ENGINEERING REPORTS

DRAINAGE REPORTS

TIMA

ABBREVIATED WATER & SEWER NEED REPORT

WATER STUDY

WASTEWATER STUDY

STORM WATER WAIVER APPLICATION

CASE FILE

Crossroads Apartments
Scottsdale, Arizona

Basis of Design
Water and Wastewater Needs Report

Accepted For:
City of Scottsdale
Water Resources Department
9379 E. San Salvador
Scottsdale, Arizona

By: DougMann
Date: FEB 7, 2014

Prepared for:
The P.B. Bell Companies
8434 North 90th Street
Suite 100
Scottsdale, Arizona 85258

Prepared by:
Kimley-Horn and Associates, Inc.
7740 North 16th Street
Suite 300
Phoenix, Arizona 85020

191316002
October 2013

Kimley-Horn
and Associates, Inc.

27DR2013

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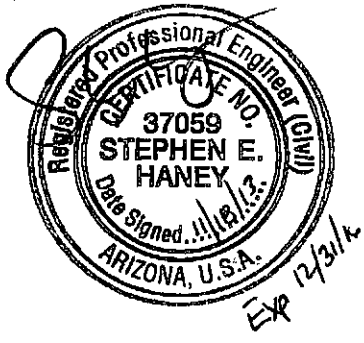

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INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this water and wastewater report for the proposed Crossroads Apartments development at the NEC of Scottsdale Road and Chauncey Lane as required per the City of Scottsdale.

The proposed project encompasses approximately 4.58 acres and 6 multistory multifamily residential buildings totaling 187 dwelling units.

DOMESTIC WATER SUPPY

A 12" DIP water main exists within 73rd Place and Chauncey Lane. This 12" DIP water main is connected to existing water mains in Mayo Boulevard (16") and Scottsdale Road (12"), creating a loop. The "Bell Lexus of North Scottsdale" development to the north of this proposed development includes a new water main that is connected to the water mains in Mayo Boulevard and 73rd Place. The on-site water main improvements to the Lexus parcel include an 8" stub to the Crossroads site. An 8" DIP water main is proposed within the Crossroads spine roads with 8" stubs to serve Crossroads Apartments development. An 8" DIP water main loop will be constructed on-site that will connect to the spine road improvements and serve new on-site fire hydrants and 8" firelines to the multiple buildings. This on-site water main will be looped to the existing 8" DIP water main stub from the Lexus parcel and the existing 12" DIP water mains in 73rd Place and Chauncey Lane via the Crossroads spine road improvement plans. Domestic water supplies are proposed to serve the apartment buildings. See Appendix C for the Preliminary Utility Plan.

The overall design concept for the Crossroads site was modeled and submitted to the City of Scottsdale in January 2013 as part of case number PC 411-13-1.

DOMESTIC WATER DEMANDS

According to the guidelines provided in Figure 6.1-2 of the City of Scottsdale *Standards and Policies, Chapter 6, Water*, the proposed building will add the following demands to the City of Scottsdale's existing system:

	Area (DU)	Inside Demand (GPD/DU)	Outside Demand (GPD/DU)	Total Demand (GPD/DU)	ADD (GPM)	Peak Hour (GPM)	Maximum Day (GPM)
High Density Condo	187	155.3	30	185.3	24.1	84 4	48.2
TOTAL					24.1	84.4	48.2

The Peak Hour demand is 3.5 times the Average Daily Demand (ADD). The Maximum Day Demand is two times the ADD.

According to the 2006 International Fire Code (IFC), fire flow to Group R (residential) buildings may be reduced by 25%, and then by another 50% if an approved fire sprinkler system is installed. A fire sprinkler system will be installed with all buildings. Therefore, the required maximum building fire flow rate for the proposed buildings is 3,000 gallons per minute. This is based on a 164,350 s.f. building that is construction type III-B.

WASTERWATER COLLECTION SYSTEM

An 8" PVC sewer main exists within 73rd Place and Chauncey Lane. This sewer main includes multiple 8" PVC stubs to the site for building sewer services. An 8" private sewer main is proposed within the Crossroads spine roads with 8" stubs to serve Crossroads Apartments development. A new 8" PVC private sewer main and sewer services are proposed on-site that will connect to the aforementioned 73rd Place stubs via the spine road infrastructure. See Appendix B for the Preliminary Utility Plan. The following demand calculations are based on Figure 7.1-2 of the City of Scottsdale *Design Standards and Policies Manual*

	Dwelling units	Demand (GPD/DU)	ADD (GPM)	Peaking Factor	Peak Demand (GPM)	Maximum Day (GPM)
High Density Condo	187	140	18.2	4.0	72.8	36.4
TOTAL			18.2		72.8	36.4

The Maximum Day Demand is two times the Average Day Demand (ADD).

CONCLUSION

Water

This development proposes to connect to City of Scottsdale water mains located adjacent to the site in 73rd Place and Chauncey Lane and to an existing stub from the Lexus parcel via the spine road infrastructure improvements. The Crossroads spine road infrastructure will be constructed prior to the construction of the Crossroads Apartments. The connections are consistent with the Water Basis of Design Report for the 29.4 Acre Commercial Development and Crossroads East Planning Unit IV prepared by Kimley-Horn and Associates in February 2012. The water main serving the Crossroads Apartments will be a looped system.

Per the flow test conducted by E.J. Engineering Group on July 30, 2012, the available flow at 20 PSI is 2,705 gallons per minute. Refer to Appendix A for the Flow Test Summary. This flow appears sufficient to serve the domestic and fire flow demands for the proposed Crossroads Apartments.

Wastewater

This development proposes to connect the building sewer services to the new 8" PVC sewer main in 73rd Place via the spine road infrastructure improvements. These connections are consistent with the Wastewater Basis of Design Report for the 29.4 Acre Commercial Development and Crossroads East Planning Unit IV prepared by Kimley-Horn and Associates in February 2012. The 8" PVC sanitary sewer main has capacity for both this site and the upstream Lexus parcel (107.2 gpm Peak) based upon a full flow capacity of 402 gpm utilizing a Manning's N value of 0.013. Refer to Appendix B for the Sewer Capacity Calculations.

Appendix A
Flow Test Summary

E·J Flow Tests

FLOW TESTING SERVICES

Flow Test Summary

EJ Flow Tests Project Name:	PB Bell Apartments
EJ Flow Tests Project No.:	13156
Project Address:	Scottsdale Rd. and Chauncey Ln., Scottsdale, Arizona 85255
Date of Flow Test:	July 30, 2013
Time of Flow Test:	8:15AM
Data is Current and Reliable Until:	January 30, 2014

Raw Test Data:

Static Pressure: (measured in pounds per square inch)	74.0	psi
Residual Pressure: (measured in pounds per square inch)	47.0	psi
Pitot Pressure: (measured in pounds per square inch)	36.0	psi (each)
Number of Outlets Flowed:	2	
Fire Hydrant Orifice Diameter: (measured in inches)	2.5	inches (each)
Coefficient of Discharge: (0.9 smooth/round outlet, 0.8 square/sharp outlet, 0.7 square/raised outlet)	0.9	(each)
Flowing GPM: (measured in gallons per minute)	2,014	(1007 + 1007)
GPM at 20 PSI:	2,929	

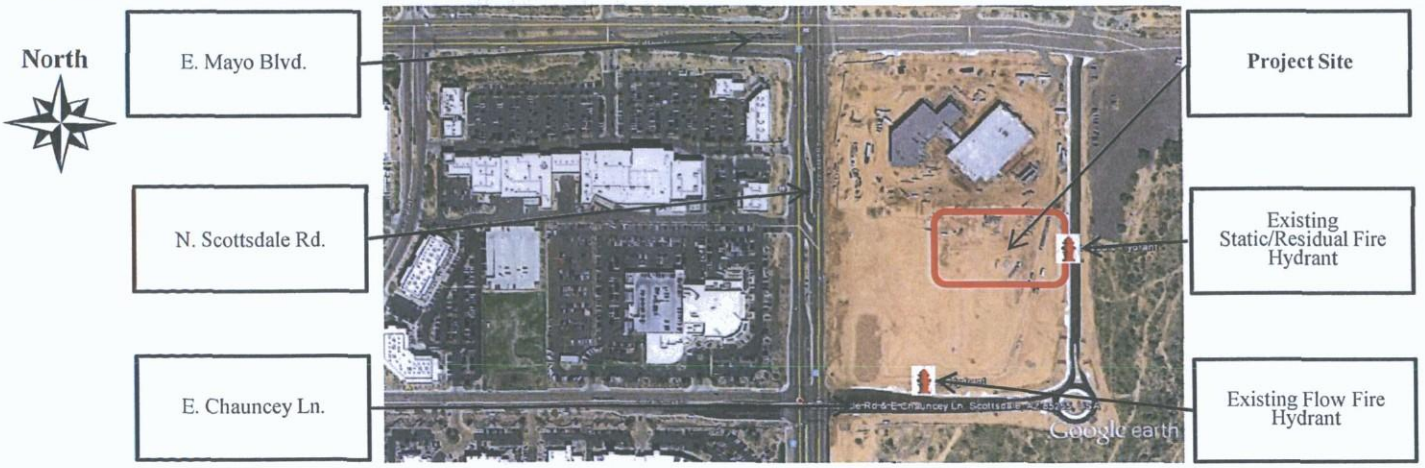
Data with minimum safety factor of: 10% :

Static Pressure: (measured in pounds per square inch)	66.6	psi
Residual Pressure: (measured in pounds per square inch)	39.6	psi
Main Size: (measured in inches)	Not Provided	
Approximate Distance Between Hydrants: (measured in feet)	675	ft
Approx. Static/Residual Hydrant Elevation: (measured above sea level)	1,582	ft
Approx. Flow Hydrant Elevation: (measured above sea level)	1,576	ft
Flowing GPM: (measured in gallons per minute)	2,014	(1007 + 1007)
GPM at 20 PSI:	2,705	

Conducted by/Witnessed by/City Forces Contacted:

Conducted by:	Rachel Hightower, and Eric Sandmann, EJ Flow Tests (602.999.7637)
Witnessed by:	Mike Young, City of Scottsdale Public Works (602.541.0586)
City Forces Contacted:	Bill Kalber, City of Scottsdale (480.312.8122)

Flow Test Vicinity Map (No Scale)



Appendix B
8" PVC Sewer Capacity Calculations

Worksheet for Crossroads Apartments Sewer Main

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0 013	
Channel Slope	0 00550	ft/ft
Normal Depth	8	in
Diameter	8	in
Discharge	402	gal/min

Results

Discharge	402	gal/min
Normal Depth	8	in
Flow Area	0 35	ft²
Wetted Perimeter	2 09	ft
Hydraulic Radius	2	in
Top Width	0 00	ft
Critical Depth	0 45	ft
Percent Full	100 0	%
Critical Slope	0 00872	ft/ft
Velocity	2 57	ft/s
Velocity Head	0 10	ft
Specific Energy	0 77	ft
Froude Number	0 00	
Maximum Discharge	0 96	ft³/s
Discharge Full	0 90	ft³/s
Slope Full	0 00550	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0	in
Length	0 00	ft
Number Of Steps	0	

GVF Output Data

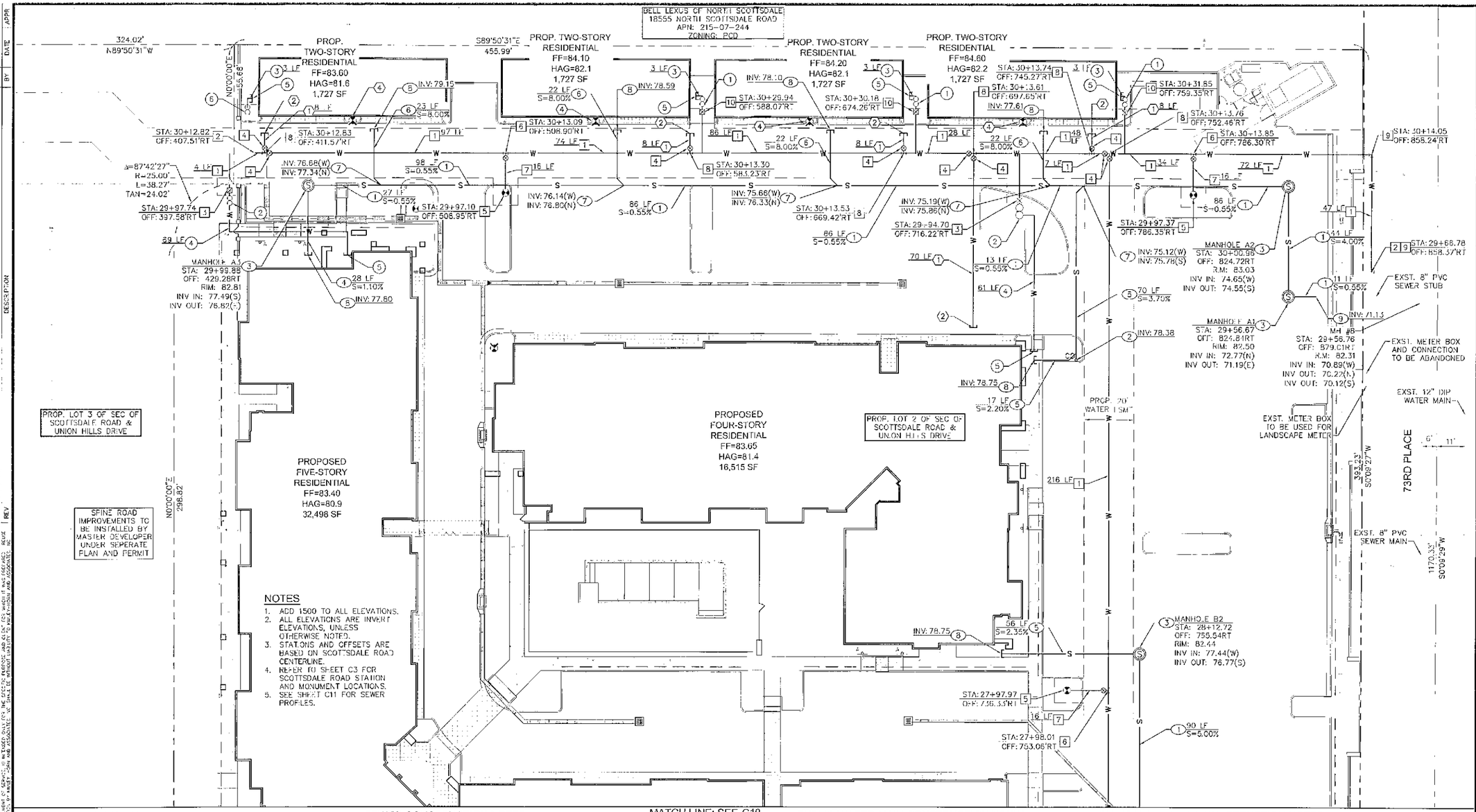
Upstream Depth	0	in
Profile Description		
Profile Headloss	0 00	ft
Average End Depth Over Rise	0 00	%

Worksheet for Crossroads Apartments Sewer Main

GVF Output Data

Normal Depth Over Rise	100 00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8	in
Critical Depth	0 45	ft
Channel Slope	0 00550	ft/ft
Critical Slope	0 00872	ft/ft

Appendix C
Utility Plan



DRY UTILITY NOTES

1. PROPOSED SW GAS SERVICE ROUTING, REF SW GAS PLANS FOR DETAILS.
2. PROPOSED SW GAS STUB LOCATION FOR FUTURE CONNECTION, REF SW GAS PLANS FOR DETAILS.
3. GAS SERVICE IN RIGHT-OF-WAY TO BE INSTALLED BY SW GAS, REF SW GAS PLANS.
4. CONNECT TO SW GAS STUB, REF SW GAS PLANS.

PRIVATE FIRELINE CONSTRUCTION NOTES

1. INSTALL 8" CLASS 350 DIP WATER MAIN POLYWRAPPED, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
2. BUILDING FIRELINE CONNECTION POINT, REF MEP PLANS FOR CONTINUATION.
3. REMOVE PLUG AND CONNECT TO EXISTING FIRELINE STUB.
4. PROPOSED FDC LOCATION, REF FIRE SPRINKLER PLANS.

SEWER CONSTRUCTION NOTES

1. INSTALL 8" SDR 35 PVC PRIVATE SEWER MAIN, LENGTH AND SLOPE PER PLAN.
2. INSTALL SEWER CLEANOUT PER MAG STD DET 441, INVERT PER PLAN.
3. INSTALL 48" PRIVATE SEWER MANHOLE PER MAG STD DET 420-2, INVERTS PER PLAN.
4. INSTALL 8" SDR 35 PVC PRIVATE SEWER SERVICE, LENGTH AND SLOPE PER PLAN. SEWER SERVICES PER UPC.
5. INSTALL 6" SDR 35 PVC PRIVATE SEWER SERVICE, LENGTH AND SLOPE PER PLAN. SEWER SERVICES PER UPC.
6. INSTALL 4" SDR 35 PVC PRIVATE SEWER SERVICE, LENGTH AND SLOPE PER PLAN. SEWER SERVICES PER UPC.
7. INSTALL SEWER WYE CONNECTION, SIZE TO MATCH ADJOINING PIPES. INVERTS PER PLAN.
8. CONNECT TO BUILDING SEWER AT TWO-WAY CLEANOUT, INVERT PER PLAN. REF MEP PLANS FOR CONTINUATION.
9. REMOVE SEWER PLUG AND CONNECT TO EXISTING SEWER STUB, INVERT PER PLAN.

PUBLIC WATER MAIN CONSTRUCTION NOTES

1. INSTALL 8" CLASS 350 DIP WATER MAIN POLYWRAPPED, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
2. REMOVE CAP AND CONNECT TO EXISTING 8" DIP WATER STUB.
3. INSTALL 2" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.
4. INSTALL 8" WATER MAIN GATE VALVE PER MAG STD DET 391-1 TYPE 'C', SIZE TO MATCH ADJOINING PIPES.
5. INSTALL FIRE HYDRANT ASSEMBLY PER MAG STD DET 360.
6. INSTALL 8"X6" TEE WITH RESTRAINED JOINTS PER MAG STD DET 303.
7. INSTALL 8" CLASS 350 DIP WATER MAIN POLYWRAPPED, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
8. INSTALL 8"X8" TEE WITH RESTRAINED JOINTS PER MAG STD DET 303.

PUBLIC WATER MAIN CONSTRUCTION NOTES

9. INSTALL 6" 90° BEND WITH RESTRAINED JOINTS PER MAG STD DET 303.
10. INSTALL 3/4" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.

PRIVATE WATER CONSTRUCTION NOTES

1. INSTALL 3/4" REDUCED PRESSURE PRINCIPLE ASSEMBLY PER COS STD DET 2352.
2. INSTALL 2" REDUCED PRESSURE PRINCIPLE ASSEMBLY PER COS STD DET 2352.
3. INSTALL 1-1/4" SCH 40 PVC DOMESTIC WATER SERVICE, LENGTH PER PLAN.
4. INSTALL 3" SCH 40 PVC DOMESTIC WATER SERVICE, LENGTH PER PLAN.
5. DOMESTIC WATER BUILDING ENTRY LOCATION, REF MEP PLANS FOR CONTINUATION.
6. INSTALL 3/4" DOMESTIC WATER METER IN EXISTING METER BOX. METER TO BE INSTALLED BY CITY FORCES.

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

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Phoenix, Arizona 85020 (602) 944-5500

THE R.G. BELL COMPANIES

NEC SCOTTSDALE ROAD AND CHAUNCEY LANE

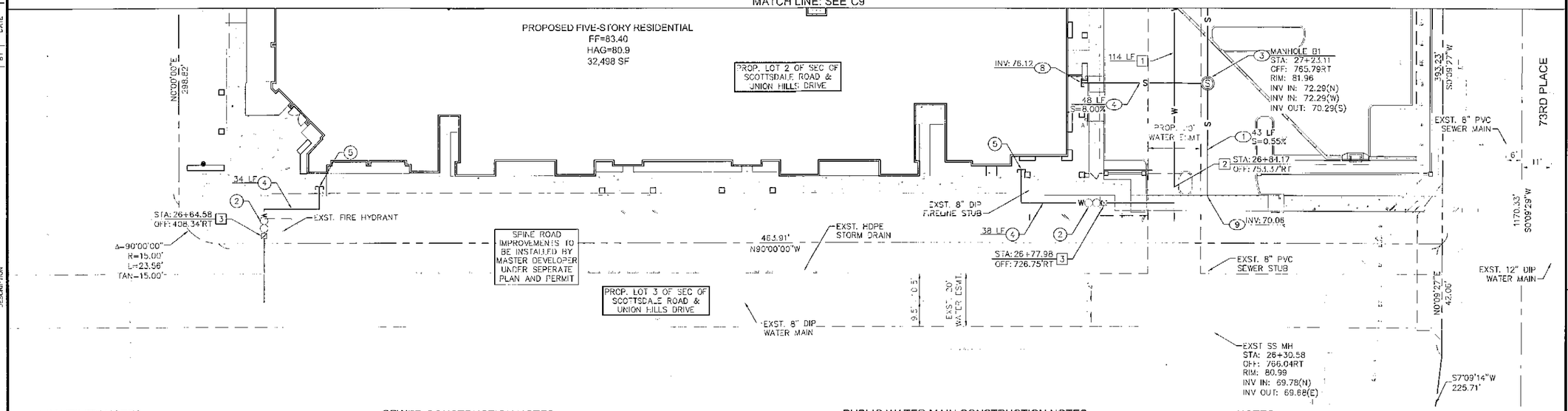
UTILITY PLAN

SCOTTSDALE, ARIZONA

PROJECT No.	191316002
SCALE (H):	1"=20'
SCALE (V):	NONE
DRAWN BY:	CGF
DESIGN BY:	TMJ
CHECK BY:	SCH
DATE:	11/11/13

C9

9 OF 20 SHEETS



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2. PROPOSED SW GAS STUB LOCATION FOR FUTURE CONNECTION, REF SW GAS PLANS FOR DETAILS.
3. GAS SERVICE IN RIGHT-OF-WAY TO BE INSTALLED BY SW GAS, REF SW GAS PLANS.
4. CONNECT TO SW GAS STUB, REF SW GAS PLANS.

SEWER CONSTRUCTION NOTES

1. INSTALL 8" SDR 35 PVC PRIVATE SEWER MAIN, LENGTH AND SLOPE PER PLAN.
3. INSTALL 48" PRIVATE SEWER MANHOLE PER MAG STD DET 420-2, INVERTS PER PLAN.
4. INSTALL 8" SDR 35 PVC PRIVATE SEWER SERVICE, LENGTH AND SLOPE PER PLAN. SEWER SERVICES PER UPC.
8. CONNECT TO BUILDING SEWER AT TWO-WAY CLEANOUT, INVERT PER PLAN. REF MEP PLANS FOR CONTINUATION.
9. REMOVE SEWER PLUG AND CONNECT TO EXISTING SEWER STUB, INVERT PER PLAN.

PUBLIC WATER MAIN CONSTRUCTION NOTES

1. INSTALL 8" CLASS 350 DIP WATER MAIN POLYWRAPPED, LENGTH PER PLAN, MINIMUM 3' COVER. BEDDING AND BACKFILL PER MAG SPEC 601.
2. REMOVE CAP AND CONNECT TO EXISTING 8" DIP WATER STUB.
3. INSTALL 2" WATER SERVICE LINE CONNECTION PER COS STD DET 2330. METER TO BE INSTALLED BY CITY FORCES.

PRIVATE WATER CONSTRUCTION NOTES

2. INSTALL 2" REDUCED PRESSURE PRINCIPLE ASSEMBLY PER COS STD DET 2352.
4. INSTALL 3" SCH 40 PVC DOMESTIC WATER SERVICE, LENGTH PER PLAN.
5. DOMESTIC WATER BUILDING ENTRY LOCATION, REF MEP PLANS FOR CONTINUATION.

NOTES

1. ADD 1500 TO ALL ELEVATIONS.
2. ALL ELEVATIONS ARE INVERT ELEVATIONS, UNLESS OTHERWISE NOTED.
3. STATIONS AND OFFSETS ARE BASED ON SCOTTSDALE ROAD CENTERLINE.
4. REFER TO SHEET C3 FOR SCOTTSDALE ROAD STATION AND MONUMENT LOCATIONS.
5. SEE SHEET C11 FOR SEWER PROFILES.

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

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SCOTTSDALE, ARIZONA

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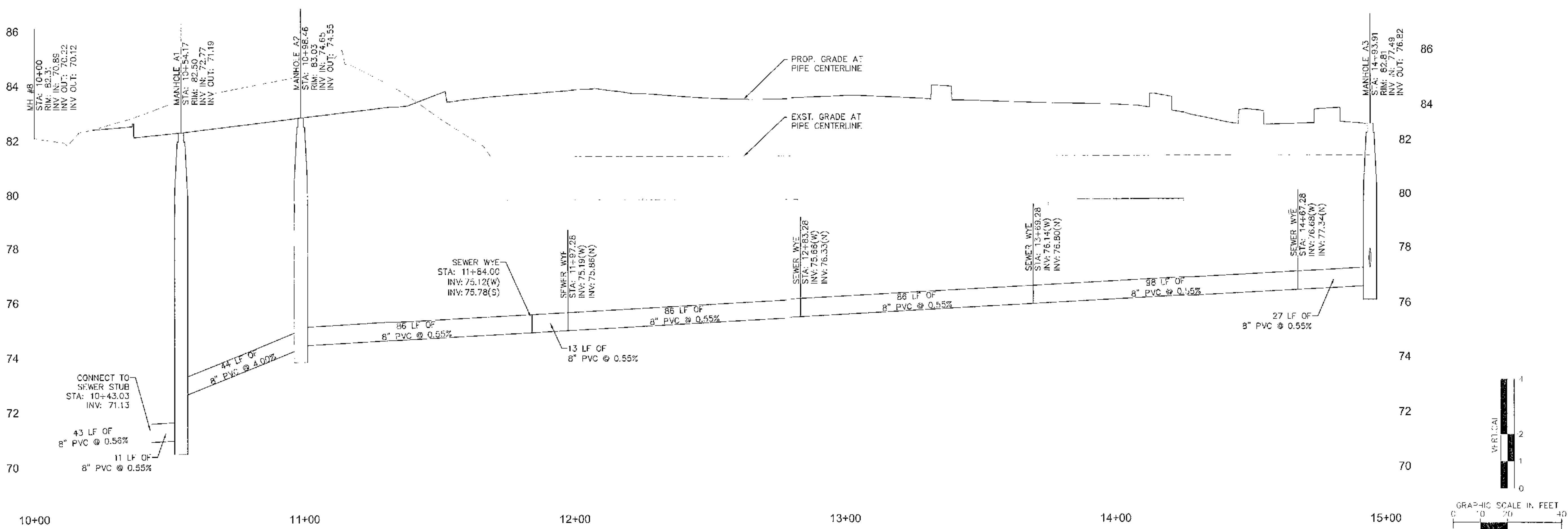
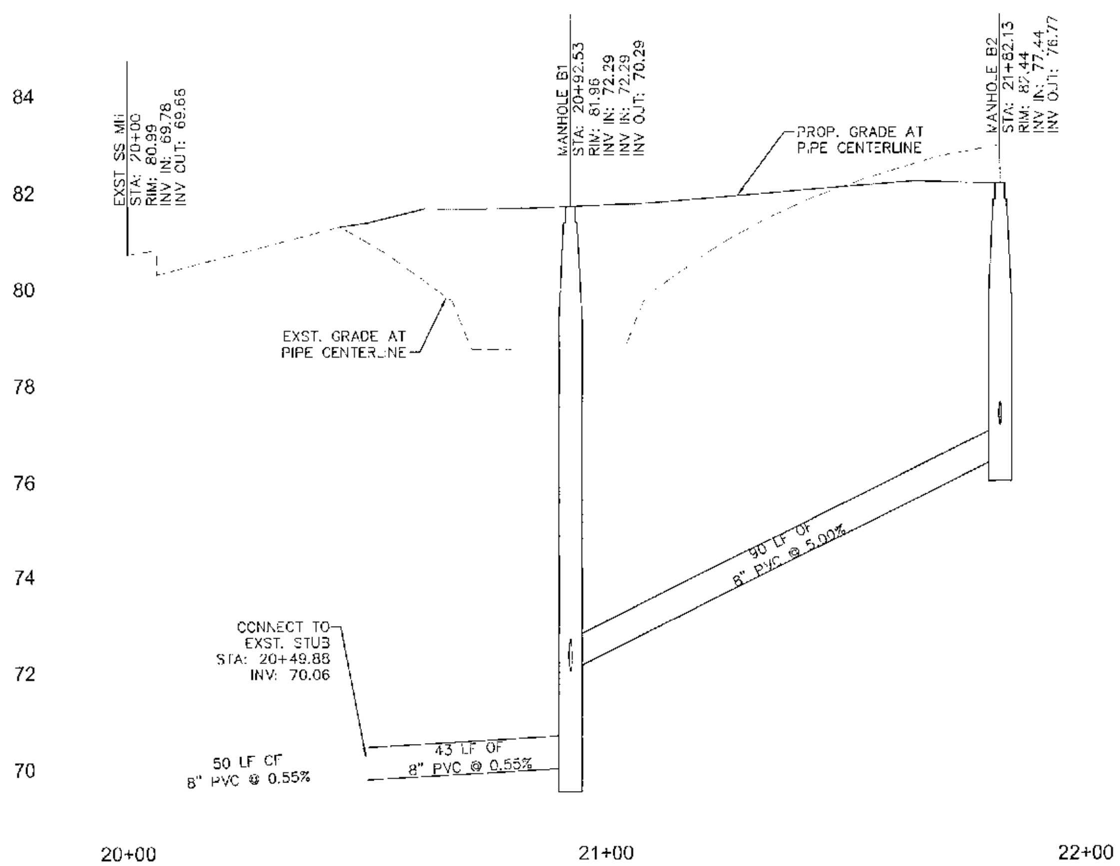
SCALE (H):	1"=20'
SCALE (V):	NONE
DRAWN BY:	CGF
DESIGN BY:	TMJ
CHECK BY:	SEH
DATE:	11/11/13

C10
10 OF 20 SHEETS

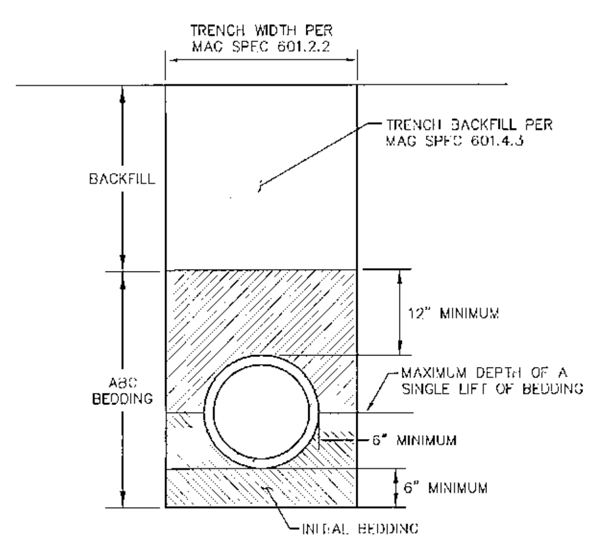
APPR | DATE | BY | DESCRIPTION | REV



SANITARY SEWER 'A' PROFILE



SANITARY SEWER 'B' PROFILE



NOTES:

1. BEDDING TO BE PLACED WITH A MAXIMUM LIFT THICKNESS OF 8".
2. BEDDING SHALL BE SHAPED TO CONFORM TO THE BOTTOM OF PIPE PRIOR TO PLACEMENT OF THE PIPE.
3. BACKFILL SHALL BE PLACED WITH A MAXIMUM LIFT THICKNESS OF 12" AND COMPACTED MECHANICALLY.

APP 4.01 PRIVATE SANITARY SEWER BEDDING AND BACKFILL DETAIL — N.T.S.

APP 4.01 SEWER NOTES

1. ALL SEWER LINES MUST MAINTAIN AT LEAST 3 FEET OF BACKFILL COVER.
2. CONTRACTOR MUST PERFORM DEFLECTION TEST OF THE TOTAL LENGTH OF ALL SEWER LINES MADE OF FLEXIBLE MATERIALS TO ENSURE THAT THE INSTALLATION MEETS OR EXCEEDS THE MANUFACTURER'S RECOMMENDATIONS AND RECORD THE RESULTS.
3. CONTRACTOR MUST TEST EACH SEGMENT OF THE SEWER LINE FOR LEAKAGE USING AN APPLICABLE METHOD LOCATED IN THE ARIZONA ADMINISTRATIVE CODE R18-9-E301-D-2-J, AND RECORD THE RESULTS.
4. CONTRACTOR MUST TEST THE TOTAL LENGTH OF THE SEWER LINE FOR UNIFORM SLOPE BY LAMP LIGHTING, REMOTE CAMERA OR SIMILAR METHOD APPROVED BY THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY, AND RECORD THE RESULTS.
5. CONTRACTOR SHALL TEST MANHOLES USING ONE OF THE METHODS SPECIFIED IN THE ARIZONA ADMINISTRATIVE CODE R18-9-E301-D-3-F, AND RECORD THE RESULTS.
6. CONTRACTOR SHALL PERFORM MANHOLE TESTING UNDER THE ARIZONA ADMINISTRATIVE CODE R18-9-E301-D-3-F AFTER INSTALLATION OF THE MANHOLE CONE TO VERIFY WATERTIGHTNESS OF THE MANHOLE FROM THE TOP OF THE CONE DOWN.
7. KIMLEY-HORN AND ASSOCIATES, INC. (KHA) HAS BEEN RETAINED TO OBSERVE THE SEWER CONSTRUCTION. KHA WILL SIGN, SEAL, AND SUBMIT AN ENGINEER'S CERTIFICATE OF COMPLETION TO MARICOPA COUNTY ENVIRONMENTAL SERVICES DEPARTMENT (MCESD) IN A FORMAT APPROVED BY THE DEPARTMENT CONTAINING ITEMS LISTED IN THE ARIZONA ADMINISTRATIVE CODE R18-9-E301-E-1. CONTRACTOR SHALL ENSURE KHA IS PRESENT FOR ALL CONSTRUCTION AND TESTING ACTIVITIES AND SHALL PROVIDE 48 HOURS NOTICE PRIOR TO SEWER MAIN EXCAVATION, INSTALLATION, OR TESTING ACTIVITIES (602-944-5500).
8. CONTRACTOR TO VERIFY SIZES AND INVERTS OF EXISTING SEWER AND CONTACT DESIGN ENGINEER IF DIFFERENT FROM SHOWN.
9. SEE GRADING PLAN FOR PROPOSED SURFACE ELEVATIONS.
10. PROFILE HORIZONTAL STATIONING IS MEASURED ALONG THE SANITARY SEWER CENTERLINE.

BENCHMARK

PER SURVEY INNOVATION GROUP, THE BENCHMARK IS A CITY OF SCOTTSDALE BRASS CAP IN HANDHOLE AT THE INTERSECTION OF UNION HILLS (MAYO BOULEVARD) AND SCOTTSDALE ROAD.

ELEVATION=1588.43 (NAVD-88)

BASIS OF BEARINGS

PER SURVEY INNOVATION GROUP, THE BASIS OF BEARING IS THE WEST LINE OF THE NORTHWEST QUARTER OF SECTION 35, TOWNSHIP 4 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE MERIDIAN, MARICOPA COUNTY, ARIZONA. SAID LINE BEARS S00°09'29"W.

PRIVATE SEWER AS-BUILT CERTIFICATION

I HEREBY CERTIFY THAT THE "RECORD DRAWING" MEASUREMENTS AS SHOWN HEREON WERE MADE UNDER MY SUPERVISION OR AS NOTED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

ARIZONA REGISTERED ENGINEER/LAND SURVEYOR — DATE

CALL TWO WORKING DAYS BEFORE YOU DIG
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THE PLAZA COMPANIES

NEC SCOTTSDALE ROAD AND CHAUNCEY LANE

SEWER PROFILE

SCOTTSDALE, ARIZONA

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C11

REV | DESCRIPTION | BY | DATE | APPR