50	SEC5A + 11-K2 + 11-J1 + 11-J2 + 11-I + 11-H + 11-L + 11-G
Cross Section 18A**	5.58	32	0.87	6.65	5	Trap	2:1	12	1.00	12-I1 +12-I2 + 12-J1 + 12-J2
Cross Section 20**	5.22	41	0.18	4.36	51	Trap	2:1	Earth	1.00	12-A
Cross Section 21**	6.08	22	0.10	3.05	51	Trap	2:1	Earth	1.00	12-D2 + 12-C + $Q_{By\text{-}Sect13}$
Cross Section 23**	4.63	19	0.09	2.56	83	Trap	1:1	Earth	1.00	12-E
Cross Section 26*	7.95	75	0.36	5.26	39	Trap	1:1	12	1.00	Referenced From the WB Study
Cross Section 27*	0.40	106	1.42	4.20	15	Trap	2:1	Earth	4.50	CP8

*Referenced from the Offsites Study.
**Revised from the Offsites Study.

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F:\Projects\700\764-204-013\Division\Cvil\Figures\RTC-PHASE 1\Fig 5R.dwg
David Clark

% COMPLETE

DATE:	DESCRIPTION	DATE	ASSN. APP	DATE	CGW APP

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-16-16
PLOT TIME: 10:53:42

PULTE HOMES

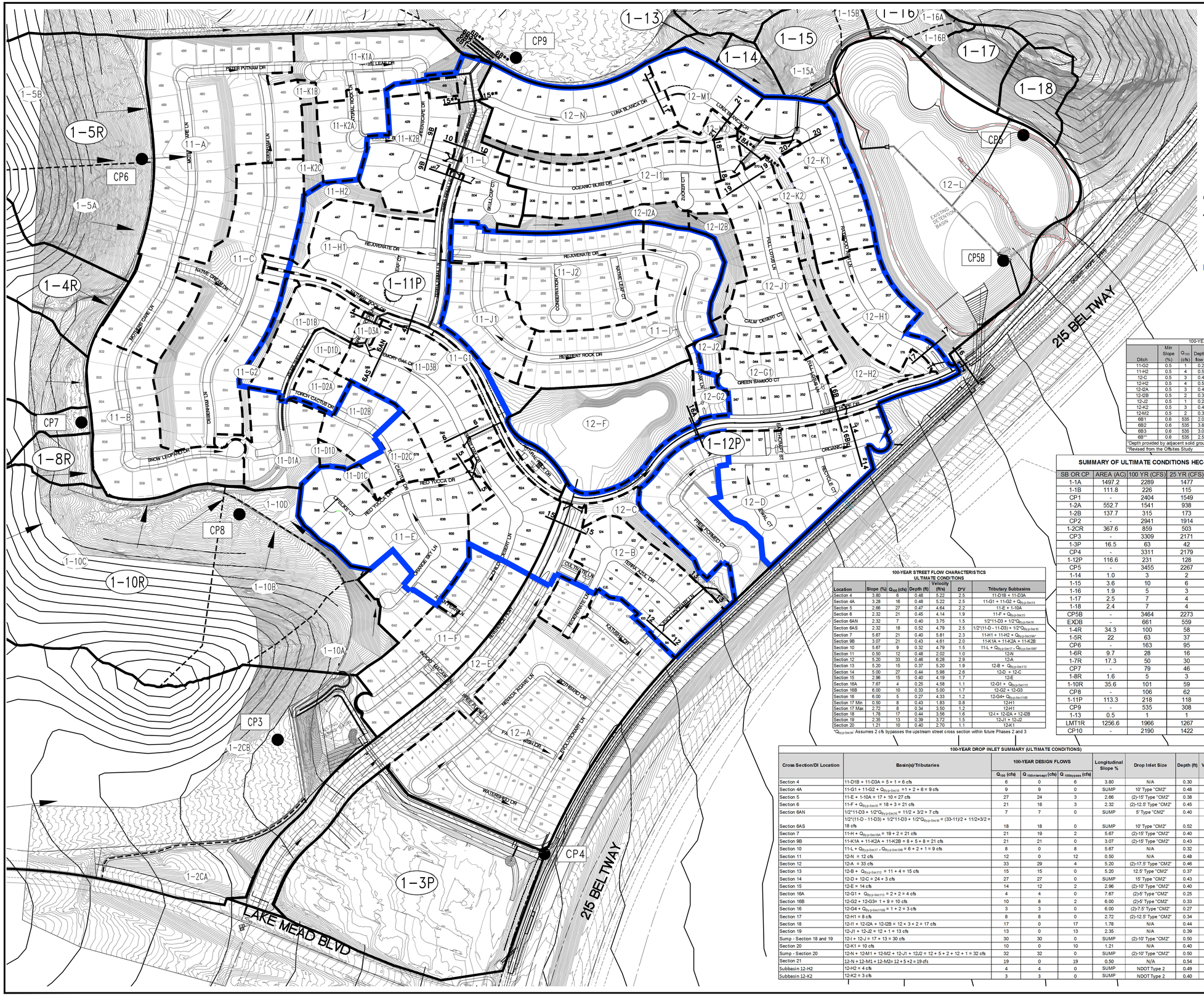
SUMMERLIN VILLAGE 26 – REVERENCE
PHASE 1

INTERIM CONDITIONS DRAINAGE MAP

DRAWING
FIG-5R
OF SHTS

LID#:

HTE: 00-00000



GRAPHIC SCALE
300 0 150 300
(IN FEET)
1 inch = 300 ft.

NORTH
SCALE 1" = 300'

LEGEND

- 1-3P DRAINAGE BASIN
- 3-E ⊠RORATED DRAINAGE BASIN
- CP3 ● ⊠ON⊠ENTRATION ⊠OINT
- BASIN BO⊠NDAR⊠
- ⊠RORATE BASIN BO⊠NDAR⊠
- FLOW DIRE⊠TION
- 1 1 STREET ⊠ROSS SE⊠TION
- ⊠⊠ASE 1 BO⊠NDAR⊠

100-YEAR ONSITE DITCH CHARACTERISTICS SUMMARY TABLE

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 Subbasin
11-G2	0.5	1	0.22	1.37	0	V	50:1	Earth	2.00	11-G2
11-H2	0.5	4	0.52	2.26	0	V	50:1	Earth	2.00	11-K2C+11-H2
12-C	0.5	3	0.44	2.04	0	V	50:1	Earth	2.00	12-C
12-H2	0.5	4	0.52	2.26	0	V	50:1	Earth	2.00	12-H2
12-I2A	0.5	3	0.44	2.04	0	V	50:1	Earth	2.00	12-I2A
12-I2B	0.5	2	0.34	1.77	0	V	50:1	Earth	2.00	12-I2B
12-J2	0.5	1	0.22	1.37	0	V	50:1	Earth	2.00	12-J2
12-K2	0.5	3	0.44	2.04	0	V	50:1	Earth	2.00	12-K2
12-M2	0.5	2	0.34	1.77	0	V	50:1	Earth	2.00	12-M2
6B1	0.6	535	2.08	11.19	23	U	0:1	Concrete	2.50	CP9
6B2	0.6	535	3.88	5.11	27	U	0:1	36	4.00	CP9
6B3	0.6	535	3.03	4.65	38	U	0:1	36	4.00	CP9
6B**	0.6	535	2.52	4.29	50	U	0:1	36	2.50	CP9

*Depth provided by adjacent solid grouted flood walls
*Revised from the Offsites Study

SUMMARY OF ULTIMATE CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	25 YR (CFS)	10 YR (CFS)
1-1A	1497.2	2289	1477	942
1-1B	111.8	226	115	63
CP1	-	2404	1549	986
1-2A	552.7	1541	938	608
1-2B	137.7	315	173	103
CP2	-	2941	1914	1209
1-2CR	367.6	859	503	313
CP3	-	3309	2171	1365
1-3P	16.5	63	42	31
CP4	-	3311	2179	1368
1-12P	116.6	231	128	78
CP5	-	3455	2267	1417
1-14	1.0	3	2	1
1-15	3.6	10	6	4
1-16	1.9	5	3	2
1-17	2.5	7	4	2
1-18	2.4	7	4	2
CP5B	-	3464	2273	1421
EXDB	-	661	559	457
1-4R	34.3	100	58	37
1-5R	22	63	37	24
CP6	-	163	95	61
1-6R	9.7	28	16	11
1-7R	17.3	50	30	19
CP7	-	79	46	29
1-8R	1.6	5	3	2
1-10R	35.6	101	59	38
CP8	-	106	62	39
1-11P	113.3	218	118	69
CP9	-	535	308	192
1-13	0.5	1	1	1
LMT1R	1256.6	1966	1267	821
CP10	-	2190	1422	913

OFFSITE PRORATED* FLOW SUMMARY

Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-10R	101	35.6	2.84
Offsite Prorated Basins			
Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-10A	10	3.5	2.84
1-10B	21	7.4	2.84
1-10C	66	23.2	2.84
1-10D	4	1.5	2.84

*Referenced from the Master Study

100-YEAR STREET FLOW CHARACTERISTICS ULTIMATE CONDITIONS

Location	Slope (%)	Q_{100} (cfs)	Depth (ft)	Velocity (ft/s)	DVI	Tributary Subbasins
Section 4	3.80	6	0.48	5.22	2.5	11-D1B + 11-D3A
Section 4A	3.28	16	0.48	5.22	2.5	11-G1 + 11-G2 + $Q_{by\text{-}Sec14}$
Section 5	2.66	27	0.47	4.64	2.2	11-E + 1-10A
Section 6	2.32	21	0.45	4.14	1.9	11-F + $Q_{by\text{-}Sec15}$
Section 6AN	2.32	7	0.40	3.75	1.5	1/2*11-D3 + 1/2*$Q_{by\text{-}Sec16}$
Section 6AS	2.32	18	0.52	4.79	2.5	1/2*(11-D - 11-D3) + 1/2*$Q_{by\text{-}Sec16}$
Section 7	5.67	21	0.40	5.81	2.3	11-H1 + 11-H2 + $Q_{by\text{-}Sec18A}$*
Section 9B	3.07	21	0.43	4.61	2.0	11-K1A + 11-K2A + 11-K2B
Section 10	5.67	9	0.32	4.79	1.5	11-L + $Q_{by\text{-}Sec17}$ - $Q_{by\text{-}Sec18B}$*
Section 11	0.50	12	0.48	2.02	1.0	12-N
Section 12	5.20	33	0.46	6.28	2.9	12-A
Section 13	5.20	15	0.37	5.20	1.9	12-B + $Q_{by\text{-}Sec112}$
Section 14	5.00	27	0.44	5.98	2.6	12-D + 12-C
Section 15	2.96	15	0.40	4.19	1.7	12-E
Section 16A	7.67	4	0.25	4.58	1.1	12-G1 + $Q_{by\text{-}Sec115}$
Section 16B	6.00	10	0.33	5.00	1.7	12-G2 + 12-G3
Section 16	6.00	5	0.27	4.33	1.2	12-G4+ $Q_{by\text{-}Sec116B}$
Section 17 Min	0.50	8	0.43	1.83	0.8	12-H1
Section 17 Max	2.72	8	0.34	3.50	1.2	12-H1
Section 18	1.78	17	0.44	3.56	1.6	12-I + 12-I2A + 12-I2B
Section 19	2.35	13	0.39	3.72	1.5	12-J1 + 12-J2
Section 20	1.21	10	0.40	2.72	1.1	12-K1

*$Q_{by\text{-}Sec18A}$: Assumes 2 cfs bypasses the upstream street cross section within fiture Phases 2 and 3

ULTIMATE CONDITIONS PRORATED FLOW SUMMARY

Onsite			
Subbasin	Q_{100} (cfs)	Area (acres)	cfs/acre
1-11P*	219	113.6	1.93
1-12P*	230	116.1	1.98
Onsite Prorated Basins			
Subbasin	Q_{100} (cfs)	New Area (acres)	cfs/acre
11-A	30	15.6	1.93
11-B	12	6.3	1.93
11-C	21	10.7	1.93
11-D1A	7	3.4	1.93
11-D1B	5	2.5	1.93
11-D1C	<1	0.1	1.93
11-D1D	2	0.8	1.93
11-D2A	2	0.9	1.93
11-D2B	3	1.8	1.93
11-D2C	3	1.7	1.93
11-D3A	<1	0.3	1.93
11-D3B	11	5.6	1.93
11-E	17	9.0	1.93
11-F	18	9.2	1.93
11-G1	3	1.6	1.93
11-G2	2	0.7	1.93
11-H1	16	8.3	1.93
11-H2	3	1.4	1.93
11-I	14	7.4	1.93
11-J1	6	3.3	1.93
11-J2	15	7.5	1.93
11-K1A	8	4.4	1.93
11-K1B	<1	0.1	1.93
11-K2A	5	2.8	1.93
11-K2B	8	4.1	1.93
11-K2C	1	0.7	1.93
11-L	6	3.4	1.93
Total	**219**	**113.6**	**N/A**
12-A	33	16.5	1.98
12-B	11	5.8	1.98
12-C	3	1.7	1.98
12-D	24	12.0	1.98
12-E	15	7.4	1.98
12-F	14	7.0	1.98
12-G1	12	5.9	1.98
12-G2	1	0.7	1.98
12-H1	8	3.7	1.98
12-H2	4	2.2	1.98
12-I1	12	6.2	1.98
12-I2A	3	1.4	1.98
12-I2B	2	1.2	1.98
12-J1	12	6.2	1.98
12-J2	1	0.5	1.98
12-K1	10	5.2	1.98
12-K2	3	1.2	1.98
12-L	43	21.5	1.98
12-M1	5	2.6	1.98
12-M2	2	1.2	1.98
12-N	12	6.0	1.98
Total	**230**	**116.1**	**N/A**

*Referenced Subbasins from Master Study

100-YEAR DROP INLET SUMMARY (ULTIMATE CONDITIONS)

Cross Section/DI Location	Basin(s)/Tributaries	100-YEAR DESIGN FLOWS			Longitudinal Slope %	Drop Inlet Size	Depth (ft)	Velocity (ft/s)	DXV
		Q_{100} (cfs)	$Q_{100intercept}$ (cfs)	$Q_{100bypass}$ (cfs)					
Section 4	11-D1B + 11-D3A = 5 + 1 = 6 cfs	6	0	6	3.80	N/A	0.30	3.75	1.13
Section 4A	11-G1 + 11-G2 + $Q_{by\text{-}Sec14}$ =1 + 2 + 6 = 9 cfs	9	9	0	SUMP	10' Type "CM2"	0.48	5.22	2.51
Section 5	11-E + 1-10A = 17 + 10 = 27 cfs	27	24	3	2.66	(2)-15' Type "CM2"	0.38	3.81	1.45
Section 6	11-F + $Q_{by\text{-}Sec15}$ = 18 + 3 = 21 cfs	21	18	3	2.32	(2)-12.5' Type "CM2"	0.45	4.14	1.86
Section 6AN	1/2*11-D3 + 1/2*$Q_{by\text{-}Sec16}$ = 11/2 + 3/2 = 7 cfs	7	7	0	SUMP	5' Type "CM2"	0.40	3.75	1.50
Section 6AS	1/2*(11-D - 11-D3) + 1/2*11-D3 + 1/2*$Q_{by\text{-}Sec16}$ = (33-11)/2 + 11/2+3/2 = 18 cfs	18	18	0	SUMP	10' Type "CM2"	0.52	4.79	2.49
Section 7	11-H + $Q_{by\text{-}Sec18A}$ * 19 + 2 = 21 cfs	21	19	2	5.67	(2)-15' Type "CM2"	0.40	5.81	2.32
Section 9B	11-K1A + 11-K2A + 11-K2B = 8 + 5 + 8 = 21 cfs	21	21	0	3.07	(2)-15' Type "CM2"	0.43	4.61	1.98
Section 10	11-L + $Q_{by\text{-}Sec17}$ - $Q_{by\text{-}Sec18B}$ = 6 + 2 + 1 = 9 cfs	8	0	8	5.67	N/A	0.32	4.79	1.53
Section 11	12-N = 12 cfs	12	0	12	0.50	N/A	0.48	2.02	0.97
Section 12	12-A = 33 cfs	33	29	4	5.20	(2)-17.5' Type "CM2"	0.46	6.28	2.89
Section 13	12-B + $Q_{by\text{-}Sec112}$ = 11 + 4 = 15 cfs	15	15	0	5.20	12.5' Type "CM2"	0.37	5.20	1.92
Section 14	12-D + 12-C = 24 + 3 cfs	27	27	0	SUMP	15' Type "CM2"	0.43	5.90	2.54
Section 15	12-E = 14 cfs	14	12	2	2.96	(2)-10' Type "CM2"	0.40	4.19	1.68
Section 16A	12-G1 + $Q_{by\text{-}Sec115}$ = 2 + 2 = 4 cfs	4	4	0	7.67	(2)-5' Type "CM2"	0.25	4.58	1.15
Section 16B	12-G2 + 12-G3= 1 + 9 = 10 cfs	10	8	2	6.00	(2)-5' Type "CM2"	0.33	5.00	1.65
Section 16	12-G4 + $Q_{by\text{-}Sec116B}$ = 1 + 2 = 3 cfs	3	3	0	6.00	(2)-7.5' Type "CM2"	0.27	4.33	1.2
Section 17	12-H1 = 8 cfs	8	8	0	2.72	(2)-12.5' Type "CM2"	0.34	3.50	1.19
Section 18	12-I1 + 12-I2A + 12-I2B = 12 + 3 + 2 = 17 cfs	17	0	17	1.78	N/A	0.44	3.56	1.57
Section 19	12-J1 + 12-J2 = 12 + 1 = 13 cfs	13	0	13	2.35	N/A	0.39	3.72	1.45
Sump - Section 18 and 19	12-I + 12-J = 17 + 13 = 30 cfs	30	30	0	SUMP	(2)-10' Type "CM2"	0.50	-	-
Section 20	12-K1 = 10 cfs	10	0	10	1.21	N/A	0.40	2.70	1.08
Sump - Section 20	12-N + 12-M1 + 12-M2 + 12-J1 + 12J2 = 12 + 5 + 2 + 12 + 1 = 32 cfs	32	32	0	SUMP	(2)-10' Type "CM2"	0.50	-	-
Section 21	12-N + 12-M1 + 12-M2= 12 + 5 +2 = 19 cfs	19	0	19	0.50	N/A	0.54	2.39	1.29
Subbasin 12-H2	12-H2 = 4 cfs	4	4	0	SUMP	NDOT Type 2	0.49	-	-
Subbasin 12-K2	12-K2 = 3 cfs	3	3	0	SUMP	NDOT Type 2	0.40	-	-

% COMPLETE

DATE:
CDW APP
DATE
ACEN APP
DATE
DESCRIPTION
REV DATE

PROJECT NO. 764-204-013
DESIGN:
DRAWN:
CHECK:
PLOT DATE: 04-04-16
PLOT TIME: 10:59:22

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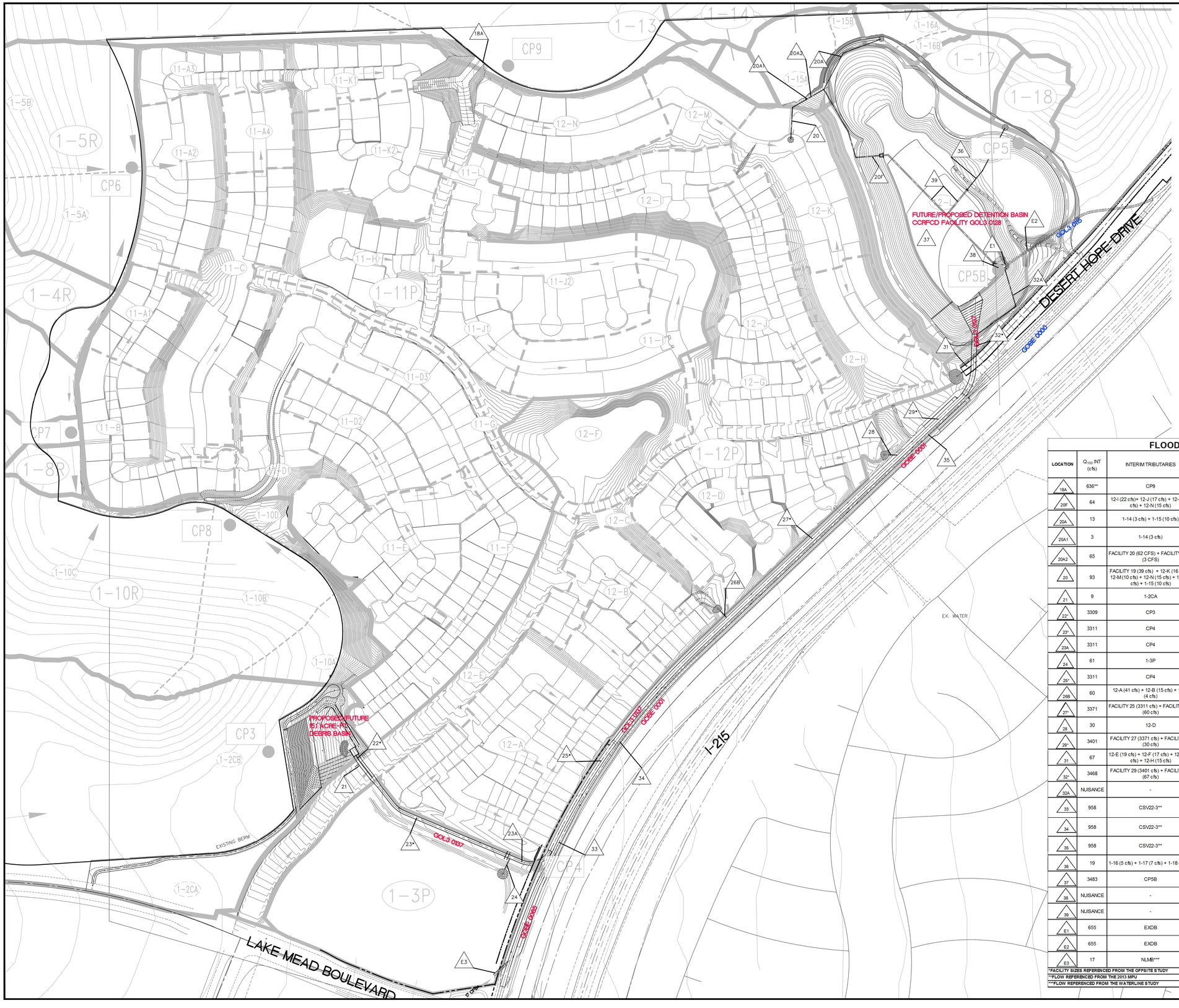
F:\Projects\700\764-204-013\Division\Exh\Figures\RTC-PHASE 1\Fig 6R-ULTIMATE CONDITIONS DRAINAGE MAP.dwg
David Dork

PULTE HOMES
SUMMERLIN VILLAGE 26 - REVERENCE
PHASE 1

ULTIMATE CONDITIONS DRAINAGE MAP

DRAWING
FIG-6R
OF SHTS

LD#:
HTE: 00-00000



NORTH

SCALE 1" = 200'

GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

LEGEND

- 1-18 DRAINAGE BASIN
- 3-E PRORATED DRAINAGE BASIN
- CP3 CONCENTRATION POINT
- BASIN BOUNDARY
- PRORATE BASIN BOUNDARY
- FLOW DIRECTION
- 1 1 STREET CROSS SECTION
- 1 FACILITY IDENTIFIER

*17 CFS REFERENCED FROM THE WATERLINE STUDY

FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} INT (cfs)	INTERIM TRIBUTARIES	Q_{100} ULT (cfs)	ULTIMATE TRIBUTARIES	FACILITY
18A	636**	CP9	536	CP9	60' X 50' Rirpap Outlet Structure D_{50}=18" Thickness=36"
20F	64	12-I (22 cfs)+ 12-J (17 cfs) + 12-M (10 cfs) + 12-N (15 cfs)	49	12-I (22 cfs)+ 12-J (17 cfs) + 12-M (7 cfs) + 12-N (12 cfs)	36" RCP
20A	13	1-14 (3 cfs) + 1-15 (10 cfs)	-	-	18" RCP
20A1	3	1-14 (3 cfs)	3	1-14 (3 cfs)	STUB FOR PHASE 1 DROP INLET
20A2	65	FACILITY 20 (62 CFS) + FACILITY 20A1 (3 CFS)	63.5	FACILITY 20 (60.5 CFS) + FACILITY 20A1 (3 CFS)	EXISTING 42" RCP
20	93	FACILITY 19 (39 cfs) + 12-K (16 cfs) + 12-M (10 cfs) + 12-N (15 cfs) + 1-14 (3 cfs) + 1-15 (10 cfs)	62	FACILITY 19 (30 cfs) + 12-K (13 cfs) + 12-M (7 cfs) + 12-N (12 cfs)	42" RCP W/ 5.5' DEEP SUMP. 12" RIPRAP 5.5' HIGH
21	9	1-2CA	9	1-2CA	24" RCP
22*	3309	CP3	3309	CP3	20'X14' RCB
23*	3311	CP4	3311	CP4	14'X14' RCB (CCRFCD FACILITY GOL3)
23A	3311	CP4	3311	CP4	14'X14' RCB (CCRFCD FACILITY GOL3)
24	61	1-3P	63	1-3P	48" RCP W/ 6' DEEP SUMP. 12" RIPRAP 4' HIGH
25*	3311	CP4	3311	CP4	20' X 7.5' CONCRETE CHANNEL (CCRFCD FACILITY GOL3)
26B	60	12-A (41 cfs) + 12-B (15 cfs) + 12-C (4 cfs)	47	FACILITY 26A (33 cfs) + 12-B (11 cfs) + 12-C (3 cfs)	42" RCP W/ 5.5' DEEP SUMP. 12" RIPRAP 4' HIGH
27*	3371	FACILITY 25 (3311 cfs) + FACILITY 26B (60 cfs)	3358	FACILITY 25 (3311 cfs) + FACILITY 26B (47 cfs)	20' X 7.5' CONCRETE CHANNEL (CCRFCD FACILITY 0137)
28	30	12-D	24	12-D	36" RCP W/ 5' DEEP SUMP. 12" RIPRAP 6' HIGH
29*	3401	FACILITY 27 (3371 cfs) + FACILITY 28 (30 cfs)	3382	FACILITY 27 (3358 cfs) + FACILITY 28 (24 cfs)	20' X 7.5' CONCRETE CHANNEL (CCRFCD FACILITY 0137)
31	67	12-E (19 cfs) + 12-F (17 cfs) + 12-G (16 cfs) + 12-H (15 cfs)	54	12-E (15 cfs) + FACILITY 30 (14 cfs) + 12-G (13 cfs) + FACILITY 30A (12 cfs)	36" RCP
32*	3468	FACILITY 29 (3401 cfs) + FACILITY 31 (67 cfs)	3436	FACILITY 29 (3382 cfs) + FACILITY 31 (54 cfs)	20'X7' RCB
32A	NUISANCE	-	NUISANCE	-	36" RCP
33	958	CSV22-3**	958	CSV22-3**	17'W 7.5'-9'D CONCRETE CHANNEL (EX CCRFCD FACILITY GOBE 0065)
34	958	CSV22-3**	958	CSV22-3**	15'W 7.5'D CONCRETE CHANNEL (EX CCRFCD FACILITY GOBE 0001)
35	958	CSV22-3**	958	CSV22-3**	11'W 6.8'D CONCRETE CHANNEL (EX CCRFCD FACILITY GOBE 0001)
36	19	1-16 (5 cfs) + 1-17 (7 cfs) + 1-18 (7 cfs)	19	1-16 (5 cfs) + 1-17 (7 cfs) + 1-18 (7 cfs)	30" RCP
37	3483	CP5B	3464	CP5B	MODIFIED DETENTION BASIN
38	NUISANCE	-	NUISANCE	-	WATER QUALITY FEATURE
39	NUISANCE	-	NUISANCE	-	6' WIDE LOW FLOW U-CHANNELS
E1	655	EXDB	653	EXDB	EXISTING 65" ORIFICE PLATE
E2	655	EXDB	653	EXDB	EXISTING 96" OUTFALL PIPE (EX CCRFCD FACILITY GOL3 0115)
E3	17	NLMB***	-	-	EXISTING 8'X5' RCB TO BE REMOVED AND REPLACED

*FACILITY SIZES REFERENCED FROM THE OFFSITE STUDY

**FLOW REFERENCED FROM THE 2013 MPU

***FLOW REFERENCED FROM THE WATERLINE STUDY

LDP#:

HTE: 00-00000

% COMPLETE

DATE:	GCW APP	DATE	AGEN APP	DATE	DESCRIPTION	REV	DATE

PROJECT NO. 764-201-013

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DRAWN:

CHECK:

PLOT DATE: 03-17-16

PLOT TIME: 14:20:09

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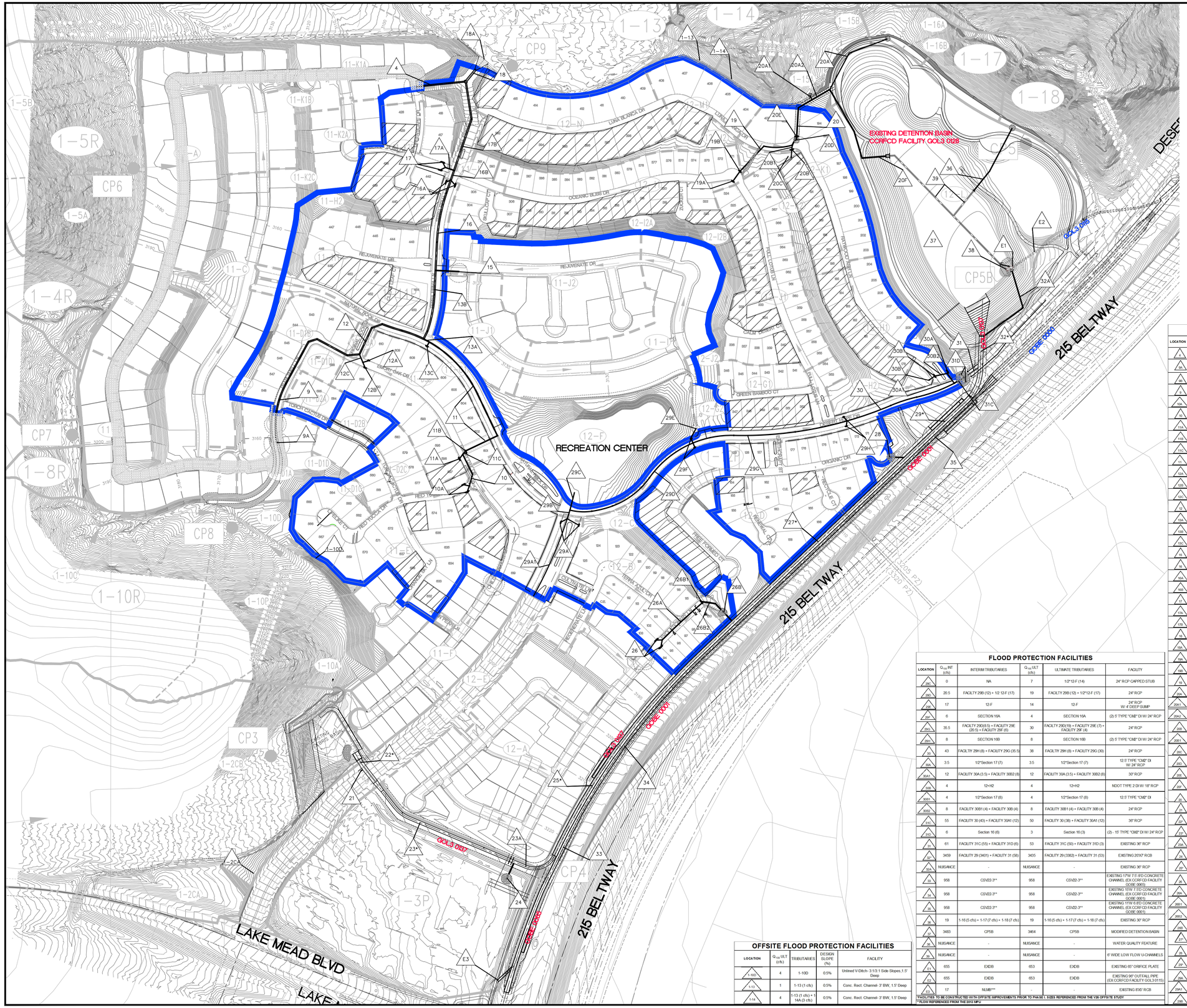
Nelson Boggs

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
OFFSITE DRAINAGE IMPROVEMENTS

FACILITIES MAP

DRAWING
FIG-6R
OF SHTS



GRAPHIC SCALE

200 0 100 200

(IN FEET)

1 inch = 200 ft.

NORTH

SCALE 1" = 200'

LEGEND

- DRAINAGE BASIN
- ⊠RORATED DRAINAGE BASIN
- ⊠ON⊠ ENTRATION ⊠OINT
- BASIN BO⊠ NDAR⊠
- ⊠RORATE BASIN BO⊠ NDAR⊠
- FLOW DIRE⊠ TION
- STREET ⊠ ROSS SE⊠ TION
- FA⊠ ILIT⊠ IDENTIFIER
- ⊠⊠ ASE BO⊠ NDAR⊠
- FLOOD ⊠ ROTE⊠ TED W⊠SOLID GRO⊠ TED ⊠NEEWALL

FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} INT (cfs)	INTERMTRIBUTARIES	Q_{100} ULT (cfs)	ULTIMATE TRIBUTARIES	FACILITY
4	227	FACILITY 1* (163) + FACILITY 2* (21 (5)) + 11-A (30) + 11-K1 (13)	214	FACILITY 1* (163) + FACILITY 2* (21 (5)) + 11-A (30) + 11-K1 (13)	66" RCP W/ SUMP
18	214	CP7 (79) + CP9 (106) + 11-B (17) + 11-DA (9) + 11-DD (2) + 11-D1C (1)	195	CP7 (79) + 1-8R (5) + 1-10C (66) + 1-10B (21) + 1-10D (4) + 11-D1A(4) + 11-DSC(1)	66" RCP W/ SUMP
19	214	FACILITY 9A* (214)	195	FACILITY 9A (195)	66" RCP
20	214	FACILITY 9A* (214)	195	FACILITY 9A (195)	66" RCP
20A	24	SECTION 5 (24)	24	SECTION 5 (24)	(2) - 15' TYPE "CMP, DI WITH 24" RCP
20A2	24	FACILITY 10A (24)	24	11-E (17 cfs) + 1-10A (10)	30" RCP
11A	9	1/2*SECTION 6 (18)	9	1/2*SECTION 6 (18)	12.5' TYPE "CMP, DI W/ 24" RCP
11B	9	1/2*SECTION 6 (18)	9	1/2*SECTION 6 (18)	12.5' TYPE "CMP, DI W/ 30" RCP
11	33	FACILITY 10 (26) + FACILITY 11A (9)	33	FACILITY 10 (26) + FACILITY 11A (9)	36" RCP
11	42	FACILITY 10 (33) + 11-F (9)	42	FACILITY 10 (27) + 11-F (18)	36" RCP
11A	11	SECTION 6/A	7	SECTION 6/A	7.5' TYPE "CMP, DI W/ 24" RCP
11C	21	SECTION 6/A5	18	SECTION 6A5	12.5' TYPE "CMP, DI W/ 24" RCP
12A	32	FACILITY 12A (11) + FACILITY 12B (21)	29	FACILITY 12A (11) + FACILITY 12B (18)	24" RCP
12	246	FACILITY 9 (214) + FACILITY 12C (32)	224	FACILITY 9 (195) + FACILITY 12C (29)	66" RCP
13	52	SECTION 4A (10) + FACILITY 11 (42)	52	SECTION 5A (9) + FACILITY 11 (42)	30" RCP
13A	298	FACILITY 13A (52) + FACILITY 12 (246)	276	FACILITY 13A (52) + FACILITY 12 (224)	72" RCP
13B	10	SECTION 4A (10)	10	SECTION 4A (10)	10' TYPE "CMP, DI W/ 24" RCP
13C	50	11-I (20) + 11-J1 (9) + 11-J2 (21)	35	11-I (14) + 11-J1 (6) + 11-J2 (15 cfs)	42" RCP W/ 5' DEEP SUMP
15	348	FACILITY 13B (296) + FACILITY 15 (50)	311	FACILITY 13B (276) + FACILITY 15 (35)	72" RCP
16A	19	SECTION 7 (19)	19	SECTION 7 (19)	(2) - 15' TYPE "CMP, DI WITH 24" RCP
16B	367	FACILITY 16A (19) + FACILITY 16 (348)	330	FACILITY 16A (19) + FACILITY 16 (311)	72" RCP
17	21	SECTION 9B (21)	15	SECTION 9B (15)	(2) - 15' TYPE "CMP, DI WITH 24" RCP
17A	21	FACILITY 17 (21)	15	FACILITY 17 (15)	30" RCP
17B	388	FACILITY 16B (367) + FACILITY 17A (21)	345	FACILITY 16B (330 + FACILITY 17A (15)	72" RCP
9	636**	CP9	536	CP9	8'X6' RCB
19A	636**	CP9	536	CP9	60' LONG OUTLET CHANNEL
19B	15	1/2*SECTION 18 (17) + 1/2 SECTION 19 (13)	15	1/2 SECTION 18 (17) + 1/2 SECTION 19 (13)	10' TYPE "CMP, DI W/ 24" RCP
19B	15	1/2*SECTION 18 (17) + 1/2*SECTION 19 (13)	15	1/2*SECTION 18 (17) + 1/2*SECTION 19 (13)	10' TYPE "CMP, DI W/ 30" RCP
19A	30	FACILITY 19A (15) + FACILITY 19B (15)	30	FACILITY 19A (15) + FACILITY 19B (15)	36" RCP
20A	10	1-15 (10)	10	1-15 (10)	EXISTING 18" RCP
20A1	3	1-14 (3)	3	1-14 (3)	NDOT TYPE 2 DI W/ 18" RCP
20A2	65	FACILITY 20 (62) + FACILITY 20A1 (3)	63.5	FACILITY 20 (60.5) + FACILITY 20A1 (3)	EXISTING 42" RCP
20B	15	1/2*12-K1 (10) + 1/2*SECTION 21 (20)	14.5	1/2*12-K1 (10) + 1/2*SECTION 21 (19)	10' TYPE "CMP, DI W/ 24" RCP
20B1	17	FACILITY 20B (15) + FACILITY 20C (2)	16.5	FACILITY 20B (14.5) + FACILITY 20C (2)	24" RCP
20C	2	12-K2	2	12-K2	NDOT TYPE 2 DI W/ 24" RCP
20D	47	FACILITY 19 (30) + FACILITY 20B1 (17)	46	FACILITY 19 (29.5) + FACILITY 20B1 (16.5)	42" RCP
20E	15	1/2*12-K1 (10) + 1/2*SECTION 21 (20)	14.5	1/2*12-K1 (10) + 1/2*SECTION 21 (19)	10' TYPE "CMP, DI W/ 42" RCP
20F	75	FACILITY 20AZ (65) + FACILITY 20A (10)	73.5	FACILITY 20 (63.5) + FACILITY 20A (10)	EXISTING 42" RCP
21	62	FACILITY 20D (47) + FACILITY 20E (15)	60.5	FACILITY 20D (45) + FACILITY 20E (14.5)	EXISTING 42" RCP
21	9	1-2CA	9	1-2CA	EXISTING 24" RCP
22*	3309	CP3	3309	CP3	EXISTING 20'X5'4" RCB
23	3311	CP4	3311	CP4	EXISTING 14'X5'4" RCB (EX.CCRFCD FACILITY GOL3 0137)
23A	3311	CP4	3311	CP4	EXISTING 14'X5'4" RCB (EX.CCRFCD FACILITY GOL3 0137)
24	61	1-3P	63	1-3P	EXISTING 48" RCP W/ 6' DEEP SUMP, 12" RIPRAP 4' HIGH
25	3311	CP4	3311	CP4	EXISTING 20' X 7.5' CONCRETE CHANNEL (EX.CCRFCD FACILITY GOL3 0137)
26	29	SECTION 12	29	SECTION 12	(2) - 17.5' TYPE "CMP, DI W/ 24" RCP
26A	29	FACILITY 26	29	FACILITY 26A (33 cfs) + 12-B (11 cfs) + 12-C (3 cfs)	24" RCP
26B1	25	SECTION 13	15	SECTION 13	12.5' TYPE "CMP, DI W/ 24" RCP
26B2	54	FACILITY 26A (29) + FACILITY 26B1 (15)	44	FACILITY 26A (29) + FACILITY 26B1 (15)	30" RCP
26B	57	FACILITY 26B2 (54) + 12-C (3)	47	FACILITY 26B2 (44) + 12-C (3)	EXISTING 42" RCP
27	3371	FACILITY 25 (3311 cfs) + FACILITY 26B (60 cfs)	3358	FACILITY 25 (3311 cfs) + FACILITY 26B (47 cfs)	EXISTING 20' X 7.5' CONCRETE CHANNEL (EX.CCRFCD FACILITY GOL3 0137)
28	29	SECTION 14 (26) + 12-C (3)	26	SECTION 14 (23) + 12-C (3)	12.5' TYPE "CMP, DI W/ 36" RCP
29	3397	FACILITY 27 (3371 cfs) + FACILITY 28 (26 cfs)	3381	FACILITY 27 (3358 cfs) + FACILITY 28 (23 cfs)	EXISTING 20' X 7.5' CONCRETE CHANNEL (CCRFCD FACILITY GOL3 0137)
29A	12	SECTION 15 (12)	12	SECTION 15 (12)	(2) - 10' TYPE "CMP, DI W/ 24" RCP
29B1	NUISANCE	-	NUISANCE	-	CAPPED 18" STUB
29B	12	FACILITY 29A (12)	12	FACILITY 29A (12)	24" RCP

OFFSITE FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} ULT (cfs)	TRIBUTARIES	DESIGN SLOPE (%)	FACILITY
1-10D	4	1-10D	0.5%	Unlined V-Ditch- 3:1/3:1 Side Slopes,1.5' Deep
1-13	1	1-13 (1 cfs)	0.5%	Conc. Rect. Channel- 3' BW, 1.5' Deep
1-14	4	1-13 (1 cfs) + 1-14A (3 cfs)	0.5%	Conc. Rect. Channel- 3' BW, 1.5' Deep

FLOOD PROTECTION FACILITIES

LOCATION	Q_{100} INT (cfs)	INTERM TRIBUTARIES	Q_{100} ULT (cfs)	ULTIMATE TRIBUTARIES	FACILITY
20C	0	NA	7	1/2*12-F (14)	24" RCP CAPPED STUB
20D	20.5	FACILITY 29B (12) + 1/2 12-F (17)	19	FACILITY 29B (12) + 1/2*12-F (17)	24" RCP
29B	17	12-F	14	12-F	24" RCP W/ 4' DEEP SUMP
29F	6	SECTION 19A	4	SECTION 19A	(2) 5' TYPE "CMP, DI W/ 24" RCP
29G	35.5	FACILITY 29D(5.5) + FACILITY 29E (29.5) + FACILITY 29F (6)	30	FACILITY 29D(19) + FACILITY 29E (7) + FACILITY 29F (4)	24" RCP
29H1	8	SECTION 19B	8	SECTION 19B	(2) 5' TYPE "CMP, DI W/ 24" RCP
30	43	FACILITY 29H (8) + FACILITY 29G (35.5)	38	FACILITY 29H (8) + FACILITY 29G (30)	24" RCP
30A	3.5	1/2*Section 17 (7)	3.5	1/2*Section 17 (7)	12.5' TYPE "CMP, DI W/ 24" RCP
30A1	12	FACILITY 30A (3.5) + FACILITY 30B2 (8)	12	FACILITY 30A (3.5) + FACILITY 30B2 (8)	30" RCP
30B	4	12-H2	4	12-H2	NDOT TYPE 2 DI W/ 18" RCP
30B1	4	1/2*Section 17 (8)	4	1/2*Section 17 (8)	12.5' TYPE "CMP, DI
30B2	8	FACILITY 30B1 (4) + FACILITY 30B (4)	8	FACILITY 30B1 (4) + FACILITY 30B (4)	24" RCP
31C	55	FACILITY 30 (43) + FACILITY 30A1 (12)	50	FACILITY 30 (38) + FACILITY 30A1 (12)	36" RCP
31D	6	Section 16 (6)	3	Section 16 (3)	(2) - 15' TYPE "CMP, DI W/ 24" RCP
31E	61	FACILITY 31C (55) + FACILITY 31D (6)	53	FACILITY 31C (50) + FACILITY 31D (3)	EXISTING 36" RCP
32*	3459	FACILITY 29 (3401) + FACILITY 31 (58)	3435	FACILITY 29 (3382) + FACILITY 31 (53)	EXISTING 20'X7' RCB
E1	NUISANCE	-	NUISANCE	-	EXISTING 36" RCP
E2	958	CSV22-3**	958	CSV22-3**	EXISTING 17'W 7.5'-9'D CONCRETE CHANNEL (EX.CCRFCD FACILITY GOBE 0005)
E2	958	CSV22-3**	958	CSV22-3**	EXISTING 15'W 7.5'D CONCRETE CHANNEL (EX.CCRFCD FACILITY GOBE 0001)
E2	958	CSV22-3**	958	CSV22-3**	EXISTING 11'W 6.5'D CONCRETE CHANNEL (EX.CCRFCD FACILITY GOBE 0001)
E2	19	1-16 (5 cfs) + 1-17 (7 cfs) + 1-18 (7 cfs)	19	1-16 (5 cfs) + 1-17 (7 cfs) + 1-18 (7 cfs)	EXISTING 30" RCP
E3	3483	CPSB	3464	CPSB	MODIFIED DETENTION BASIN
E3	NUISANCE	-	NUISANCE	-	WATER QUALITY FEATURE
E3	NUISANCE	-	NUISANCE	-	6' WIDE LOW FLOW U-CHANNELS
E3	655	EXDB	653	EXDB	EXISTING 65" ORIFICE PLATE
E3	655	EXDB	653	EXDB	EXISTING 96" OUTFALL PIPE (EX.CCRFCD FACILITY GOL3 0115)
E3	17	NLMB***	-	-	EXISTING 8'X5' RCB

*FACILITIES TO BE CONSTRUCTED WITH OFFSITE IMPROVEMENTS PRIOR TO PHASE 1. SIZES REFERENCED FROM THE V36 OFFSITE STUDY.
**FLOW REFERENCED FROM THE 2015 MFU

% COMPLETE

REV	DATE	DESCRIPTION	DATE	ACEN. APP	DATE	CCW APP	DATE:

PROJECT NO. 764-204-013

DESIGN:
DRAWN:
CHECK:

PLOT DATE: 04-04-16
PLOT TIME: 11:26:01

GCW ENGINEERS\SURVEYORS
1555 S. RAINBOW BLVD.
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F:\Projects\700\764-204-013\Division\Exh\Figures\RTC-PHASE 1\Fig 7R-FACILITIES MAP.dwg
David Clark

PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE PHASE 1

FACILITIES MAP

DRAWING
FIG-7R
OF SHTS

HTE: 00-00000

WESTERN BELTWAY CHANNEL HEC-RAS SECTION SUMMARY TABLE

Sta	ULT Q	FL Elevation	Depth	Vel	Top Width	Froude #	Radius	Freeboard	Super-elevation	Total Depth	Interim Depth	
	(cfs)	(ft)	(ft)	(ft/s)	(ft)			(ft)	(ft)	(ft)	(ft)	Notes
03+84.04	1664	3221.97	4.27	14.62	35.87	1.45	0	1.6	0.0	5.9	4.27	
09+56.12	1664	3219.11	8.02	6.02	50.86	0.46	0	1.1	0.0	9.1	8.02	
10+06.12	1664	3218.36	6.72	12.38	20.00	0.84	0	2.9	0.0	9.6	6.72	
14+06.12	1664	3216.36	7.99	10.42	20.00	0.65	4279	2.2	0.0	10.2	7.99	Exit from RCB Structure
14+07.12	1664	3216.35	8.15	9.73	21.00	0.60	4279	2.0	0.0	10.1	8.15	
15+06.12	1664	3215.58	7.11	13.78	17.00	0.91	4279	3.4	0.0	10.6	7.11	Transition to 17' BW Channel
15+31.61	1692	3215.38	6.75	14.75	17.00	1.00	4279	1.7	0.0	8.5	6.75	Junction
19+56.42	1692	3212	5.13	19.42	17.00	1.51	2992	1.8	0.0	7.0	5.13	Grade Break
20+56.42	1692	3208.24	4.09	24.37	17.00	2.12	2993	2.0	0.1	6.1	4.09	Grade Break
22+22.38	1716	3206.97	4.72	21.41	17.00	1.74	2993	1.9	0.0	6.7	4.72	Transition to 15' BW, Grade Break
22+72.38	1716	3205	5.00	22.88	15.00	1.80	2993	2.0	0.0	7.0	5.00	End Transition
23+27.53	1716	3202.84	4.56	25.11	15.00	2.07	2993	2.0	0.0	6.6	4.56	Transition to 11' BW Channel
24+77.53	1716	3196.94	3.95	28.99	15.00	2.57	2993	2.1	0.1	6.2	3.95	End Transition
25+65.46	1716	3193.48	3.77	30.36	15.00	2.76	2993	2.2	0.1	6.0	3.77	Grade Break
26+26.68	1716	3191.07	5.33	29.29	11.00	2.24	2993	2.3	0.0	7.7	5.33	
27+17.76	1716	3187.48	5.06	30.84	11.00	2.42	2993	2.3	0.1	7.4	5.06	
28+00.00	1716	3182.1	4.61	33.88	11.00	2.78	2993	2.4	0.1	7.1	4.61	
29+00.00	1716	3175.56	4.28	36.44	11.00	3.1	2993	2.5	0.1	6.8	4.28	
30+00.00	1716	3169.03	4.08	38.21	11.00	3.33	0	2.5	0.0	6.6	4.08	
31+50.00	1716	3159.22	3.90	39.98	11.00	3.57	0	2.6	0.0	6.5	3.90	
36+00.00	1716	3129.96	3.69	42.24	11.00	3.87	0	2.6	0.0	6.3	3.69	
40+00.00	1716	3103.96	3.67	42.57	11.00	3.92	0	2.6	0.0	6.3	3.67	Grade Break
44+00.00	1716	3077.96	3.66	42.65	11.00	3.93	0	2.6	0.0	6.3	3.66	Beginning of Transition
47+71.98	1769	3053.76	3.76	42.76	11.00	3.89	0	2.7	0.0	6.4	3.76	
48+80.88	1769	3047.57	3.83	42.04	11.00	3.79	0	2.6	0.0	6.5	3.83	
49+31.11	1769	3044.82	2.46	42.52	19.49	5.13	0	2.4	0.0	4.9	2.46	End of Transition/Channel

WSPGW MODEL SUMMARY

14' X 14' RCB

Station	Invert (ft)	Flow Depth (ft)	HGL (ft)	Q Total (cfs)	Velocity (fps)	Froude	Facility Description
20+58.06	3208.240	9.91	3218.15	3311.10	23.86	1.34	14' x 14' RCB
19+05.20	3209.410	9.64	3219.05	3311.10	24.52	1.39	14' x 14' RCB
18+52.70	3209.935	9.68	3219.61	3311.10	24.44	1.38	14' x 14' RCB
18+47.70	3209.986	9.66	3219.64	3309.10	24.48	1.39	14' x 14' RCB
13+37.60	3215.170	11.84	3227.01	3309.10	19.96	1.02	14' x 14' RCB
12+61.10	3215.600	11.77	3227.37	3309.10	20.08	1.03	14' x 14' RCB
11+65.71	3216.145	12.02	3228.16	3309.10	19.67	1.00	14' x 14' RCB
11+15.71	3216.430	16.18	3232.61	3309.10	11.82	0.57	DUAL 10' X 14' RCBs
10+42.54	3216.837	16.02	3232.86	3309.10	11.82	0.57	DUAL 10' X 14' RCBs
10+38.41	3216.861	16.01	3232.87	3309.10	11.82	0.57	DUAL 10' X 14' RCBs
10+35.41	3216.878	16.00	3232.88	3309.00	11.82	0.57	DUAL 10' X 14' RCBs
10+05.12	3217.051	16.06	3232.88	3309.00	11.82	0.57	DUAL 10' X 14' RCBs
09+91.35	3217.130	16.02	3233.11	3309.00	11.82	-	WALL ENTRANCE

VILLAGE 26 CHANNEL HEC-RAS SECTION SUMMARY TABLE

Sta	Q	FL Elevation	Depth	Vel	Top Width	Froude #	Radius	Freeboard	Super-elevation	Total Depth	
	(cfs)	(ft)	(ft)	(ft/s)	(ft)			(ft)	(ft)	(ft)	Notes
20+38.06	3311	3208.39	10.52	22.49	14.0	1.22	3000	2.2	0.0	12.8	
20+58.05	3311	3208.25	10.56	22.40	14.0	1.22	3000	2.2	0.0	12.8	Beginning of 20' Wide Rect. Channel
20+58.06	3311	3208.24	10.53	22.46	20.0	1.22	3000	2.2	0.1	12.8	
20+70.06	3311	3208.15	5.95	27.84	20.0	2.01	3000	2.3	0.1	8.3	End of Ineffective Flow
20+83.06	3311	3208.05	5.99	27.64	20.0	1.99	3000	2.3	0.1	8.3	Drop Channel Height to 9 feet
22+25.20	3311	3206.98	6.42	25.79	20.0	1.79	3000	2.2	0.1	8.7	Grade Break
23+61.30	3311	3201.65	5.44	30.41	20.0	2.30	3000	2.3	0.1	7.9	Drop Channel Height to 8 feet
25+69.80	3311	3193.50	4.81	34.42	20.0	2.77	3000	2.5	0.1	7.4	
26+22.97	3311	3191.41	4.29	35.41	21.8	3.01	3000	2.4	0.1	6.9	
26+33.22	3311	3191.03	4.74	34.96	20.0	2.83	0	2.5	0.0	7.2	
27+23.72	3311	3187.48	4.60	35.96	20.0	2.95	0	2.5	0.0	7.1	Drop Channel Height to 6.8 feet, GB
30+00.00	3311	3169.52	3.90	42.49	20.0	3.79	0	2.7	0.0	6.6	
32+00.00	3311	3156.52	3.71	44.63	20.0	4.08	0	2.7	0.0	6.4	
33+85.00	3371	3144.50	3.68	45.79	20.0	4.21	0	2.8	0.0	6.4	
34+00.00	3371	3143.52	3.67	45.88	20.0	4.22	0	2.8	0.0	6.4	
36+00.00	3371	3130.51	3.61	46.69	20.0	4.33	0	2.8	0.0	6.4	
38+00.00	3371	3117.51	3.57	47.16	20.0	4.4	0	2.8	0.0	6.4	
40+00.00	3371	3104.51	3.55	47.44	20.0	4.43	0	2.8	0.0	6.4	
42+00.00	3371	3091.51	3.54	47.6	20.0	4.46	0	2.8	0.0	6.4	
44+00.00	3371	3078.51	3.53	47.69	20.0	4.47	0	2.8	0.0	6.3	
44+49.18	3401	3075.31	3.57	47.7	20.0	4.45	0	2.8	0.0	6.4	
46+00.00	3401	3065.51	3.56	47.78	20.0	4.46	0	2.8	0.0	6.4	
47+80.33	3401	3053.79	3.55	47.85	20	4.47	0	2.8	0.00	6.4	Grade Break
48+25.86	3401	3048.2	3.44	49.43	20	4.7	0	2.9	0.00	6.3	Beginning of 20'x7' RCB

DETENTION BASIN INFLOW HEC-RAS SECTION SUMMARY TABLE

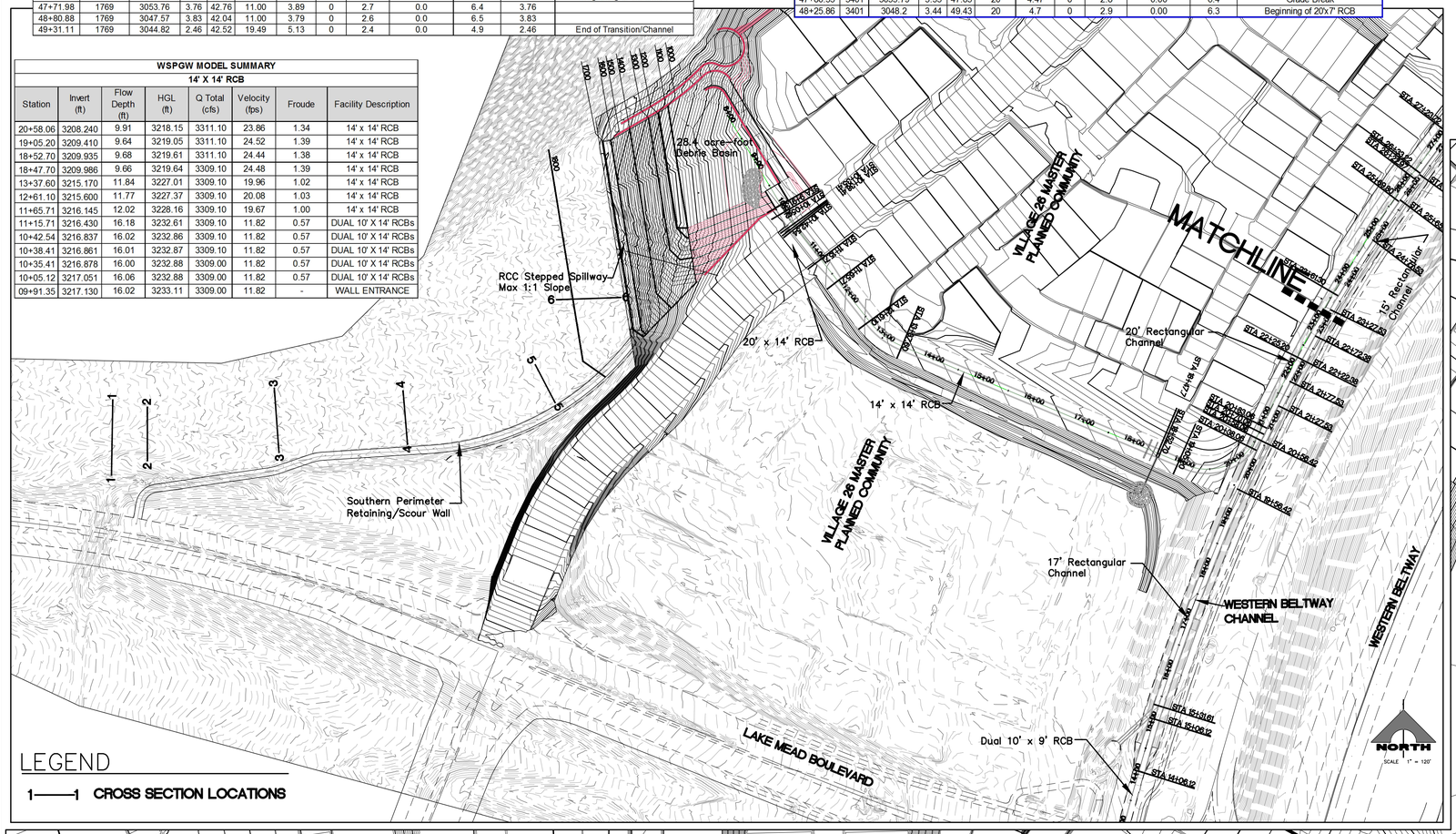
Sta	Q	Min Ch El	W.S. Elev	Depth	Vel	Top Width	Froude #	Freeboard	Total Depth	
	(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)	(ft)	Notes
1600	3493	3023.20	3026.78	3.58	48.78	20.0	4.54	2.9	6.4	Outlet of RCB
1500	3493	3022.70	3024.87	2.17	48.16	33.4	5.76	2.6	4.7	Top of First Step
1400	3493	3012.70	3014.82	2.12	28.94	57.0	3.50	1.9	4.0	Grade Break
1300	3493	2995.20	2997.01	1.81	17.22	112.0	2.26	1.5	3.3	Top of Bottom Step
1200	3493	2992.80	2994.26	1.46	21.32	112.0	3.11	1.6	3.1	Toe of Bottom Step
1100	3493	2992.00	2998.38	6.38	5.13	112.0	0.37	1.0	7.4	End of Stilling Basin
1000	3493	2994.00	2997.11	3.11	10.04	112.0	1.00	1.4	4.5	Top of sill

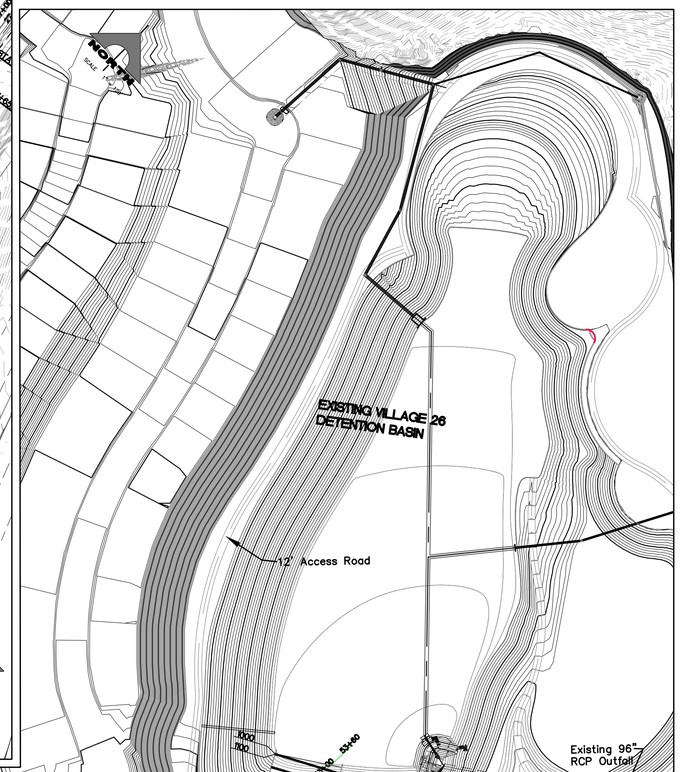
DEBRIS BASIN INFLOW HEC-RAS SECTION SUMMARY TABLE

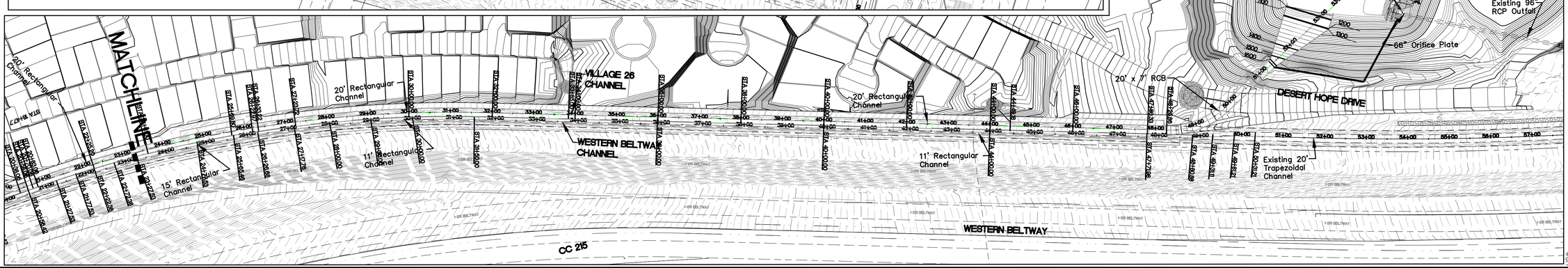
Sta	Q	Min Ch El	W.S. Elev	Depth	Vel	Top Width	Froude #	Freeboard	Total Depth	
	(cfs)	(ft)	(ft)	(ft)	(ft/s)	(ft)		(ft)	(ft)	Notes
1800	3503	3290.80	3294.07	3.27	11.79	243.6	1.88	1.4	4.7	Upstream Section
1700	3503	3286.00	3287.85	1.85	18.08	149.7	2.80	1.6	3.4	Top of Wall
1600	3503	3286.30	3286.90	0.60	19.51	300.0	4.45	1.4	2.0	Edge of Access Road
1500	3503	3286.00	3286.80	0.80	12.01	364.0	2.36	1.3	2.1	Top of Spillway
1400	3503	3261.00	3262.47	1.47	6.92	345.0	1.01	1.2	2.7	Stepped Spillway
1300	3503	3236.00	3237.20	1.20	9.88	295.0	1.59	1.3	2.5	Stepped Spillway
1200	3503	3223.50	3225.31	1.81	7.93	244.0	1.04	1.2	3.1	Top of Bottom Step
1100	3503	3221.00	3221.96	0.96	15.72	233.0	2.83	1.4	2.3	Toe of Spillway
1000	3503	3220.90	3221.99	1.09	14.09	228.0	2.38	1.4	2.5	Edge of Concrete Pad

FLO-2D SECTION SUMMARY TABLE

Section	Q	Depth	Vel	Top Width	Froude #	Freeboard	Total Depth	
	(cfs)	(ft)	(ft/s)	(ft)		(ft)	(ft)	Notes
1	318	1.70	8.60	140.0	1.16	1.3	3.0	Use 3.0 feet above grade
2	365	1.80	10.40	100.0	1.37	1.3	3.1	Use 3.0 feet above grade
3	447	1.70	10.00	120.0	1.35	1.3	3.0	Use 3.0 feet above grade
4	447	0.70	5.90	100.0	1.24	1.1	1.8	Use 3.0 feet above grade
5	447	0.80	5.80	80.0	1.14	1.1	1.9	Use 3.0 feet above grade
6	2008	6.60	24.20	120.0	1.66	2.1	8.7	Use 15.0 feet above grade







PULTE HOMES

SUMMERLIN VILLAGE 26 - REVERENCE
OFFSITE DRAINAGE IMPROVEMENTS

HYDRAULIC CROSS SECTION MAP

DRAWING FIG-5AUR

OF SHTS

PROJECT NO. 764-201-013

DESIGN:
DRAWN:
CHECK:
PLOT DATE: 03-17-16
PLOT TIME: 09:19:59

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F:\Projects\700\764-204-013\Division\Civil\Figures\RTC-OFFSITES\Fig 5AUR.dwg
Nelson Boggs

DATE: | GCW APP | DATE | AGEN APP | DATE | DESCRIPTION | REV | DATE

% COMPLETE

HTE: 00-00000



NORTH

SCALE 1" = 300'

GRAPHIC SCALE

300 0 150 300

(IN FEET)

1 inch = 300 ft.

LEGEND

- 1-3P — DRAINAGE BASIN
- 3-E — ⊠RORATED DRAINAGE BASIN
- CP3 ● — ⊠ON⊠ENTRATION ⊠OINT
- BASIN BO⊠NDAR⊠
- ⊠RORATE BASIN BO⊠NDAR⊠
- FLOW DIRE⊠TION
- 1 1 — STREET ⊠ROSS SE⊠TION

SUMMARY OF INTERIM CONDITIONS HEC-1 MODEL

SB OR CP	AREA (AC)	100 YR (CFS)	25 YR (CFS)	10 YR (CFS)
1-1A	1497.2	2289	1477	942
1-1B	111.8	226	115	63
CP1	-	2404	1549	986
1-2A	552.7	1541	938	608
1-2B	137.7	315	173	103
CP2	-	2941	1914	1209
1-2CR	367.6	859	503	313
CP3	-	3309	2171	1365
1-3P	16.5	61	40	29
CP4	-	3311	2179	1368
1-12P	116.1	291	181	124
CP5	-	3483	2295	1443
1-14	1.0	3	2	1
1-15	3.6	10	6	4
1-16	1.9	5	3	2
1-17	2.5	7	4	2
1-18	2.4	7	4	2
CP5B	-	3493	2302	1448
EXDB	-	663	561	461
1-4R	34.3	100	58	37
1-5R	22	63	37	24
CP6	-	163	95	61
1-6R	9.7	28	16	11
1-7R	17.3	50	30	19
CP7	-	79	46	29
1-8R	1.6	5	3	2
1-10R	35.6	101	59	38
CP8	-	106	62	39
1-11P	113.6	311	193	132
CP9	-	636	391	261
1-13	0.5	1	1	1
LMT1R	1256.6	1966	1267	821
CP10	-	2224	1456	945

Label	Channel Slope (%)	Discharge (ft³/s)	Normal Depth (ft)	Velocity (ft/s)	Bottom Width (ft)	Type	Side Slopes	Lining D50 (in)	Min Depth (ft)	Tributary
Cross Section 1	3.64	108	0.48	4.30	51	Trap	2:1	12	1.00	1-4R + 11-A1
Cross Section 2	0.53	189	1.20	2.96	5	Trap	1:1	12	1.50	CP6 + 11-A1 + 11-A2
Cross Section 2A	6.00	199	0.62	6.17	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3
Cross Section 3	6.00	235	0.68	6.58	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-C
Cross Section 4	0.50	36	0.34	2.04	51	Trap	2:1	Earth	1.00	11-C + 11-A4
Cross Section 5	5.00	96	0.41	4.52	51	Trap	2:1	12	1.00	CP7 + 11-B
Cross Section 5A	4.87	299	0.76	6.39	61	Trap	1:1	12	1.00	CP7 + CP8 + 11-B + 11-D1 + 11-D2 +11-D3 11-E + 11-F
Cross Section 6	4.49	247	0.77	6.13	51	Trap	2:1	18	1.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-A4 + 11-C + 11-K1
Cross Section 6A	21.51	247	0.52	9.32	50	Trap	2:1	36	2.00	CP6 + 11-A1 + 11-A2 + 11-A3 + 11-A4 + 11-C + 11-K1
Cross Section 6B	0.60	636	2.65	4.35	50	Trap	2:1	36	4.00	CP9
Cross Section 7	3.45	21	0.13	2.77	61	Trap	1:1	Earth	1.00	11-K2
Cross Section 8	4.75	27	0.15	3.59	51	Trap	2:1	Earth	1.00	11-H
Cross Section 9	0.98	233	1.13	3.87	51	Trap	2:1	12	1.50	CP7 + CP8 + 11-B + 11-D1 +11-D2
Cross Section 9A	2.98	12	0.10	2.26	51	Trap	2:1	Earth	1.00	11-D2
Cross Section 10	3.65	25	0.15	3.22	51	Trap	2:1	Earth	1.00	11-E
Cross Section 10A	4.99	25	0.14	3.53	51	Trap	2:1	Earth	1.00	11-E
Cross Section 11	4.90	50	0.21	4.63	51	Trap	2:1	Earth	1.00	11-E + 11F
Cross Section 12	2.35	66	0.31	4.13	51	Trap	2:1	Earth	1.00	11-E + 11F + 11-D3
Cross Section 13	0.50	41	0.37	2.14	51	Trap	2:1	Earth	1.00	11-I + 11-J2
Cross Section 13A	2.35	9	0.09	1.87	51	Trap	2:1	Earth	1.00	11-J1
Cross Section 14	4.29	15	0.11	2.75	51	Trap	2:1	Earth	1.00	12-N
Cross Section 15	12.12	412	0.79	9.21	55	Trap	2:1	36	2.00	SEC5A + 11-K2 + 11-J1 + 11-J2 + 11-I + 11-H + 11-L + 11-G
Cross Section 15A	6.50	412	1.00	7.80	83	Trap	1:1	24	1.00	SEC5A + 11-K2 + 11-J1 + 11-J2 + 11-I + 11-H + 11-L + 11-G
Cross Section 15B	5.67	382	1.05	7.74	51	Trap	2:1	30	1.50	SEC5A + 11-J1 + 11-J2 + 11-I + 11-H + 11-G
Cross Section 15C	3.39	382	1.16	6.99	51	Trap	2:1	24	1.50	SEC5A + 11-J1 + 11-J2 + 11-I + 11-H + 11-G
Cross Section 15D	3.27	305	1.02	6.33	46	Trap	1:1	12	1.50	SEC5A + 11-G
Cross Section 16	0.50	25	0.28	1.76	51	Trap	2:1	Earth	1.00	12-N + 12-M
Cross Section 17	1.22	16	0.16	1.93	51	Trap	2:1	Earth	1.00	12-K
Cross Section 18	5.03	39	0.18	4.23	51	Trap	2:1	Earth	1.00	12-I + 12-J
Cross Section 18A	5.58	39	0.87	6.65	5	Trap	2:1	12	1.00	12-I + 12-J
Cross Section 19	0.55	15	0.20	1.48	51	Trap	2:1	Earth	1.00	12-H
Cross Section 20	5.22	41	0.18	4.36	51	Trap	2:1	Earth	1.00	12-A
Cross Section 20A	5.21	56	0.22	4.93	51	Trap	2:1	Earth	1.00	12-A + 12-B
Cross Section 21	6.08	30	0.14	4.04	51	Trap	2:1	Earth	1.00	12-D
Cross Section 22	4.99	30	0.15	3.80	51	Trap	2:1	Earth	1.00	12-D
Cross Section 23	4.63	19	0.09	2.56	83	Trap	1:1	Earth	1.00	12-E
Cross Section 24	5.97	67	0.25	5.75	46	Trap	1:1	Earth	1.00	12-E + 12-F + 12-G + 12+H
Cross Section 25	22.20	31	0.20	5.90	26	Trap	2:1	12	1.00	LMT1RB
Cross Section 26	7.95	75	0.36	5.26	39	Trap	1:1	12	1.00	Referenced From the WB Study
Cross Section 27	0.40	106	1.42	4.20	15	Trap	2:1	Earth	4.50	CP8

ONSITE PRORATED FLOW SUMMARY

Subbasin	Q_{100} (cfs)	New Area	cfs/acre
1-11P	311	113.6*	2.74
1-12P	291	116.1*	2.51

Onsite Prorated Basins

Subbasin	Q_{100} (cfs)	New Area (acres)	cfs/acre
11-A1	8	3.0	2.74
11-A2	18	6.5	2.74
11-A3	10	3.5	2.74
11-A4	7	2.5	2.74
11-B	17	6.3	2.74
11-C	29	10.7	2.74
11-D1	19	6.9	2.74
11-D2	12	4.3	2.74
11-D3	16	5.9	2.74
11-E	25	9.0	2.74
11-F	25	9.2	2.74
11-G	6	2.3	2.74
11-H	27	9.7	2.74
11-I	20	7.4	2.74
11-J1	9	3.3	2.74
11-J2	21	7.5	2.74
11-K1	13	4.6	2.74
11-K2	21	7.6	2.74
11-L	9	3.4	2.74
Total	**311**	**113.6***	**N/A**
12-A	41	16.5	2.51
12-B	15	5.8	2.51
12-C	4	1.7	2.51
12-D	30	12.0	2.51
12-E	19	7.4	2.51
12-F	17	7.0	2.51
12-G	16	6.6	2.51
12-H	15	5.9	2.51
12-I	22	8.8	2.51
12-J	17	6.7	2.51
12-K	16	6.4	2.51
12-L	54	21.5	2.51
12-M	10	3.8	2.51
12-N	15	6.0	2.51
TOTAL	**291**	**116.1***	**N/A**

*Revised from Previous Submittal

% COMPLETE

REV	DATE	DESCRIPTION	DATE	ACSN APP	DATE	CCW APP	DATE

PROJECT NO. 764-201-013

DESIGN:
DRAWN:
CHECK:

PLOT DATE: 03-17-16
PLOT TIME: 12:14:55

F:\Projects\700\764-201-013\Division\Civil\Figures\RTC-OFFSITES\Fig -5R.dwg
Michelle Castell

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PULTE HOMES

SUMMERLIN VILLAGE 26 – REVERENCE
OFFSITE DRAINAGE IMPROVEMENTS

INTERIM CONDITIONS DRAINAGE MAP

DRAWING
FIG-5R
OF SHTS

LD #:

HTE: 00-00000