KLAND CIVIL ENGINEERS

# Water and Sewer Basis of Design Report

# INSPIRE on EARLL

**#K14138**

**Case No. 880-PA-14**

**Prepared for:**
Deco Communities
8135 East Indian Bend Road, Suite 101
Scottsdale, AZ 85250
Contact: Dan Richards

**Submitted to:**
City of Scottsdale
7447 E. Indian School Road
Scottsdale, Arizona 85251

**Prepared by:**
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November 5, 2014

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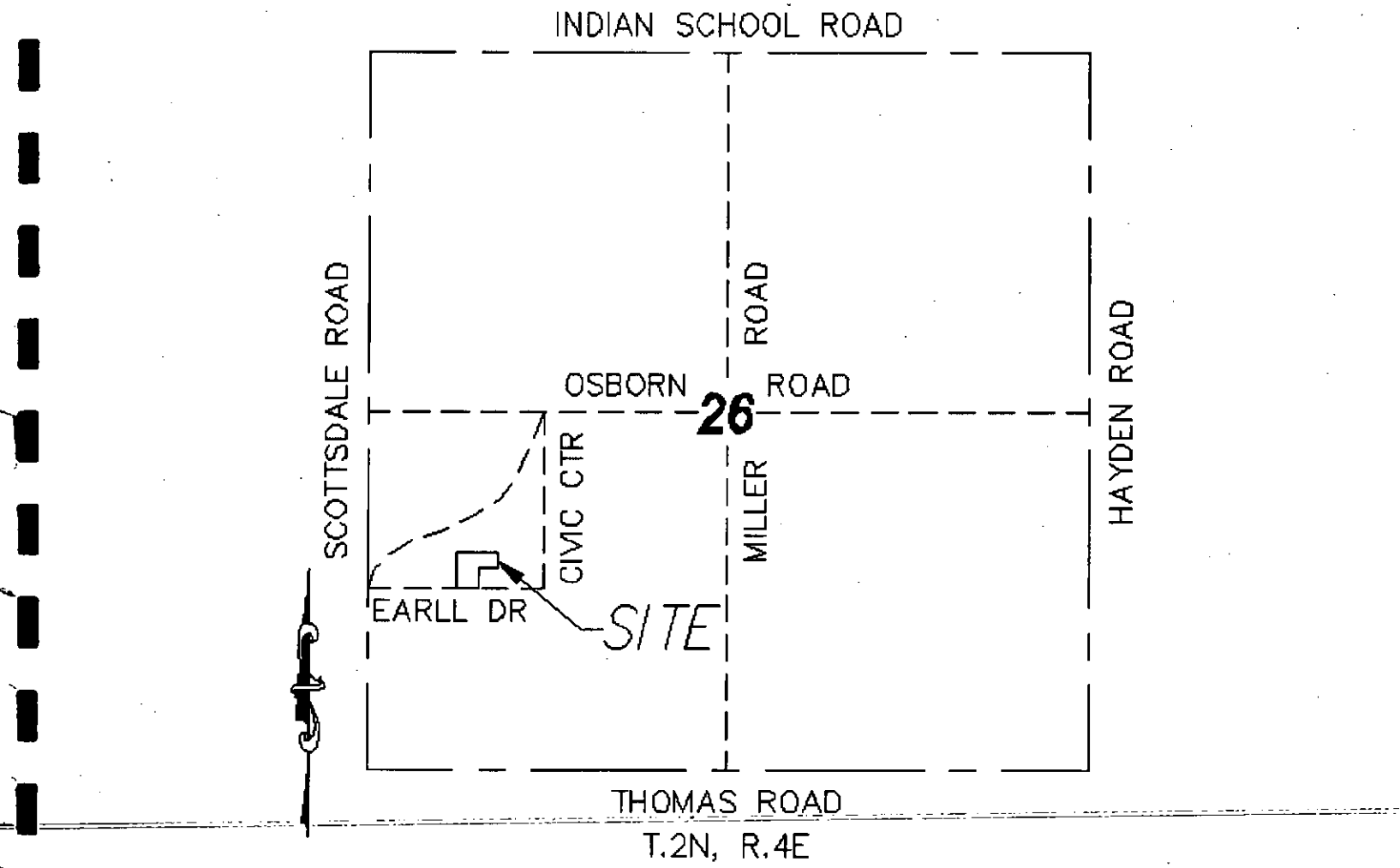
Expires 09/30/15

November 5, 2014

## 1. Introduction

The Earll Condos site is located east of the northeast corner of Scottsdale Road and Earll Drive in Scottsdale, Arizona. The site is bounded on the south by Earll Drive, on the west by a hotel, on the north and east by commercial developments. The proposed condominium projects will consist of 97 dwelling units, lobby and fitness center, pool, one level of underground parking, landscape and hardscape on approximately 2.44 net acres. The project is within a portion of the southwest ¼ of Section 26, Township 2 North, Range 4 East of the Gila and Salt River Base and Meridian in Maricopa County, Arizona. The sites are currently fully developed office building, surface parking, landscape and hardscape.

The site is located within COS Q.S. 15-45 which is the City of Scottsdale water and sewer service area. There is an existing 8-inch water line on the north side of Earll Drive adjacent to the site. There is an existing 8-inch sewer main on the north side of Earll Drive. In addition there is a 21-inch sewer main located in the center of Earll Drive.




**VICINITY MAP**

N.T.S.

## 2. Water System

The Earll Condos site will be serviced with a single 4-inch domestic water service and 1.5-inch landscape water service. There is an existing 4-inch water service located near the middle of the site that we anticipate using for domestic water service. There is an existing 6-inch fire line at the near the southeast corner of the site that we plan to utilized for the fire sprinkler service. A new fire hydrant is proposed at the driveway entrance at the southeast corner of the site. The site all has two meter that may be used for the landscape service. All existing water service that are not used for this development will be required to be removed per the City of Scottsdale requirements.

The fire hydrant coverage for this site is provided by an existing fire hydrant located at the southwest corner of the site and a new fire hydrant located at the southeast corner of the site. The FDC will be located within 150-feet of the new fire hydrant at the southeast corner of the building. A fire lane will be provide on both the east and west side of the building in accordance with the City of Scottsdale Design Standards & Polices Manual requirements.

A fire flow test was conducted for the site on October 22, 2014 by EJ Flow Tests, LLC. The flow test resulted in an anticipated 5,033 gpm of available water at 20 psi with a 16 psi safety factor. The minimum building fire demand is 2,000 gpm per the 2012 International Fire Code, Appendix B, Section B105.2 with the allowable 75% reduction. Water system was analyzed for average day, maximum day, peak hour and maximum day with fire demand. Water demand calculations and fire flow test are provided in Appendix A-1.

## 3. Sanitary Sewer System

We are estimating that the building will be serviced with two 8-inch sewer service. The 8-inch services will discharge into the existing 8-inch public sewer main on the north side of Earll Drive. The sewer services will be sized per IPC based on plumbing fixture units from the site. We are assuming the fixture units would be equally split between the two sewer services. Based on the anticipated fixture units for each sewer service a minimum slope of 0.5% to 1% per IPC will be used.

We have also estimated the sewer discharge from the site using The City of Scottsdale Design Standards & Polices Manual. The average daily flow was estimated at 0.0210 cfs, see Appendix A-1. The peak discharge was calculated by increasing the average daily flow by a factor of 4.5, which is a total of 0.095 cfs. The sewer discharge will be split between two 8-inch sewer services for a peak discharge of 0.0475 cfs each. Using Manning's Equation, we calculated that the proposed 8-inch sewer services at a minimum of 0.5% have a velocity of 2.45 fps flowing full with a capacity of 0.86 cfs. Pool backwash and drain system shall be connected to the sanitary sewer system and not discharge to the storm drain system. For the purpose of the design we have assumed a pool backwash flow rate of 100 gpm (0.22 cfs). Actual backwash discharge rate shall not exceed 100 gpm. Backwash pump and pipe sizing will be done by pool designer under separate permit. Sanitary Sewer Capacity Calculations are provided in Appendix A-2.

A trench drain is proposed at the bottom of the garage ramps and will discharge to the storm drain system. Additional floor drains may also be installed within the lower garage levels. The floor drains will go through a sand and oil separator prior to being discharged to the sewer system or pumped to the storm drain system. The trash compactor is located within the building. No drains are planned in the trash compactor area however if a drain is installed during final design it will need to be connected to a sand and oil separator prior to discharging to the sanitary sewer system.

See Appendix A-3 for the Conceptual Water and Sewer Layout Exhibit.

## 4. References


1. City of Scottsdale Design Standards & Policies Manual.

2. 2012 International Fire Code, Appendix B, Fire-Flow Requirements for Buildings

# APPENDIX A-1

# Water Calculations

RESIDENTIAL

| | |
|---|---|
| Number of units: | 97 |
| Average day demand per dwelling unit: | 185.3 |
| **Average day demand:** | **97 x 185.3 = 17,974 gpd (12.48 gpm)** |
| Maximum daily peaking factor: | 2.0 |
| Maximum daily demand per dwelling unit: | 370.60 gpd |
| **Maximum day demand:** | **97 x 370.60 = 35,948 gpd (24.96 gpm)** |
| Peak hour demand factor: | 3.5 |
| Peak hour demand per dwelling unit: | 648.55 gpd |
| **Peak hour demand:** | **97 x 648.55 = 62,909 gpd (43.69 gpm)** |

FIRE FLOW DEMAND

| | | | |
|---|---|---|---|
| Building Area | = 157,605 sf, | Construction Type = IIIB, | Required Fire Flow = 8,000 gpm |
| Garage Area | = 76,431 sf, | Construction Type = IB, | Required Fire Flow = 3,000 gpm |

Per 2012 International Fire Code, Appendix B, Section B105.2 a 75% reduction in the fire flow can be approved if an approved automatic sprinkler system is installed. The resulting fire flow shall not be less than the required minimum of 1,500 gpm. We are using a fire flow of 2,000 gpm based on a 75% reduction of the required fire flow.

TOTAL SITE DEMAND

| | |
|---|---|
| Fire flow demand (see demand calculation above): | 2,000 gpm |
| **Peak hour demand + Fire Flow Demand** | **43.69 + 2,000 = 2,043.69 gpm** |

E•J Flow Tests

FLOW TESTING SERVICES

# Flow Test Summary

| | |
|---|---|
| EJ Flow Tests Project Name: | Deco Earll |
| EJ Flow Tests Project No.: | 14134 |
| Project Address: | 7300 East Earll Drive, Scottsdale, Arizona 85251 |
| Date of Flow Test: | October 22, 2014 |
| Time of Flow Test: | 7:50AM |
| Data is Current and Reliable Until: | April 22, 2015 |

City of Scottsdale requires a Maximum Static Pressure of 72 PSI for use as Safety Factor.

## Raw Test Data:

| | | |
|---|---|---|
| Static Pressure: (measured in pounds per square inch) | 88.0 | psi |
| Residual Pressure: (measured in pounds per square inch) | 77.0 | psi |
| Pitot Pressure: (measured in pounds per square inch) | 42.0 | psi |
| Number of Outlets Flowed: | 2 | |
| Fire Hydrant Orifice Diameter: (measured in inches) | 2.5 | inches |
| Coefficient of Discharge: (0.9 smooth/round outlet, 0.8 square/sharp outlet, 0.7 square/raised outlet) | 0.9 | |
| Flowing GPM: (measured in gallons per minute) | 2,176 | |
| GPM at 20 PSI: | 5,818 | |

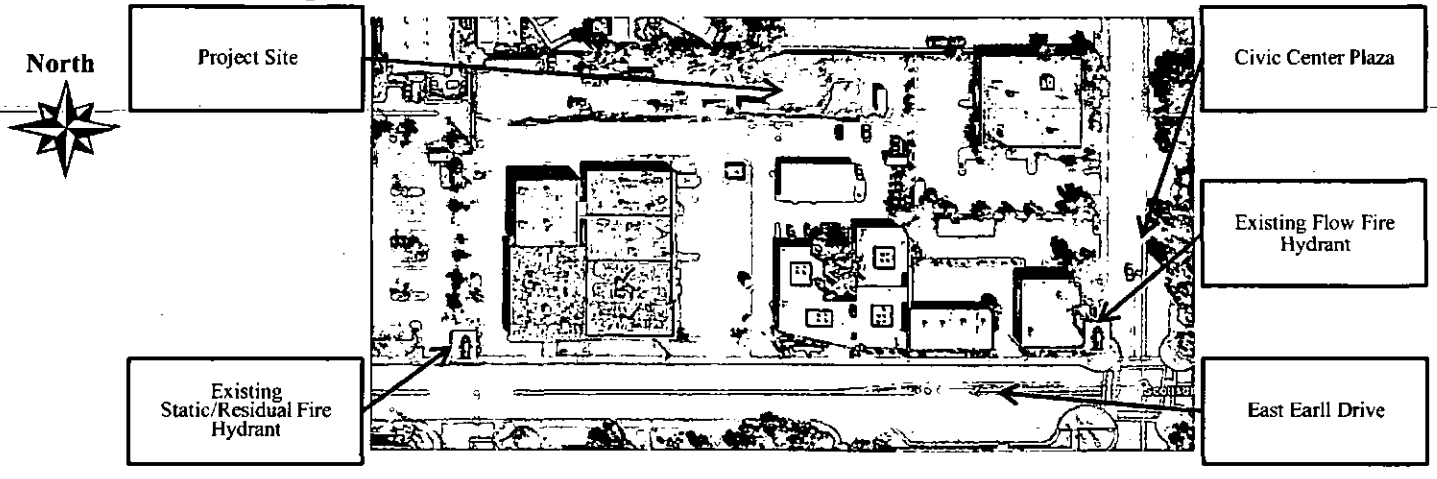
## Data with minimum safety factor of: 16 PSI :

| | | |
|---|---|---|
| Static Pressure: (measured in pounds per square inch) | 72.0 | psi |
| Residual Pressure: (measured in pounds per square inch) | 61.0 | psi |
| Main Size: (measured in inches) | 8 | |
| Approximate Distance Between Hydrants: (measured in feet) | 635 | ft |
| Approx. Static/Residual Hydrant Elevation: (measured above sea level) | 1,241 | ft |
| Approx. Flow Hydrant Elevation: (measured above sea level) | 1,238 | ft |
| Flowing GPM: (measured in gallons per minute) | 2,176 | |
| GPM at 20 PSI: | 5,033 | |

## Conducted by/Witnessed by/City Forces Contacted:

| | |
|---|---|
| Conducted by: | John Echeverri, Cesar Reyna, & Austin Gourley (EJ Flow Tests) 602.999.7637 |
| Witnessed by: | Phil Cipolla (City of Scottsdale) 602.828.0847 |
| City Forces Contacted: | City of Scottsdale (Permit Number C46139) |

## Flow Test Vicinity Map (No Scale)




E J Flow Tests, LLC
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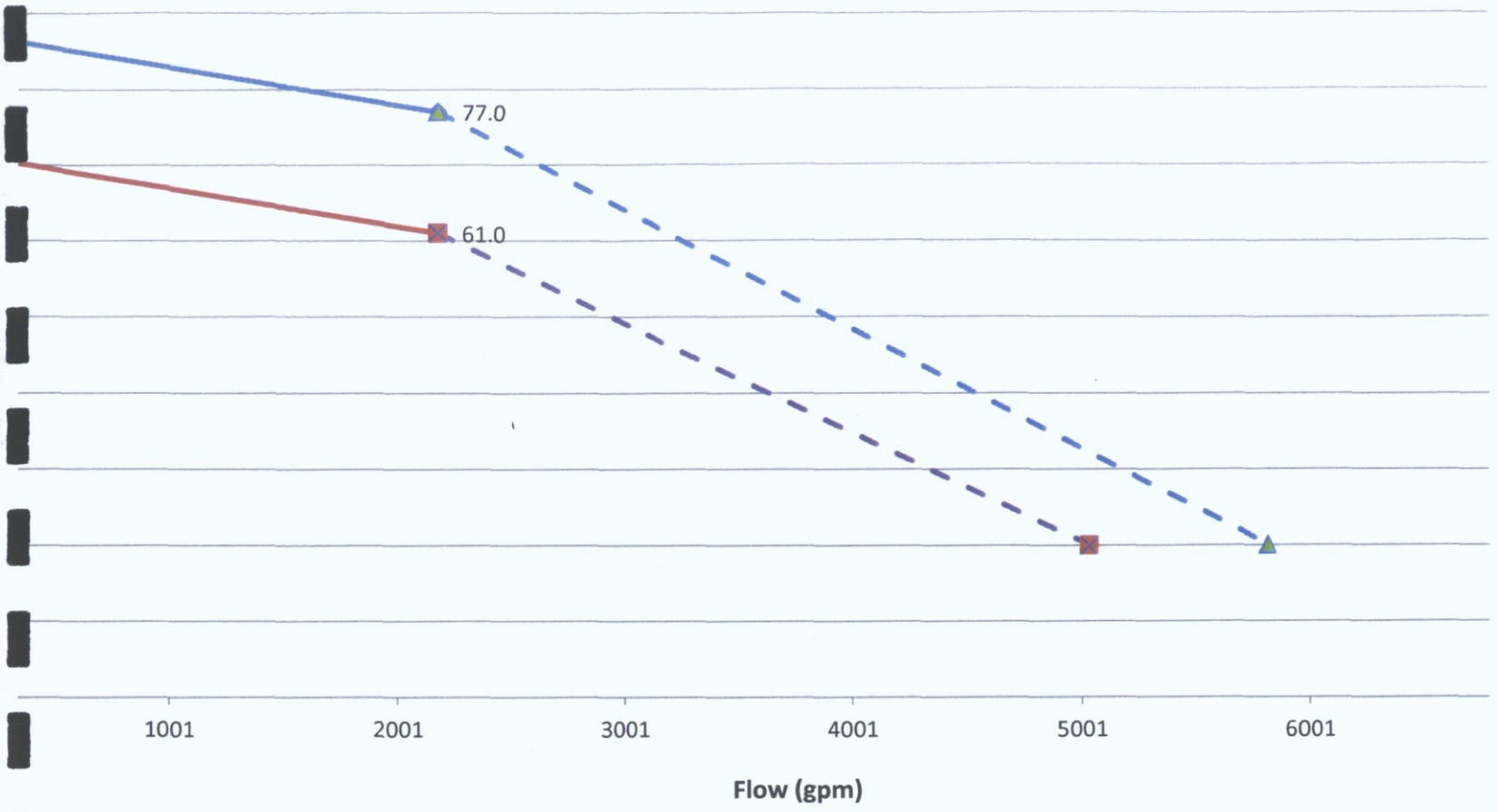
John L. Echeverri • NICET Level IV 078493 SME • C-16 FP Contractor ROC 271705 AZ • NFPA CFPS 1915

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# APPENDIX A-2

# Sanitary Sewer Calculations

**Manning's Formula**

8" Pipe Flowing Full

**Capacity**

$$Q = \frac{1.49}{n} * R^{2/3} * S^{1/2} * A$$

n = 0.013
R = 0.16667
A = 0.3490
S = 0.0050 ft/ft

Q = 0.86 cfs

**Velocity**

$$Q = \frac{1.49}{n} * R^{2/3} * S^{1/2}$$

n = 0.013
R = 0.16667
S = 0.0050 ft/ft

V = 2.45 fps

## Sewer Demand Calculations

**Average daily flow**

**Condominium**

| | |
|---|---|
| Number of Units: | 97 |
| Average day demand per dwelling unit: | 140 |
| **Average day demand:** | **97 x 140 = 13,580 gpd** |

**Total average daily flow:** **13,580 gpd = 0.0210 cfs**

**Peak daily flow**

0.0195 cfs x 4.5 = 0.095 cfs or 42 gpm

The site sewer discharge is split between two 8" sewer services.
Peak demand of 0.095 cfs / 2 = **0.0475 cfs**

Capacity of **0.86** cfs > Peak Demand of **0.0475 cfs**

**Pool Backwash Flow Rate**

100 gpm (0.22 cfs) assumed for preliminary purposes. Actual discharge and pipe sizing will be calculated at the time of final design.

# APPENDIX A-3

# Conceptual Water
# And
# Sewer Layout Exhibit