NOTES

1. GENERAL UTILITY NOTES PROVIDED ON SHEET C2.
2. SANITARY SEWER MANHOLE, STORM SEWER STRUCTURE AND DRY CREEK DITCH NO. 2 STRUCTURE INFORMATION PROVIDED ON SHEET C2.
3. REFER TO TYPICAL RESIDENTIAL STREET DETAIL PROVIDED ON SHEET C2 FOR ADDITIONAL UTILITY LAYOUT AND EASEMENTS INFORMATION.
3. REFER TO TYPICAL RESIDENTIAL ACCESS STREET DETAIL PROVIDED ON SHEET C2 FOR ADDITIONAL UTILITY LAYOUT AND EASEMENTS INFORMATION.
4. REFER TO INTERSECTION BULB-OUT DETAIL PROVIDED ON SHEET C2 FOR ADDITIONAL EASEMENT AND ROADWAY DESIGN INFORMATION.

60 30 0 60 120

SCALE: 1"=60'

LEGEND

- PROPERTY LINE
- EASEMENT
- EX. EASEMENT
- RIGHT-OF-WAY
- EX. FENCES
- EX. STORM SEWER
- EX. SANITARY SEWER
- EX. WATER LINE
- EX. NATURAL GAS LINE
- EX. FIBER OPTIC LINE
- EX. UNDERGROUND ELECTRICAL TELEPHONE, CABLE TV LINE
- EX. UNDERGROUND ELECTRICAL LINE
- EX. UNDERGROUND TELEPHONE LINE
- EX. LIGHT POLE
- EX. POWER POLE
- EX. GROUND WATER MONITORING WELL
- EX. MANHOLE
- EX. FIRE HYDRANT
- EX. WATER VALVE
- PROPOSED WATER LINE — 8" PVC (TYP.)
- PROPOSED WATER VALVE
- PROPOSED TEE WITH THRUST BLOCKING
- PROPOSED HORIZONTAL BEND WITH THRUST BLOCKING
- PROPOSED FIRE HYDRANT
- PROPOSED FIRE SERVICE — F
- PROPOSED WATER SERVICE — W
- PROPOSED IRRIGATION SERVICE — IRR
- PROPOSED WATER METER
- PROPOSED SANITARY SEWER — 8" PVC (TYP.)
- PROPOSED SANITARY SEWER SERVICE — S
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER MANHOLE DESIGNATOR — 1
- PROPOSED ELECTRICAL LINE — E
- PROPOSED GAS LINE — G
- PROPOSED DRY UTILITIES (GAS, ELECTRIC, TELECOM) — DRY
- PROPOSED CHANNEL/SWALE FLOWLINE
- PROPOSED BUILDING ENTRY AND EXIT
- PROPOSED IRRIGATION PIPE — 30" RCP (TYP.)
- PROPOSED IRRIGATION STRUCTURE
- PROPOSED IRRIGATION STRUCTURE DESIGNATOR — A
- PROPOSED STORM SEWER PIPE
- PROPOSED PRIVATE STORM PIPE
- PROPOSED STORM SEWER MANHOLE
- PROPOSED STORM SEWER CURB INLET
- PROPOSED STORM SEWER GRATED INLET
- PROPOSED STORM STRUCTURE DESIGNATOR — 1
- EX. REGULATED WETLAND
- EX. NON-REGULATED WETLAND
- EX. REGULATED WETLAND WITH PROPOSED ENHANCEMENT
- PROPOSED WETLAND CREATION
- PROPOSED INNER WETLAND BUFFER
- PROPOSED OUTER WETLAND BUFFER
- EX. 100YR FLOOD PLAIN LIMITS
- EX. CONVEYANCE ZONE LIMITS
- EX. TREES
- PROPOSED TREES

CITY OF BOULDER
EAST BOULDER COMMUNITY PARK
AND
RECREATION CENTER

EAST PARCEL
SEE SHT C2

UNINCORPORATED BOULDER COUNTY

1006UP

PREPARED BY:

The Sanitas Group
1022 WILLOW PLACE
LOUISVILLE, CO 80027
303.981.9238
PROJECT CONTACT:
LESLIE R. EWY, PE

OWNER / DEVELOPER:

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303.949.1322

SITE REVIEW DOCUMENTS FOR:

BOULDER CREEK COMMONS

5399 KEWANEE DRIVE AND 5697 S. BOULDER ROAD
LOCATED IN THE SW¼ OF SECTION 3 AND THE SE¼ OF SECTION 4,
T1S, R70W, 6TH P.M., COUNTY OF BOULDER, STATE OF COLORADO

ISSUE	DATE
SITE REVIEW	06/18/12

DESIGNED BY:	LRE
DRAWN BY:	LRE
CHECKED BY:	CCS

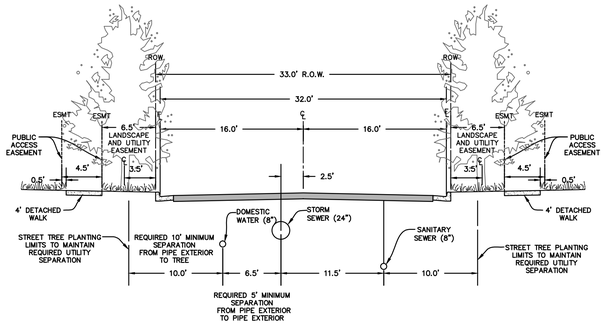
DRAWING SCALE:
HORIZONTAL: 1" = 60'
VERTICAL: NONE

PRELIMINARY
UTILITY PLAN
WEST PARCEL

PROJECT NO. B1006

C1

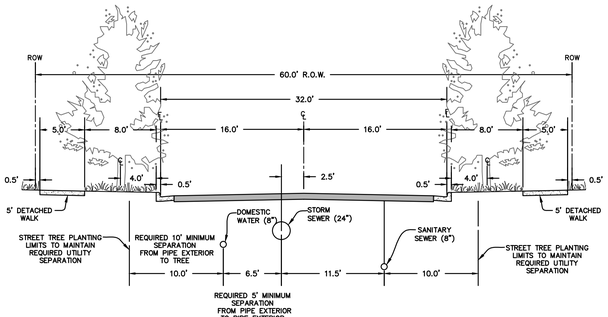
SHEET: 05 OF 30



TYPICAL RESIDENTIAL ACCESS STREET SECTION

(33.0' RIGHT-OF-WAY WIDTH)

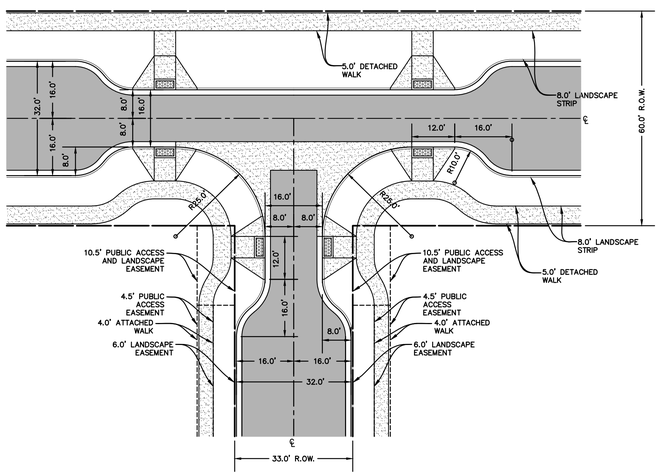
NO SCALE



TYPICAL RESIDENTIAL STREET SECTION

(60.0' RIGHT-OF-WAY WIDTH)

NO SCALE



TYPICAL INTERSECTION BULB-OUT DETAIL

NO SCALE

SANITARY SEWER MANHOLE INFORMATION

Manhole ID	Rim Elevation	Invert Out	Invert In		Invert In	
A	*5316.90*	*5301.29*	*5301.29*	*SW*	-	
1	5315.98	5303.71	5303.81	S	-	
2	5317.82	5306.46	5306.66	E	-	
3	5320.13	5308.25	5308.35	E	-	
4	5321.92	5309.65	5309.75	SE	-	
5	5323.07	5310.43	5310.53	SE	5310.63	SW
6	5324.18	5311.63	5311.73	SE	-	
7	5324.55	5312.11	5312.21	SE	5312.31	SW
8	5324.89	5312.55	5312.65	SE	-	
9	5325.85	5313.63	5313.83	SW	5313.93	NE
10	5326.74	5318.86	5318.96	S	-	
11	5328.45	5320.60	5320.70	SE	-	
12	5329.65	5321.58	5321.78	E	-	
13	5329.98	5322.47	-		-	
14	5323.65	5316.01	5316.11	S	-	
15	5326.64	5319.13	-		-	
16	5326.56	5316.13	5316.23	S	-	
17	5327.46	5318.28	5318.38	S	5318.48	E,W
18	5326.89	5319.25	5319.35	NE	-	
19	5327.74	5319.64	-		-	
20	5328.29	5319.33	-		-	
21	5327.83	5319.00	-		-	
B	*5317.71*	*5310.93*	*5311.65*	*S*	*5311.41*	*E*
C	*5317.32*	*5311.78*	-		-	

STORM SEWER STRUCTURE INFORMATION

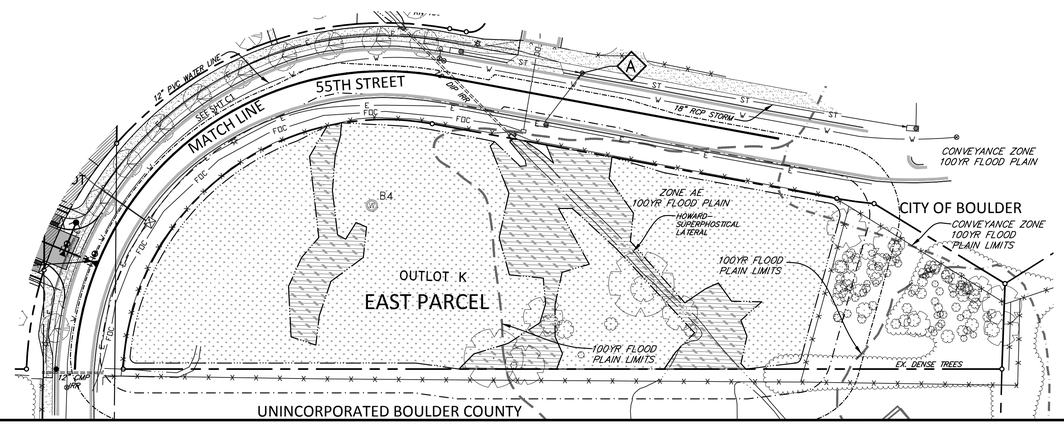
Structure ID	Rim or Grate Elevation	Invert Out	Invert In		Invert In	
1	5319.70	5316.40	5316.50	E	-	
2	5322.32	5317.34	5317.44	NE	-	
3	5323.01	5318.03	5318.13	SE	5318.63	NW
4	5323.34	5318.46	5318.46	SE	-	
5	5324.49	5319.61	5319.61	SE	5320.11	SW
6	5324.82	5319.94	5319.94	SE	-	
7	5325.08	5320.20	5320.30	SE	-	
8	5323.50	5320.50	5320.60	S	-	
9	5325.34	5320.98	5321.08	SE	-	
10	5325.59	5321.33	5321.33	SE	-	
11	5325.50	5321.87	5321.87	SE	-	
12	5322.49	5319.08	-		-	
13	5324.77	5320.43	-		-	
A	*5324.68*	5319.80	*5319.90*	*S*	*5319.90*	*W*

DRY CREEK DITCH NO. 2 STRUCTURE INFORMATION

Structure ID	Rim Elevation	Invert In/Out	Invert Out		Sump
A	FES	5311.00	-		-
B	5316.79	5311.58	5314.10	W	5309.58
C	5315.66	5311.88	-		5309.88
D	5316.97	5312.45	-		5310.45
E	5318.39	5312.83	-		5310.83
F	5320.57	5315.67	-		5313.67
G	5323.34	5318.42	-		5316.42
H	Headwall	5321.00	-		-

GENERAL UTILITY NOTES

1. UTILITIES SHALL COMPLY WITH THE CITY OF BOULDER DESIGN AND CONSTRUCTION STANDARDS, LATEST EDITION THEREOF.
2. UTILITIES CONSTRUCTED IN THE SEASONAL HIGH GROUND WATER TABLE SHALL HAVE GROUND WATER BARRIERS CONSTRUCTED AT REGULAR INTERVALS WITHIN THE UTILITY TRENCH.
3. UTILITIES SHALL BE LOCATED A MINIMUM OF 10-FT AWAY FROM PROPOSED AND EXISTING TREES.
4. WATER MAINS SHALL BE 8" PVC C900 CLASS 200 PRESSURE PIPE. ALL WATER MAINS SHALL HAVE A MINIMUM FOUR AND A HALF (4-1/2) FEET MINIMUM COVER.
5. WATER SERVICES FOR SINGLE FAMILY RESIDENTIAL AND DUPLEX UNITS SHALL BE 3/4" TYPE K COPPER WITH 3/4" METERS.
6. WATER SERVICE FOR SENIOR HOUSING BUILDING SHALL BE AS SIZED NOTED ON SHEET C1.
7. IRRIGATION SERVICES FOR SENIOR HOUSING BUILDING AND COMMONS AREAS SHALL BE SIZED AS NOTED ON SHEET C1.
8. SANITARY SEWER MAINS SHALL BE 8" SDR 35 PVC PIPE AT 0.5% MINIMUM SLOPE OR GREATER.
9. SANITARY SEWER MANHOLES LOCATED WITHIN THE 100-YEAR FLOOD PLAIN OR OTHER AREAS OF PONDING SHALL HAVE WATERTIGHT, BOLT-DOWN COVERS.
10. SANITARY SEWER SERVICES FOR SINGLE FAMILY RESIDENTIAL AND DUPLEX UNITS SHALL BE 4" SDR 35 PVC PIPE AT 2.0% MINIMUM SLOPE OR GREATER.
11. SEWER SERVICE FOR SENIOR HOUSING BUILDING SHALL BE 6" SDR 35 PVC PIPE AT 1.0% MINIMUM SLOPE OR GREATER.
12. STORM SEWER INSTALLED WITHIN THE CITY OF BOULDER RIGHT-OF-WAY OR PUBLIC UTILITY EASEMENT SHALL BE REINFORCED CONCRETE PIPE.
13. STORM SEWER SYSTEM ON THE SENIOR HOUSING LOT SHALL BE PRIVATE AND MAY BE CONSTRUCTED OF RCP, PVC, HDPE OR OTHER SIMILAR PIPE MATERIAL.
14. DRY CREEK DITCH NO. 2 PIPE SHALL BE 30" DIAMETER REINFORCED CONCRETE PIPE.
15. IMPROVEMENTS WITHIN THE DRY CREEK DITCH NO. 2 PRESCRIPTIVE EASEMENT SHALL BE SUBJECT TO THE REVIEW AND APPROVAL OF THE DITCH COMPANY.
16. UTILITIES CROSSING THE HOWARD-SUPERPHOSTICAL DITCH SHALL BE SUBJECT TO THE REVIEW AND APPROVAL OF THE DITCH COMPANY AND/OR LATERAL OWNER.



PREPARED BY:

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LOCATED IN THE SW¼ OF SECTION 3 AND THE SE¼ OF SECTION 4,
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ISSUE	DATE
SITE REVIEW	06/18/12

DESIGNED BY:	LRE
DRAWN BY:	LRE
CHECKED BY:	CCS

DRAWING SCALE:
HORIZONTAL: 1" = 60'
VERTICAL: NONE

PRELIMINARY UTILITY PLAN EAST PARCEL

PROJECT NO. B1006

C2

SHEET: 06 OF 30

PRELIMINARY UTILITY REPORT

For

BOULDER CREEK COMMONS

5399 Kewanee Drive &
5697 South Boulder Road
County of Boulder, Colorado

June 2012

Prepared For:
BCC, LLC
1526 Spruce Street, Suite 260
Boulder, CO 80302

Contact: Michael Boyers

Prepared By:

The Sanitas Group, LLC
1022 Willow Place
Louisville, CO 80027

Contact: Leslie R. Ewy, P.E.

PRELIMINARY UTILITY REPORT

BOULDER CREEK COMMONS

Boulder, Colorado

TABLE OF CONTENTS

TECHNICAL APPENDICES

EXHIBIT PLANS

1.0 INTRODUCTION

This **Preliminary Utility Report** [Report] is prepared on behalf of BCC, LLC for the proposed **Boulder Creek Commons Subdivision**, and is in accordance with the City of Boulder's "Design and Construction Standards", latest edition. The intent of this report is to provide an analysis of the proposed utility system and demonstrate that it will not have any adverse impacts on the surrounding area.

A. LOCATION AND DESCRIPTION

The proposed Boulder Creek Commons project is located just south of the East Boulder Recreation Center on 55th Street. The Keewaydin Meadows Subdivision bounds the property on the west, two estate lots in unincorporated Boulder County lie to the south, and Boulder County Open Space is directly east. Access is provided by 55th Street, which cuts through the property on the eastern portion, and Kewanee Drive, which provides access to the northwest corners from the Keewaydin Meadows Subdivision. A vicinity map is provided for reference.

The property encompasses a total of 22.17 acres in two parcels, a western parcel of 19.44 acres and an eastern parcel of 2.73 acres. 55th Street splits the parcels. The proposed residential development will occur on the western parcel only, while the eastern parcel will be reserved for wetland mitigation. The property is currently in Unincorporated Boulder County, but the developer is requesting annexation into the City of Boulder. Unimproved agricultural land with irrigation ditches and minor agricultural buildings occupy the majority of the property.

B. PROPOSED DEVELOPMENT

The Boulder Creek Commons project proposes a variety of residential units with associated site improvements such as public roads, sidewalks, parks, storm water and detention facilities, and open space areas. The requested zoning is RL-2. Proposed units include 65 single family residential lots and 3 duplex lots on16.39 acres, and a 3.06 acre congregate care senior housing site with a total of 50 units. The overall proposed project density is 5.457 units per acre. Preliminary Utility Plans are included in the back of this report for reference and show the proposed site improvements.

2.0 WATER SYSTEM DESIGN

The proposed Boulder Creek Commons will connect to the existing City of Boulder water distribution system in order to provide a reliable source of water for domestic and fire suppression purposes. Two connections are proposed; one to the existing 8" water main located in 55th Street, and another to the existing 8" CIP water main in Kewanee Drive to the west. A looped distribution system will be constructed in the site, provide the necessary coverage. All mains are proposed as 8" PVC. See the Utility Plans included with this report for layout details.

A. DOMESTIC DEMANDS

For system sizing, the proposed water demands were calculated using the City of Boulder Design and Construction Standards. An average of 3.2 persons per unit was used for the single family and duplex units, and an average of 2.0 persons per unit for the senior housing units. For the target market of the project, these values are higher than the actual anticipated occupancy levels, but were used in to provide a conservative analysis. Based on the overall development density of approximately 5.5 units per acre, the low-density average day demand value of 180 GPCD was used. A summary of water demands is as follows:

Design Number of Persons	328
Low Density Average Day Demand	180 GPCD
Project Average Day Demand	59,040 GPD
Max Hour Demand	12,546 Gal/Hour
Max Day Demand	301,104 GPD

Irrigation demands are not known at this time, but will be provided with the Final Utility Report during Technical Document Review.

Detailed calculations are included in Appendix A for reference.

B. FIRE DEMANDS

For fire flow demand the worst case scenario was used, which in the case of this project would be a fire in the proposed congregate care facility. Using an approximate proposed building square footage of 54,000 square-feet and an assumed construction type of V-A, the fire code minimum fire flow is 4,250 GPM for a 4-hr duration. The building will be sprinkled, so with a code allowed 50% fire flow reduction, the resulting design fire flow is 2,125 GPM minimum. For the EPANET model, a fire flow of 750 GPM was applied to three points near the congregate care site, representing a

sprinkler system draw as well as two fire hydrants. This results in a total fire flow for modeling purposes of 2,250 GPM.

Detailed calculations are included in Appendix A for reference.

C. EPANET MODEL

A copy of the City water model was provided by City staff to The Sanitas Group for review on 5/14/2012. Based on a review of the City model, it was determined that the closest node to the project site was #327. In order to get an accurate idea of the effects of the proposed project demands on the overall system, two additional reference points were determined in the overall City model. The first point added the average-day demand to the base demand, and the second point added the peak-day demand to the base demand. A summary of results is below:

Node #327 City Model Data			
	Project Demand	Total Demand	Pressure
City Base Demand	0	0.072112 MGD	119.06 PSI
Average Day Demand	0.05904 MGD	0.131152 MGD	118.98 Psi
Peak Day + Fire Flow	3.361 MGD	3.433 MGD	105.41 PSI

A simplified project specific EPANET model was generated, utilizing the three data points above to create supply curves at the project tie-in points. Peak-day demands were applied to the project with fire flows included to determine the worst case effects on the project. The resulting minimal system pressure was 104.78 psi at Nodes SEN-DOM & SEN-FIRE, which are next to each other. With no pressures dropping near the 20 psi minimum range during this scenario, no further analysis was necessary or performed. Excluding a short section of pipe from the 55th Street 8" connection to the first site fire hydrant, all velocities in the 8" mains are below 8 fps. Additional analysis discussions and EPANET model output data is included in Appendix B for review.

3.0 WASTEWATER SYSTEM DESIGN

The project site slopes to the northwest corner, and there are currently two potential sewer connection outfall points. The first is an existing main located in Kewanee Drive. Based on a review of the existing inverts, this main is too shallow for connection. The second, and proposed connection point, is an existing 8" PVC sewer main located in the northwest corner along the

northern boundary with the East Boulder Recreation Center. This sewer main continues north under the existing park space and into Oneida Street for a short bit before turning east under Omaha Place. From there, it outfalls under Sioux Drive before connecting to the 30" collector main located east of the East Boulder Recreation Center. Based on discussions with City staff, there are no known issues with this outfall at this time.

The proposed system layout includes a network of 8"PVC sewer mains installed at a minimum of 0.5% across the site. Groundwater barriers in accordance with City of Boulder Standards will be installed as necessary. There is no underdrain system proposed on this project, and the proposed buildings will not have basements.

Wastewater loads were calculated using the City of Boulder criteria. The total projected number of project occupants at full build-out ("persons") was previously determined for the water demand calculations. An average-day wastewater load of 100 GPCD was used. A summary of results is as follows:

Design Persons	328
Low Density Average Day Load	100 GPCD
Project Average Day Load	22.8 GPM (0.051 CFS)
Minimum Day Load	5.7 GPM (0.012 CFS)
Peak Day Load	91.2 GPM (0.203 CFS)
Infiltration	0.72 GPM

Based on a minimum project pipe design slope of 0.5% and an 8" PVC pipe, the resulting pipe check analysis for peak-day flow is as follows:

Peak Day Flow	0.203 CFS
Slope	0.5%
Manning's N	0.013
Flow Depth	2.64 Inches
Velocity	2.01 ft/sec

During average-day flows, the pipe flow results for a design slope of 0.5% are as follows:

Avg Day Flow	0.051 CFS
Slope	0.5%
Manning's N	0.013
Flow Depth	1.32 Inches
Velocity	1.36 ft/sec

Detailed calculations are included in Appendix A for reference.

4.0 DRY UTILITES

Gas and electric service will be provided by the existing Xcel Energy distribution network in the area. Communications and cable will be provided by Century Link and Comcast. The Preliminary Plat included with the Site Review submittal includes proposed utility easements for final dry utility system layout. The project team is currently working with dry utility providers on system design.

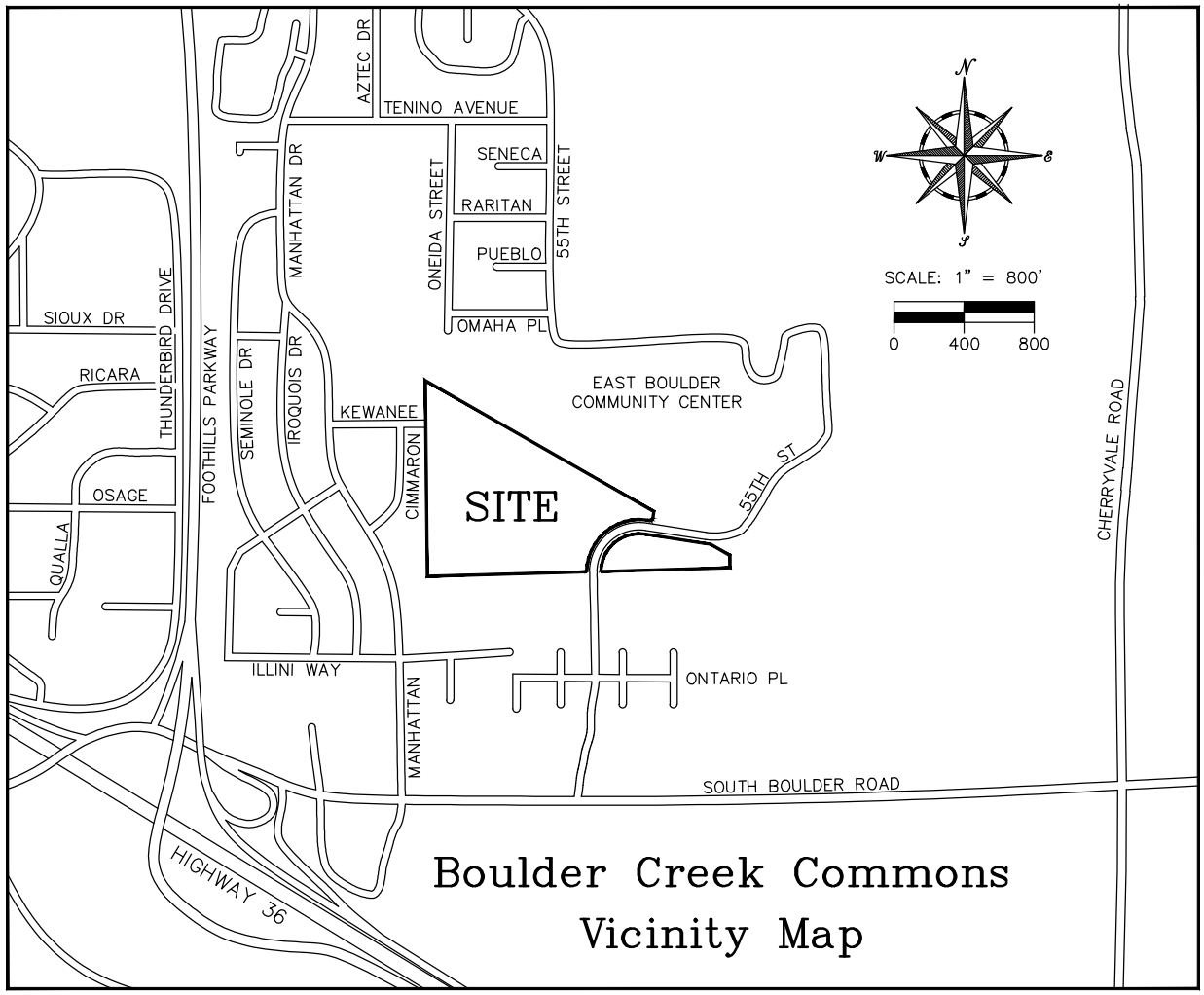
5.0 CONCLUSIONS

This Report intends to meet the requirements of the Site Review submittal, and demonstrates that the proposed project will have adequate utility services. Water and sanitary sewer service will be provided by the public City of Boulder infrastructure in accordance with City standards. A review of water pressures in the area as provided by the City show adequate pressure to meet the proposed demands without adverse impacts to the surrounding area. Dry utilities are readily available in the immediate project area.

6.0 REFERENCES

[1] City of Boulder Design and Construction Standards – Latest Edition

[2] International Fire Code – Latest Edition



Boulder Creek Commons
Vicinity Map

APPENDIX A

Supporting Calculations

PROJECT INFO

- 71 RESIDENTIAL UNITS
  - → 65 SINGLE FAMILY
  - → 6 DUPLEX UNITS (3 LOTS x 2 UNITS EA)

- 50 SENIOR CONGREGATE CARE UNITS.

⇒ TOTAL UNITS = 121 UNITS

SITE AREAS:

RESIDENTIAL AREA: 16.39 Ac
SENIOR HOUSING: 3.05 Ac.
WETLAND BANK (EAST SIDE) = 2.73 Ac
TOTAL PROPERTY: 22.17 Ac.

ZONING: RL-2 PROPOSED DENSITY: ~5.5 UNITS/ACRE ⇒ LOW-DENSITY

WATER SYSTEM DEMANDS

AVG. PERSONS PER UNIT:

→ 71 SINGLE-FAMILY/DUPLEX UNITS x 3.2 PERSONS/UNIT
= 227.2 PERSONS

⇒ 50 SENIOR (ASSUME MULTI-FAMILY) UNITS x 2.0 PERSONS/UNIT
= 100.0 PERSONS

TOTAL MAX. CAPACITY FOR DESIGN = 328 PERSONS

LOW-DENSITY AVG.-DAY DEMAND = 180 GPCD

180 GPCD x 328 PERSONS = 59,040 GPD
= 2,460 GAL/HOUR

DEMAND PEAKING FACTORS:

LOW-DENSITY: MAX/HOUR = 5.1
MAX/DAY = 5.1

PEAK DEMANDS:

MAX DAY = 59,040 GPD x 5.1 = 301,104 GPD
= 209.1 GPM. ✓

MAX HOUR = 2,460 x 5.1 = 12,546 GAL/HR
= 209.1 GPM. ✓

WASTEWATER SYSTEM LOADS

TOTAL PERSONS = 328 (SEE WATER DEMAND CALCS)

AVG. DAY LOAD = 100 GPCD

DESIGN LOAD = 32,800 GPD.
= 22.8 GPM.

AVG. DAY LOAD = 22.8 GPM. (0.051 CFS)

MINIMUM-DAY FLOW = 22.8 GPM x 0.25 (8" MAIN) = 5.7 GPM (0.012 CFS)

PEAK-DAY FLOW = 22.8 GPM x 4.0 (8" MAIN) = 91.2 GPM (0.203 CFS)

INFILTRATION: 200 GPIDM
TOTAL 8"ø MAINS = 3,440 LF
TOTAL INFILTRATION = 200 GPIDM x 8"ø x (3,440/5280) = 1,042 GPD
(0.72 GPM)

PEAK-DAY FLOW + INFILTRATION = 91.2 + 0.72 = 91.92 GPM.
(0.205 CFS)

8"ø PIPE @ 0.5% SLOPE, N=0.013, Q = 0.205 CFS ⇒ DEPTH = 0.22 FT
VELOCITY = 2.01 FPS

FIRE-FLOW WATER DEMANDS

- MAX. PROJECT FIRE FLOW WILL BE SENIOR HOUSING BUILDING.

BLDG FOOTPRINT = ~27,000 SF x 2 LEVELS = 54,000 S.F.
DESIGN SIZE

- AT THIS TIME A BLDG CONST. TYPE OF V-A IS ASSUMED AS WORST CASE;

⇒ PER FIRE CODE: MIN. FIRE FLOW = 4,250 GPM (4-HR DURATION)

⇒ BLDG WILL BE SPRINKLED ⇒ 50% REDUCTION ALLOWED.

✱ 4,250 x 0.5 = 2,125 GPM FIRE
DESIGN FLOW (MIN.)

⇒ FOR DESIGN, THE FIRE FLOW IS DISTRIBUTED IN THE MODEL AT 3 POINTS WITH 750 GPM EACH REPRESENTING A 750 GPM SPRINKLER FLOW AND TWO (2) HYDRANTS AT 750 GPM EACH. THIS TOTALS 2,250 GPM OF FIRE FLOW (> MIN. 2,125 GPM)

APPENDIX B

EPANET Water Model Info

CURRENT SYSTEM EPANet REVIEW

WATER MODEL "CURRENT MODEL.NET" RECIEVED FROM CITY STAFF ON 5/14/2012 VIA E-MAIL.

CLOSEST NODE TO PROJECT SITE IS # 327

NODE #327 EXIST. INFO:

BASE DEMAND = 0.072112 MGD
ACTUAL DEMAND = 0.07 MGD
TOTAL HEAD = 5601.79
NODE ELEV. = 5327.0
PRESSURE = 119.06 PSI

FOR 2ND POINT OF REFERENCE ⇒ ADD AVG-DAY DEMAND

AVG-DAY DEMAND = 59,040 GPD (0.05904 MGD)
NEW NODE 327 BASE DEMAND = 0.131152 MGD
NEW PRESSURE: 118.98 PSI

FOR 3RD POINT OF REFERENCE ⇒ PEAK DAY + FIRE FLOW ADDED TO BASE

MAX-DAY + FIRE = 2,334 GPM = 3.361 MGD
NEW DEMAND = 3.433 MGD @ NODE 327
NEW PRESSURE = 105.41 PSI

∴ THESE 3 POINTS OF SUPPLY REFERENCE WERE USED IN THE SITE DESIGN MODEL PUMP CURVES AT THE LOCATION OF CONNECTIONS TO EXISTING WATERLINES. SEE PROJECT SPECIFIC EPANet MODEL FOR DETAILS, BASE MODEL DEMANDS REMOVED. (0.072112 MGD)

PT. 1: SITE DEMAND = 0
PRESSURE = 119.06 (275.03 FT)

PT 2: SITE DEMAND = 0.05904 MGD
PRESSURE = 119.98 (274.84 FT)

PT 3: SITE DEMAND = 3.361 MGD
PRESSURE = 105.41 PSI (243.50 FT)

EPANET MODEL INFO

* SIMPLIFIED MODEL
  - MAIN JUNCTIONS
  - 2 CONNECTION POINTS W/ EXIST.
  - FH LOCATIONS (6" PIPE CONNECTION NOT INCL.)
  - SENIOR HOUSING FIRE SPRINKLER CONNECTION

PIPES: 8" ø
ROUGHNESS = 105
LOSS COEFF: VALUES APPLIED TO PIPES TO COUNT BENDS, GATE VALVES, ETC

MAX. DAY PLUS FIRE FLOW ANALYSIS

MAX-DAY DEMAND = 209.1 GPM
THIS WAS DISTRIBUTED ACROSS THE NETWORK AT 4 NODES:
NODE: SEN-DOM = 83.7 GPM
1 = 41.8 GPM
4 = 41.8 GPM
6 = 41.8 GPM

FIRE FLOW = 2,250 GPM
THIS WAS DISTRIBUTED ACROSS 3 NODES, THE SPRINKLER SERVICE & TWO FIRE HYDRANTS.

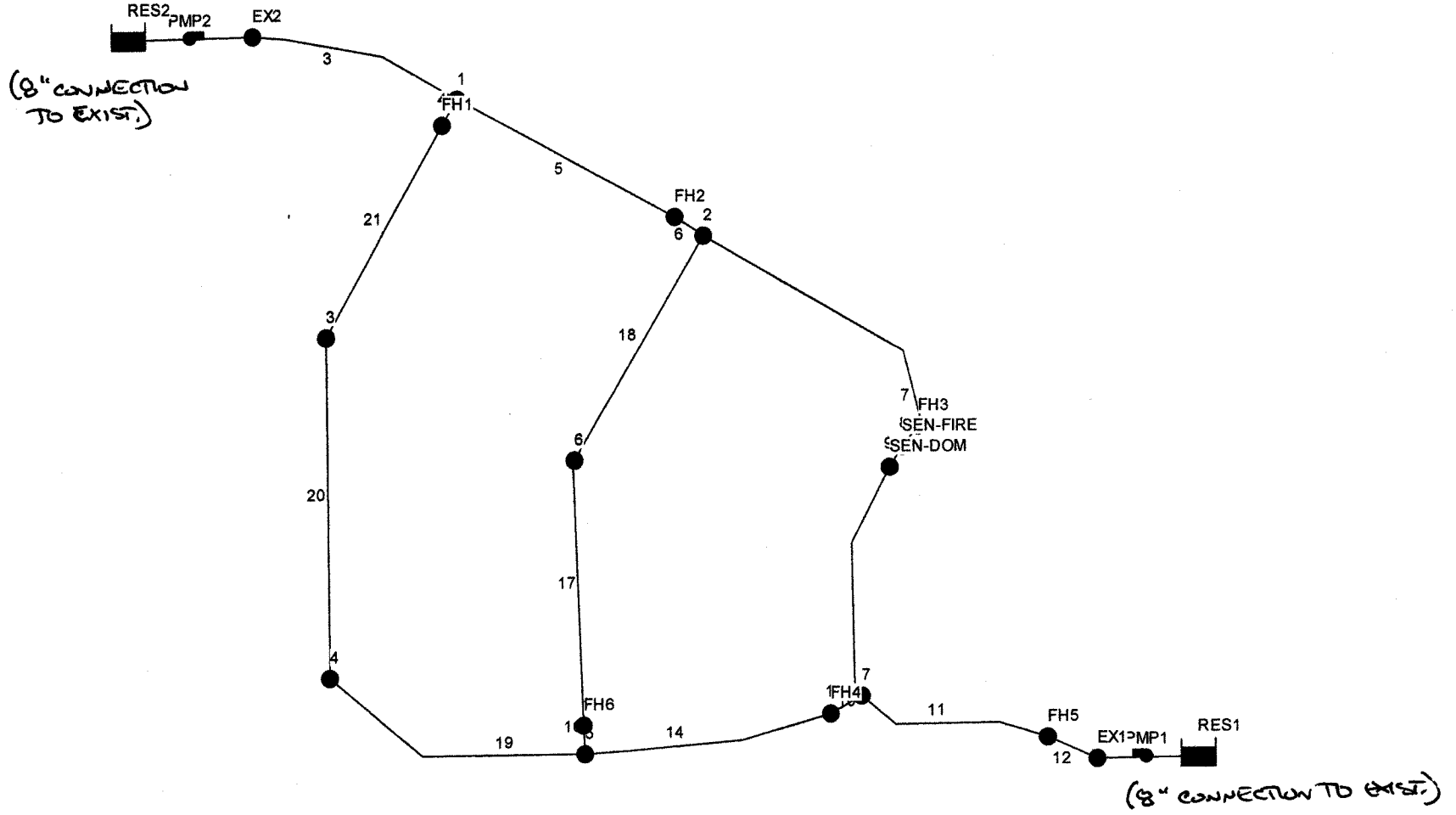
NODE: SEN-FIRE = 750 GPM
FH3 = 750 GPM
FH5 = 750 GPM

RESULTS:

- LOWEST PRESSURE = 104.78 PSI @ SEN-DOM & SEN-FIRE NODES
  ∴ > MIN. 20 PSI SO OK.
- MAX. VELOCITY IN A SIGNIFICANT RUN OF PIPE IS 5.59 FPS IN PIPE/LINK 11.
  ∴ < 8 FPS MAX.

NOTE: PIPE/LINK 12 SHOWS A VELOCITY OF 10.38 FPS. THIS IS THE SHORT 24 FT SECTION FROM THE EXIST. 8" MAIN TO THE FIRST SITE F.H.. THIS VELOCITY WOULD ONLY OCCUR IN A WORST CASE CONDITION FIRE AT THE SENIOR HOUSING SITE.

Day 1, 12:(


RES2
PMP2
EX2
(8" CONNECTION TO EXIST.)
3
1
FH1
5
FH2
2
6
21
3
18
7
FH3
SEN-FIRE
SEN-DOM
6
20
17
4
FH6
19
14
7
FH4
11
FH5
EX1
MP1
RES1
12
(8" CONNECTION TO EXIST.)

BOULDER CREEK COMMONS B1006

UTILITY REPORT JUNE 2012

PEAK-DAY + FIRE FLOW ANALYSIS

Network Table - Nodes

Node ID	Demand GPM	Head ft	Pressure psi	Quality
Junc EX2	0.00	5578.46	115.46	0.00
Junc 1	41.80	5571.21	109.71	0.00
Junc FH1	0.00	5571.06	109.65	0.00
Junc 5	0.00	5569.29	107.15	0.00
Junc FH6	0.00	5569.18	107.10	0.00
Junc 2	0.00	5568.19	107.98	0.00
Junc FH2	0.00	5568.50	108.11	0.00
Junc FH3	750.00	5562.81	104.78	0.00
Junc SEN-FIRE	750.00	5562.81	104.78	0.00
Junc SEN-DOM	83.70	5563.26	104.97	0.00
Junc 7	0.00	5569.31	106.73	0.00
Junc FH4	0.00	5569.31	106.72	0.00
Junc FH5	750.00	5574.79	109.10	0.00
Junc EX1	0.00	5577.07	110.52	0.00
Junc 6	41.80	5568.60	107.29	0.00
Junc 4	41.80	5569.77	107.36	0.00
Junc 3	0.00	5570.53	109.42	0.00
Resvr RES2	-832.90	5312.00	0.00	0.00
Resvr RES1	-1626.20	5322.00	0.00	0.00

BOULDER CREEK COMMONS BLOCK 6 UTILITY REPORT JUNE 2012

PEAK-DAY + FIRE FLOW ANALYSIS

Network Table - Links (PIPES)

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 3	832.90	5.32	21.99	0.033
Pipe 4	249.78	1.59	4.72	0.080
Pipe 5	541.33	3.46	9.49	0.034
Pipe 6	541.33	3.46	30.96	0.111
Pipe 7	744.20	4.75	16.56	0.032
Pipe 8	-5.80	0.04	0.00	0.000
Pipe 9	-755.80	4.82	45.07	0.083
Pipe 10	-839.50	5.36	20.85	0.031
Pipe 11	-876.20	5.59	22.86	0.031
Pipe 12	-1626.20	10.38	94.62	0.038
Pipe 13	36.70	0.23	0.12	0.096
Pipe 14	36.70	0.23	0.06	0.048
Pipe 16	244.67	1.56	3.52	0.062
Pipe 17	244.67	1.56	2.11	0.037
Pipe 18	202.87	1.29	1.49	0.038
Pipe 19	-207.98	1.33	1.59	0.039
Pipe 20	-249.78	1.59	2.12	0.036
Pipe 21	-249.78	1.59	2.14	0.036
Pump PMP2	832.90	0.00	-266.46	0.000
Pump PMP1	1626.20	0.00	-255.07	0.000