

STAFF REPORT FOR THE PLANNING COMMISSION MEETING OF JULY 28, 2021

FILE NO: LU-2021-0218;
VAR-2021-0232;
SUB-2021-0215

AGENDA ITEM: 13.D, 13.E, 13.F

STAFF CONTACT: Heather Ferris, Associate Planner

AGENDA TITLE: For Possible Action: Discussion and possible action regarding a request for a Special Use Permit to allow for a 52-unit attached single family residential development on 3.45 acres zoned Neighborhood Business Planned Unit Development (NB-P), located at 1147 W College Parkway, APNs 007-462-16 and 007-462-17. (Heather Ferris, hferris@carson.org)

Summary: Carson City Municipal Code (CCMC) 18.04.120 allows a residential use in the Neighborhood Business zoning district as a conditional use. As it is a conditional use, it may only be established upon approval of a Special Use Permit by the Planning Commission. This application is made in conjunction with SUB-2021-0215 and VAR-2021-0232, the next two items on this agenda. The Planning Commission is authorized to approve a Special Use Permit.

For Possible Action: Discussion and possible action regarding a request for a variance to reduce the setback along the south-eastern property line, adjacent to John Mankins Park, on 3.45 acres zoned Neighborhood Business Planned Unit Development (NB-P), located at 1147 W College Parkway, APNs 007-462-16 and 007-462-17. (Heather Ferris, hferris@carson.org)

Summary: Carson City Development Standards (CCDS) Division 1.18, subsection 4(a) requires a minimum setback of 20 feet when adjacent to a residential zoning district with an additional 10 feet for each story above 1 story. The applicant is proposing two-story, attached single-family homes and is requesting a variance to allow for a 10-foot setback along the south-eastern property line, adjacent to John Mankins Park. This application is made in conjunction with SUB-2021-0215 and LU-2021-0219. The Planning Commission is authorized to approve a variance.

For Possible Action: Discussion and possible action regarding a request for a Tentative Subdivision Map for a development known as Silver Oak at College Parkway to create 52 lots for attached single family residences on two parcels totaling 3.45 acres zoned Neighborhood Business Planned Unit Development (NB-P), located at 1147 W College Parkway, APNs 007-462-16 and 007-462-17.

Summary: The applicant is proposing to subdivide 3.45 acres into 52 lots for attached single family residential development, with a lot size of 1,237 square feet. Common open space will be provided throughout the development and each unit will have a private patio and deck area. This application is made in conjunction with LU-2021-0218 and VAR-2021-0232. The Board of Supervisors is authorized to approve a Tentative Subdivision Map. The Planning Commission makes a recommendation to the Board.

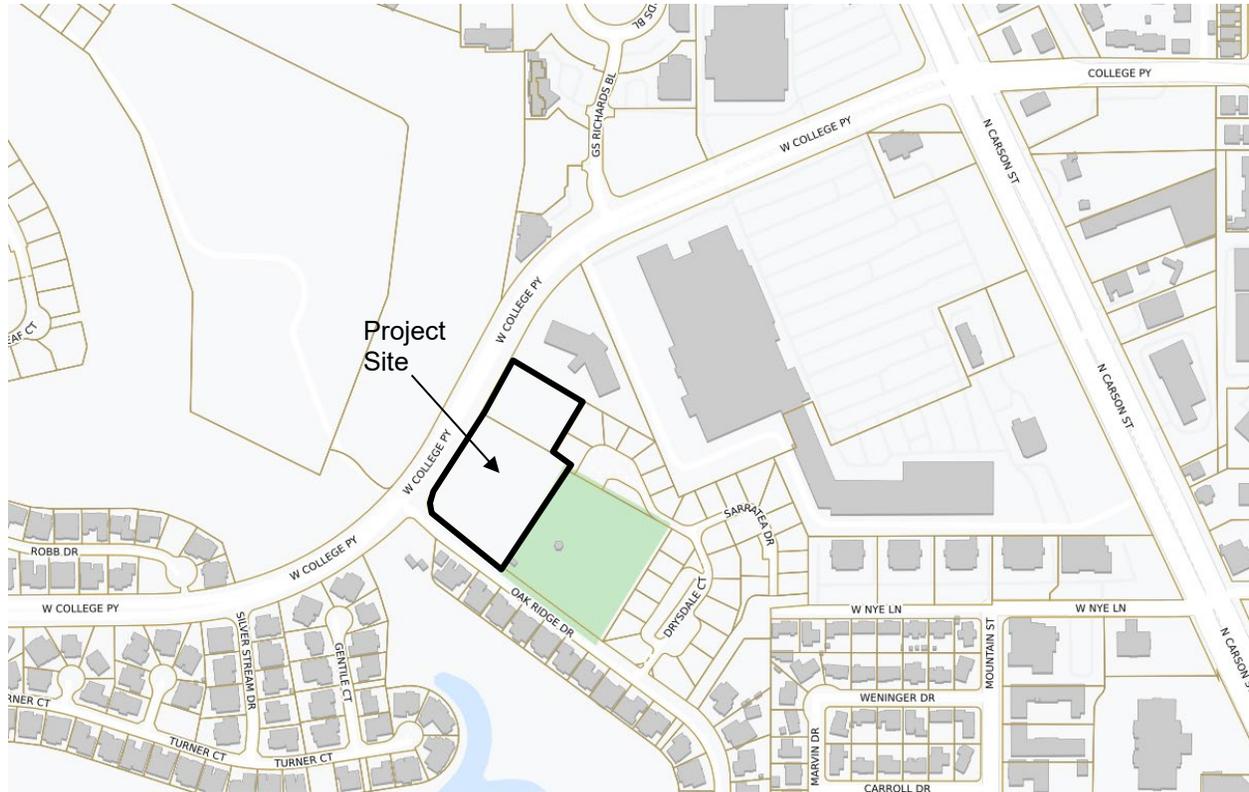
RECOMMENDED MOTIONS:

“I move to approve Special Use Permit LU-2021-0218 based on the ability to make the required findings and subject to the conditions of approval as outlined in the staff report.”

I move to approve a Major Variance VAR-2021-0232 based on the ability to make the required findings and subject to the conditions of approval included in the staff report.”

“I move to recommend approval of Tentative Subdivision Map SUB-2021-0215 to the Board of Supervisors based on the ability to make the required findings and subject to the conditions of approval included in the staff report.”

VICINITY MAP:



RECOMMENDED CONDITIONS OF APPROVAL: Tentative Map

The following are conditions of approval required per CCMC 18.02.105.5:

1. All final maps shall be in substantial accord with the approved tentative map.
2. Prior to submittal of any final map, the development engineering department shall approve all on-site and off-site improvements. The applicant shall provide construction plans to the development engineering department for all required on-site and off-site improvements, prior to any submittals for approval of a final map. The plan must adhere to the recommendations contained in the project soils and geotechnical report.
3. Lots not planned for immediate development shall be left undisturbed and mass grading and clearing of natural vegetation shall not be allowed. Any and all grading shall comply with city standards. A grading permit from the Nevada Division of Environmental Protection shall be obtained prior to any grading. Noncompliance with this provision shall cause a cease-and-desist order to halt all grading work.
4. All lot areas and lot widths shall meet the zoning requirements approved as part of this tentative map with the submittal of any parcel map or preferably final map.

5. With the submittal of any parcel map or preferably final maps, the applicant shall provide evidence to the planning and community development department from the health and fire departments indicating the agencies' concerns or requirements have been satisfied. Said correspondence shall be included in the submittal package for any final maps and shall include approval by the fire department of all hydrant locations.
6. The following note shall be placed on all final maps stating:

"These parcels are subject to Carson City's growth management ordinance and all property owners shall comply with provisions of said ordinance."
7. Placement of all utilities, including AT&T Cablevision, shall be underground within the subdivision. Any existing overhead facilities shall be relocated prior to the submittal of final maps.
8. The applicant must sign and return the notice of decision for conditions for approval within 10 days of receipt of notification after the board of supervisors meeting. If the notice of decision is not signed and returned within 10 days, then the item will be rescheduled for the next planning commission meeting for further consideration.
9. Hours of construction will be limited to 7:00 a.m. to 7:00 p.m., Monday through Friday, and 7:00 a.m. to 5:00 p.m. on Saturday and Sunday. If the hours of construction are not adhered to, the Carson City building department will issue a warning for the first violation, and upon a second violation, will have the ability to cause work at the site to cease immediately.
10. The applicant shall adhere to all city standards and requirements for water and sewer systems, grading and drainage, and street improvements.
11. The applicant shall obtain a dust control permit from the Nevada Division of Environmental Protection. The site grading must incorporate proper dust control and erosion control measures.
12. A detailed storm drainage analysis, water system analysis, and sewer system analysis shall be submitted to the development engineering department prior to approval of a final map.
13. Prior to the recordation of the final map for any phase of the project, the improvements associated with the project must either be constructed and approved by Carson City, or the specific performance of said work secured, by providing the city with a proper surety in the amount of 150 percent of the engineer's estimate. In either case, upon acceptance of the improvements by the city, the developer shall provide the city with a proper surety in the amount of 10% of the engineer's estimate to secure the developer's obligation to repair defects in workmanship and materials which appear in the work within 1 year of acceptance by the city.
14. A "will serve" letter from the water and wastewater utilities shall be provided to the Nevada Health Division prior to approval of a final map.
15. The district attorney shall approve any CC&R's prior to recordation of the first final map.

Other Conditions of Approval:

16. The internal street shall be privately owned and maintained.
17. The water main must be private, and the line shall be master metered with appropriate backflow preventers.
18. The developer shall install a curb ramp, meeting current ADA standards, at the intersection of College Parkway and Oak Ridge Drive.
19. The developer shall enter into an agreement to pay it's pro-rata share of the cost to improve approximately 1,135 feet of 12 inch sewer main which is currently at capacity in College Parkway between Imperial Way and Granite Way. The pro-rate share for this development is 1.6 percent and is not to exceed \$9,600.
20. As part of the site improvement permit, the applicant must provide a landscape plan demonstrating compliance with the Development Standards in Division 3.
21. Carson City is a nationally recognized Bee City USA. As a result, the applicant shall use approximately 50% pollinator friendly plant material for any required landscaping on the project site. A recommended tree and shrub species list has been provided. Any remaining landscape plant material selection must be consistent with the City's approved tree species list or other tree species, as approved by the City.
22. An exhibit demonstrating compliance with the open space requirements (Carson City Development Standards 1.18.6) shall be included in the application for site improvement permit.
23. The applicant is required to incorporate "best management practices" into their construction documents and specifications to reduce the spread of noxious weeds. The Parks, Recreation & Open Space Department is willing to assist the applicant with this aspect of their project as needed.
24. The applicant shall provide the Community Development Department with a deed restriction for recordation at the time the final map is submitted for recordation. The document shall state the following:
 - Variance (VAR-2021-0232) has been approved placing the homes along the south-eastern boundary of the project site within 20 feet closer to the existing park on APN 007-462-13, than is required by Carson City Development Standards 1.18. There may be inconvenience or discomfort, including but not limited to noise, glare, or physical activity, associated with the proximity to such a use.
25. At the time of recordation of the final map, a private Homeowner's Association (HOA) or similar entity must be formed to provide maintenance for all common areas, including the private road, in perpetuity.
26. The Tentative Subdivision Map is only approved if the applicant obtains approval from the Planning Commission for the following concurrent applications:
 - a. LU-2021-0218- A Special Use Permit for a residential use in a non-residential zoning district.

- b. VAR-2021-0232- A Variance from Division 1.18.4(b) requiring a minimum of a 20-foot setback plus 10 feet for each story above one-story if adjacent to a single-family zoning district.

RECOMMENDED CONDITIONS OF APPROVAL: Special Use Permits (LU-2021-0218)

1. All development shall be substantially in accordance with the plans presented to the Planning Commission.
2. All on and off-site improvements shall conform to city standards and requirements.
3. The use for which this permit is approved shall expire with the Tentative Subdivision Map (SUB-2021-0215).
4. The applicant must sign and return the notice of decision for conditions of approval within 10 days of receipt of notification. If the notice of decision is not signed and returned within 10 days, then the item will be rescheduled for the next planning commission meeting for further considerations.

RECOMMENDED CONDITIONS OF APPROVAL: Variance (VAR-2021-0232)

1. All development shall be substantially in accordance with the plans presented to the Planning Commission.
2. All on and off-site improvements shall conform to city standards and requirements.
3. The use for which this permit is approved shall expire with the Tentative Subdivision Map (SUB-2021-0215).
4. The applicant must sign and return the notice of decision within 10 days of receipt of notification. If the notice of decision is not signed and returned within 10 days, then the item will be rescheduled for the next planning commission meeting for further consideration.

LEGAL REQUIREMENTS: CCMC 17.05 (Tentative Maps); CCMC 17.07 (Findings); CCMC 18.02.080 (Special Use Permit); 18.04.120.3 (Neighborhood Business); (Development Standards 1.18 (Residential development standards in non-residential districts); NRS 278.330

SITE DEVELOPMENT INFORMATION:

SUBJECT SITE AREA: 3.45 acres
EXISTING LAND USE: Vacant

MASTER PLAN DESIGNATION: High Density Residential (HDR)

ZONING: Neighborhood Business Planned Unit Development (NB-P)

KEY ISSUES: Will the Special Use Permit meet the required findings and will the proposed residential use be compatible with the surrounding neighborhood and in keeping with the standards of CCMC? Is the Tentative Map consistent with the required findings? Does the proposal meet the Tentative Map requirements and other applicable requirements? Can the proposed reduced setbacks be supported by the required findings?

SURROUNDING ZONING AND LAND USE INFORMATION

NORTH: Neighborhood Business Planned Unit Development / Senior Living Facility
SOUTH: Single Family 12,000 Planned Unit Development / Single family residences & golf course
EAST: Single Family 12,000 Planned Unit Development / Single family residences & park
WEST: Single Family 12,000 Planned Unit Development / golf course

ENVIRONMENTAL INFORMATION:

FLOOD ZONE: Zone X shaded
SEISMIC ZONE: Zone I (Greatest Severity)
FAULT: Beyond 500 feet

DISCUSSION:

The project site consists of two parcels totaling 3.45 acres in size and is zoned Neighborhood Business Planned Unit Development. The applicant is seeking approval of a Tentative Subdivision Map to subdivide the 3.45 acres into 52 lots for an attached single family development with 25,266 square feet of common area open space. Two points of access are proposed to connect to Oak Ridge Drive and West College Parkway with the interior roads proposed to be privately owned and maintained.

The project site is located within the Silver Oak Planned Unit Development. Commercially zoned parcels within the PUD are limited to those uses outlined in the zoning code. Per Carson City Municipal Code (CCMC) 18.04.120.3, a residential use is a conditional use in the Neighborhood Business zoning district and therefore requires a Special Use Permit, subject to the supplemental standards outlined in Division 1.18 of the Development Standards (Residential Development Standards in Non-Residential Districts). Carson City Development Standards (CCDS) Division 1.18.4(a) requires a minimum setback of 20 feet when adjacent to a residential zoning district, with an additional 10 feet for each story above 1 story. This would result in a required 30-foot setback along the south-eastern property line adjacent to John Mankins Park; however, the applicant is requesting a variance to allow for a 10-foot setback adjacent to the park.

There is no maximum density within non-residential zoning districts subject to meeting the height, setback, parking, and open space requirements. The overall design concept is single family attached with a lot size 1,237 square feet. The lots include all aspects of the building including patios and porches. The applicant proposes three floor plans. Each unit will be two-story, and will range in size from 1,529 to 1,627 square feet. Private open space will be provided in the form of patios and porches for each unit with 25,266 square feet of common open space throughout the project site. Proposed setbacks are as follows:

Periphery Setbacks:

| | |
|-------------------|---------|
| Front Yard- | 10 feet |
| Street Side Yard- | 10 feet |
| Side Yard | 15 feet |
| Rear Yard- | 10 feet |

Internal setbacks are 0 feet between lots

Parking is proposed to be provided via standard two car garages for each unit. Consistent with Division 2 of the Development Standards, on-site guest parking will be provided at a ratio of 1 space for every two units for a total of 35 spaces.

The Planning Commission is authorized to approve a Special Use Permit and Variance upon making the seven required findings of fact. The Planning Commission conducts a public hearing and advises the Board if the proposed tentative map is consistent with the provisions of the Municipal Code and NRS 278.320.

PUBLIC COMMENTS: Public notices were mailed to 60 property owners within 600 feet of the subject site pursuant to the provisions of NRS and CCMC for the Tentative Subdivision Map application. As of the completion of this staff report no public comments have been received. Any written comments that are received after this report is completed will be submitted prior to or at the Planning Commission meeting on July 28, 2021 depending upon their submittal date to the Planning Division.

OTHER CITY DEPARTMENT OR OUTSIDE AGENCY COMMENTS: The following comments were received from City departments. Recommendations have been incorporated into the recommended conditions of approval, where applicable.

Engineering Division

The Engineering Division has no preference or objection to the tentative map and special use permit request and offers the following conditions of approval:

- The new street must be private as proposed.
- Due to the use of the special street section, the water main must be private. This will necessitate that the line be master metered with appropriate backflow preventers.
- A curb ramp, meeting current ADA standards, must be installed at the intersection of College Parkway and Oak Ridge Drive (see CCMC 11.12.081).
- The project must enter into an agreement to pay it's pro rata share of the cost to improve approximately 1,135 feet of 12" sewer main which is currently at capacity in College Parkway between Imperial Way and Granite Way. The pro rata share for this development is 1.6%, and is not to exceed \$9,600.00
- The project must meet all Carson City Development Standards and Standard Details.

The Engineering Division has reviewed the application within our areas of purview relative to adopted standards and practices and to the provisions of CCMC 17.07.005 and CCMC 18.02.080. The following Tentative Map Findings by the Engineering Division are based on approval of the above conditions of approval:

1. *Environmental and health laws and regulations concerning water and air pollution, the disposal of solid waste, facilities to supply water, community or public sewage disposal and, where applicable, individual systems for sewage disposal.*

Water: The existing water main is 12-inch PVC on the west side of the property and 10-inch PVC on the southwest side of the property. The new domestic water system must be private with a master meter and backflow prevention per the above conditions of approval.

Sewer: The existing sewer main is 15-inch PVC on the west side of the property and 8-inch PVC on the southwest side of the property. The 15" main is approximately 30% full and the 8" main is approximately 5% full (d/D). The downstream main in College Parkway is at capacity and the development is required to enter into a pro-rata share agreement per the above recommended conditions of approval.

- 2. The availability of water which meets applicable health standards and is sufficient in quantity for the reasonably foreseeable needs of the subdivision.*

The City has sufficient system capacity and water rights to meet the required water allocation for the subdivision.

- 3. The availability and accessibility of utilities.*

Water, sanitary sewer, and stormwater utilities are available and accessible.

- 4. The availability and accessibility of public services such as schools, police protection, transportation, recreation and parks.*

The road network necessary for the subdivision is available and accessible.

- 5. Access to public lands. Any proposed subdivision that is adjacent to public lands shall incorporate public access to those lands or provide an acceptable alternative.*

There is a public park adjacent to this project. These lands are accessible via Oak Ridge Drive.

- 6. Conformity with the zoning ordinance and land use element of the city's master plan.*

Development Engineering has no comment on this finding.

- 7. General conformity with the city's master plan for streets and highways.*

The development is in conformance with the city's master plan for streets and highways.

- 8. The effect of the proposed subdivision on existing public streets and the need for new streets or highways to serve the subdivision.*

Local intersections: The site is at the corner of Oak Ridge Dr and W College Pkwy. Oak Ridge Dr is a local street while W College Pkwy is a minor collector.

Parking and internal circulation: There will be on-site parking offered via 2 car garages and on-site parking lots. There is no on street parking on Oak Ridge Dr or W College Pkwy. It was determined by the City's Transportation Department that no further analysis was needed on the existing intersections in the area.

- 9. The physical characteristics of the land such as flood plains, earthquake faults, slope and soil.*

Earthquake faults: The closest fault is over 500 feet with a slip rate of less than 0.2 mm/yr.

FEMA flood zones: The FEMA flood zone is Zone X (shaded).

Site slope: The site's slope is between 0% to 2%.

Soils and Groundwater: The soil on site is coarse sandy loam with the groundwater table about 11 feet deep according to the geotechnical report provided.

10. *The recommendations and comments of those entities reviewing the subdivision request pursuant to NRS 278.330 thru 278.348, inclusive.*

Development Engineering has no comment on this finding.

11. *The availability and accessibility of fire protection including, but not limited to, the availability and accessibility of water and services for the prevention and containment of fires including fires in wild lands.*

The subdivision has sufficient secondary access, and sufficient fire water flows.

12. *Recreation and trail easements.*

Development engineering has no comment on this finding.

Special Use Permit Findings-

C.C.M.C. 18.02.080 (5a) - Master Plan

The request is not in conflict with any Engineering Master Plans.

C.C.M.C. 18.02.080 (5b) – Use, Peaceful Enjoyment, Economic Value, Compatibility

Development Engineering has no comment on this finding.

C.C.M.C. 18.02.080 (5c) - Traffic/Pedestrians

See finding #8 above.

C.C.M.C. 18.02.080 (5d) - Public Services

See findings #1 & #3 above.

C.C.M.C. 18.02.080 (5e) – Title 18 Standards

Development Engineering has no comment on this finding.

C.C.M.C. 18.02.080 (5f) – Public health, Safety, Convenience, and Welfare

The project will meet engineering standards for health and safety if conditions are met.

C.C.M.C. 18.02.080 (5g) – Material Damage or Prejudice to Other Property

Development Engineering has no comment on this finding.

C.C.M.C. 18.02.080 (5h) – Adequate Information

The plans and reports provided were adequate for this analysis.

These comments are based on the tentative map plans and reports submitted. All applicable code requirements will apply whether mentioned in this letter or not.

Fire Department

Project must comply with the International Fire Code and northern Nevada fire code amendments as adopted by Carson City.

SPECIAL USE PERMIT FINDINGS: Staff recommends approval of the Special Use Permit based on the findings below and in the information contained in the attached reports and documents, pursuant to CCMC 18.02.080.5 (Findings), subject to the recommended conditions of approval, and further substantiated by the applicant's written justification. In making findings for approval, the Planning Commission must consider:

1. Will be consistent with the objectives of the Master Plan elements;

The project is consistent with the Master Plan. The project site is designated as High Density Residential which is designed to create opportunities for higher-density neighborhoods in an urban and suburban setting with densities ranging from 8 to 36 units per acre. The proposed density of the project is 15 units per acre.

The requested development is consistent with the concept of a Compact and Efficient Pattern of Growth (Guiding Principle 1). Carson City is committed to a compact pattern that makes efficient use of land area and water resources available for urban growth, and that fosters the provisions of infrastructure and services in a cost effective manner. The subject property can be served by water and sewer.

Guiding Principle 7 discusses compact, mixed use activity centers, stating “Carson City will encourage the creation of compact, mixed-use activity centers in easily accessible and highly visible locations of the community. The activity centers will promote the efficient use of available commercial lands and concentrate retail services in pedestrian and transit-oriented development nodes that may be easily accessed from and serve surrounding neighborhoods. Activity centers will vary in size and composition depending upon their location, context, and level of priority.

Staff finds that the proposed development is consistent with the concepts of compact development, placing people near economic centers to encourage mixed use activity centers.

2. Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare or physical activity;

The subject property is surrounded by single family residences, John Mankins Park, a senior living facility, and the golf course to the south. The project proposes a single family attached product, providing a transitional use between the commercial use (senior living facility) and the residential uses. The proposed use is consistent with the existing neighborhood and will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood. While the applicant is also seeking a variance from the 30-foot setback along the common property line with John Mankins Park, the proposed single family residential use is compatible the Park. Moreover, the proposed setback of 10 feet will be in keeping with the setbacks from the park for other homes in the area.

3. Will have little or no detrimental effect on vehicular or pedestrian traffic;

As proposed and conditioned, the project will have little or no detrimental effect on vehicular or pedestrian traffic. The applicant has provided a traffic memo outlining the estimated trips, based on the ITE Trip Generation Manual. The project is anticipated to generate approximately 305 daily trips with an AM peak of 23 trips and a PM peak of 28 trips. This is below the threshold for a full traffic analysis. The project will be required to install a curb ramp, meeting current ADA standards, must be installed at the intersection of College Parkway and Oak Ridge Drive.

4. Will not overburden existing public services and facilities, including schools, police and fire protection, water, sanitary sewer, public roads, storm drainage and other public improvements;

The project is located adjacent to existing single family and commercial developments which are served by the existing public services including schools, sheriff, transportation facilities, and parks. Staff has consulted with the School District. The District has indicated they do not have any additional comments beyond the information provided for previous projects and have indicated that the School District will be re-districting which should help. For previous projects the School District indicated that they remain concerned about capacity and advised that for every 100 new homes it expects about 30 new students. With most of the schools now at capacity, the limited capital funding for new facilities, it is concerned, as it cannot “rezone” its way out of the problem. The school district has advised that it is doing its utmost to prepare for growth, within its means. Development Engineering has reviewed the development for impacts to water, sewer, storm drainage, and roadway systems. The existing water, storm drain, and roadway infrastructure is sufficient to serve the project. The downstream sewer main in College Parkway is at capacity and staff has recommended a condition of approval requiring the developer enter into a pro-rata share agreement for the future upgrading of the downstream sewer. The Fire Department has also reviewed the development. As proposed, sufficient access is provided. As noted in the Fire Department comments, the project must comply with the currently adopted edition of the International Fire Code and the Northern Nevada Fire Code Amendments as adopted by Carson City.

5. Meets the definition and specific standards set forth elsewhere in this Title for such particular use and meets the purpose statement of that district;

The project meets the definition and specific standards set forth in Title 18. The subject property is zoned Neighborhood Business Planned Unit Development. A residential use is a conditional use in this zoning district. Development Standards 1.18 provides standards for residential development in non-residential zoning districts, as well as supplemental findings. Compliance with the provisions of 1.18- Residential Development Standards in non-residential districts is outlined below:

The following standards are intended to establish minimum standards and Special Use Permit review criteria for residential development within the Neighborhood Business (NB), Retail Commercial (RC), General Commercial (GC), Residential Office (RO) and General Office (GO) zoning districts.

Permitted uses. Residential uses are only allowed as permitted by Chapter 18.04, Use Districts, as a primary or conditional use in the applicable zoning districts.

The subject property is located in the Neighborhood Business Planned Unit Development zoning district and therefore residential uses are allowed subject to first obtaining approval of a Special Use Permit.

Maximum permitted density. There is no maximum residential density within non-residential zoning districts subject to meeting the height, setback, parking and open space requirements of this chapter.

The density for the project is 15 units per acre. The proposed development will comply with the height, parking, and open space requirements. Additional discussion regarding setbacks is below.

Maximum building height shall be the maximum height established by the zoning district in which the project is located.

The Neighborhood Business zoning allows for a maximum height of 26 feet. The applicant proposes two-story single family attached units with a maximum height of 26 feet measured to the peak.

Setbacks. *Minimum setbacks shall be those established by the zoning district in which the project is located, subject to the following:*

a. *In the NB, RC, GC and GO zoning districts, a minimum setback of twenty (20) feet is required adjacent to a residential zoning district, with an additional ten (10) feet for each story above one (1) story if adjacent to a single-family zoning district.*

The Neighborhood Business zoning district calls for a setback of 0 feet but additional setbacks are required when a residential development is proposed in a non-residential district adjacent to a single-family zoning district. As noted above, the applicant proposes two-story units; therefore, a 30-foot setback would be required along the south-eastern property line. As proposed, this setback is not met. The applicant is requesting a variance to allow for a 10-foot setback along this property line (variance findings addressed separately). Therefore, this Special Use Permit is conditioned on the applicant obtaining approval of the variance.

b. *A minimum setback of ten (10) feet is required from the right-of-way of an arterial street as identified in the adopted Transportation Master Plan, excluding the Downtown Mixed-Use area.*

As proposed, the units will be a minimum of 10 feet from the right-of-way.

Required parking: *Two (2) spaces per dwelling unit; and in compliance with the Development Standards Division 2, Parking and Loading.*

Two parking spaces are required for each unit and an additional 1 space per 2 units for guest spaces for a total of 130 required on-site spaces. The applicant is proposing a standard 2 car garage to accommodate parking for each unit with an additional 35 on-site guest spaces. As proposed, sufficient parking will be provided that the Special Use Permit for tandem parking is approved.

Open Space.

a. *For Multi-Family Residential development, a minimum of 150 square feet per dwelling unit of common open space must be provided. For projects of 10 or more units, areas of common open space may only include contiguous landscaped areas with no dimension less than 15 feet, and a minimum of 100 square feet per unit of the common open space area must be designed for recreation, which may include but not be limited to picnic areas, sports courts, a softscape surface covered with turf, sand or similar materials acceptable for use by young children, including play equipment and trees, with no dimension less than 25 feet.*

This requirement does not apply. The proposed use is for a 37 lot single family residential development.

b. *For Multi-Family Residential development, a minimum of 100 square feet of additional open space must be provided for each unit either as private open space or common open space.*

This requirement does not apply. The proposed use is for a 37 lot single family residential development.

c. *For Single-Family Residential development or Two-Family Residential development, a minimum of 250 square feet of open space must be provided for each unit either as private open space or common open space.*

The project would require a minimum of 13,000 square feet of open space. The application demonstrates a 25,266 square feet of common open space. Additionally, each unit will be provided with private patio and porch areas for additional outdoor space.

d. *Front and street side yard setback areas may not be included toward meeting the open space requirements.*

In order to ensure compliance with this requirement, staff is recommending a condition of approval requiring the applicant provide an open space exhibit demonstrating (both quantitatively and qualitatively) compliance with the open space requirements prior to recording the final subdivision map.

Landscaping. *Landscaping shall comply with the Carson City Development Standards Division 3, Landscaping.*

The applicant has identified areas for landscaping, but not a detailed landscape plan. A detailed landscape plan that demonstrates compliance with Development Standards Division 3 is required to be submitted with construction plans. Staff has included this as a condition of approval.

Special Use Permit review standards. *Where a residential use is a conditional use within a given zoning district, the Planning Commission shall make two (2) of the following findings in the affirmative in the review of the Special Use Permit in addition to the required findings of Section 18.02.080 of the Carson City Municipal Code.*

a. *The development is not situated on a primary commercial arterial street frontage.*

This finding is met. The project is not located on a commercial arterial frontage. The proposed development is located at the intersection of West College Parkway and Oak Ridge Drive, a minor collector and local street.

b. *The development is integrated into a mixed-use development that includes commercial development.*

Although the subject property is intended to develop as solely residential, it is adjacent to and in proximity to commercial and residential uses alike, thus creating a mixed use area.

6. Will not be detrimental to the public health, safety, convenience and welfare; and

Staff finds that the proposed single family residential development will not be detrimental to the public health, safety, convenience, and welfare. The use is an allowed use, consistent with the Master Plan, and will meet all City standards.

7. Will not result in material damage or prejudice to other property in the vicinity, as a result of proposed mitigation measures.

Staff finds the attached single family residential development will not result in material damage or prejudice to other property in the vicinity. The subject property is surrounded by single family residences, John Mankins Park, a senior living facility, and the golf course to the south. The

project proposes a single family attached product, providing a transitional use between the commercial use (senior living facility) and the residential uses. While the applicant is also seeking a variance from the 30-foot setback along the common property line with John Mankins Park, the proposed single family residential use is compatible with the Park. Moreover, the proposed setback of 10 feet will be in keeping with the setbacks from the park for other homes in the area.

VARIANCE FINDINGS: Staff recommends approval of the Variance based on the findings below pursuant to CCMC 18.02.085.5 (Findings), subject to the recommended conditions of approval, and further substantiated by the applicant's written justification. In making findings for approval, the Planning Commission must consider:

- a. ***That because of special circumstances applicable to the subject property, including shape, size, topography or location of surroundings, the strict application of the zoning ordinance would deprive the subject property of privileges enjoyed by other properties in the vicinity or under identical zone classification;***

Carson City Development Standards (CCDS) Division 1.18.4(a) requires a minimum setback of 20 feet when adjacent to a residential zoning district, with an additional 10 feet for each story above 1 story. The property to the south-east is zoned Single-Family 12,000 Planned Unit Development but it is developed with a City Park (John Mankins Park). Because the applicant proposes two-story houses, this would result in a required 30-foot setback along the common property line between the project site and the park. The applicant is requesting a variance to allow for a 10-foot setback in this area.

The intent of CCDS 1.18.4(a) is to protect adjacent residential uses; however, the actual adjacent use is a park. The proposed setback of 10 feet is consistent with the setbacks of other single family residences from adjacent to the park. In order to further protect the park, staff has recommended a condition of approval for the Tentative Subdivision Map requiring the applicant to record a deed restriction at the time the final map is submitted for recordation. The deed restriction will disclose the project's proximity to the existing park and the inconvenience or discomfort including but not limited to noise, glare, or physical activity that could result from living in close proximity to such a use.

- b. ***That the granting of the application is necessary for the preservation and enjoyment of substantial property rights of the applicant;***

The granting of the Variance can be supported because the intent of CCDS 1.18.4(a) is to protect adjacent residential uses; however, the actual adjacent use is a park. The proposed setback of 10 feet is consistent with the setbacks of other single family residences adjacent to the park. All other setbacks will be consistent with the requirements of Carson City Municipal Code, including 30+ foot setbacks from the single family residences that are adjacent to the project site.

- c. ***That the granting of the application will not, under the circumstances of the particular case, adversely affect to a material degree the health or safety of persons residing or working in the neighborhood of the subject property and will not be materially detrimental to the public welfare or materially injurious to property or improvements in the neighborhood of the subject property.***

The granting of the variance will not, under the circumstances of this particular case, adversely affect to a material degree the health or safety of persons residing or working in the neighborhood of the subject property and will not be materially detrimental to the public welfare or materially injurious to property or improvements in the neighborhood of the subject property. The intent of CCDS 1.18.4(a) is to protect adjacent residential uses; however, the actual adjacent use is a park.

The property that would be impacted by this request is the park property immediately south-east of the proposed project. The proposed setback of 10 feet is consistent with the setbacks of other single family residences adjacent to the park.

TENTATIVE MAP FINDINGS: Staff recommends approval of the Tentative Subdivision Map based on the findings below and the information contained in the attached reports and documents, pursuant to CCMC 17.05 (Tentative Maps); 17.07 (Findings) and NRS 278.349, subject to the recommended conditions of approval, and further substantiated by the applicant’s written justification. In making findings for approval, the Planning Commission and Board of Supervisors must consider:

- 1. *Environmental and health laws and regulations concerning water and air pollution, the disposal of solid waste, facilities to supply water, community or public sewage disposal and, where applicable, individual systems for sewage disposal.***

The development is required to comply with all applicable environmental and health laws concerning water and air pollution and disposal of solid waste. A copy of the proposed tentative map was submitted to the Nevada Division of Water Resources and the Nevada Division of Environmental Protection. The Public Works Department has advised of adequate capacity to meet water and sewer demand, subject to the recommended conditions of approval. The utility design will need to meet all applicable development standards related to water and sewer design.

- 2. *The availability of water which meets applicable health standards and is sufficient in quantity for the reasonably foreseeable needs of the subdivision.***

Water supplied to the development will meet applicable health standards. The City has sufficient system capacity and water rights to meet the required water allocation for the subdivision.

- 3. *The availability and accessibility of utilities.***

All utilities are available in the area to serve this development.

- 4. *The availability and accessibility of public services such as schools, police protection, transportation, recreation and parks.***

The project is located adjacent to existing single family and commercial developments which are served by the existing public services including schools, sheriff, transportation facilities, and parks. Staff has consulted with the School District. The District has indicated they do not have any additional comments beyond the information provided for previous projects and have indicated that the School District will be re-districting which should help. For previous projects the School District indicated that they remain concerned about capacity and advised that for every 100 new homes it expects about 30 new students. With most of the schools now at capacity, the limited capital funding for new facilities, it is concerned, as it cannot “rezone” its way out of the problem. The school district has advised that it is doing its utmost to prepare for growth, within its means. Development Engineering has reviewed the development for impacts to water, sewer, storm drainage, and roadway systems. The existing water, storm drain, and roadway infrastructure is sufficient to serve the project. The downstream sewer main in College Parkway is at capacity and staff has recommended a condition of approval requiring the developer enter into a pro-rata share agreement for the future upgrading of the downstream sewer. The Fire Department has also reviewed the development. As proposed, sufficient access is provided. As noted in the Fire Department comments, the project must comply with the currently adopted edition of the International Fire Code and the Northern Nevada Fire Code Amendments as adopted by Carson City.

5. Access to public lands. Any proposed subdivision that is adjacent to public lands shall incorporate public access to those lands or provide an acceptable alternative.

The proposed subdivision is adjacent to a public park. Residents will be able to access park via existing sidewalks along W. College Parkway and Oak Ridge Drive.

6. Conformity with the zoning ordinance and land use element of the City's Master Plan.

The project is consistent with the Master Plan. The project site is designated as High Density Residential which is designed to create opportunities for higher-density neighborhoods in an urban and suburban setting with densities ranging from 8 to 36 units per acre. The proposed density of the project is 15 units per acre. The requested development is consistent with the concept of a Compact and Efficient Pattern of Growth (Guiding Principle 1). Carson City is committed to a compact pattern that makes efficient use of the limited land area and water resources it has available for urban growth, and that fosters the provision of infrastructure and services in a cost effective manner.

Guiding Principal 7 discusses compact, mixed use activity centers, stating “Carson City will encourage the creation of compact, mixed-use activity centers in easily accessible and highly visible locations of the community. The activity centers will promote the efficient use of available commercial lands and concentrate retail services in pedestrian and transit-oriented development nodes that may be easily accessed from and serve surrounding neighborhoods. Activity centers will vary in size and composition depending upon their location, context and level of priority.”

Given the existing surrounding neighborhood context, staff finds this proposal to be consistent with the master plan.

The zoning designation is Neighborhood Business. Residential uses are permitted in this zoning district subject to first obtaining approval of a Special Use Permit for residential uses in a commercial zoning district. The applicant has concurrently applied for a Special Use Permit (LU-2021-0218) and the Tentative Subdivision Map is reliant upon approval of the SUP. The Tentative Subdivision Map is also dependent upon the approval of the concurrent application for a Variance from the required 30 foot setback along the southern-most property line (VAR-2021-0232). Staff finds the proposed subdivision is consistent with the Master Plan land use designation, and as conditioned is consistent with the zoning ordinance.

7. General conformity with the City's Master plan for streets and highways.

The proposed subdivision is in conformance with the City's master plan for streets and highways. The project will be required to install a curb ramp meeting current ADA standards.

8. The effect of the proposed subdivision on existing public streets and the need for new streets or highways to serve the subdivision.

As proposed and conditioned, the project will have little or no detrimental effect on vehicular or pedestrian traffic. The applicant has provided a traffic memo outlining the estimated trips, based on the ITE Trip Generation Manual. The project is anticipated to generate approximately 305 daily trips with an AM peak of 23 trips and a PM peak of 28 trips. This is below the threshold for a full traffic analysis. The project will be required to install a curb ramp, meeting current ADA standards, at the intersection of College Parkway and Oak Ridge Drive.

9. The physical characteristics of the land such as flood plains, earthquake faults, slope and soil.

Staff has reviewed the site for any impacts from physical characteristics. The site is relatively flat and located in the FEMA flood zone X (shaded) and therefore does not require special flood damage prevention considerations.

10. The recommendations and comments of those entities reviewing the subdivision request pursuant to NRS 278.330 thru 278.348, inclusive.

The proposed tentative map has been routed to the Nevada Department of Environmental Protection (NDEP) and the Nevada Division of Water Resources. Public Works has indicated sufficient water and sewer capacity to meet the demands of this project, subject to the condition of approval requiring the developer to enter into a pro-rata share agreement for the sewer main.

11. The availability and accessibility of fire protection including, but not limited to, the availability and accessibility of water and services for the prevention and containment of fires including fires in wild lands.

The Public Works Department has reviewed the project in conjunction with the Fire Department. There is sufficient access and sufficient fire flows to serve the project. The Fire Department will review the site improvement permit for compliance with the International Fire Code and northern Nevada fire code amendments as adopted by Carson City.

12. Recreation and trail easements.

The project is adjacent to John Mankins Park. Access to the park will be provided via sidewalks along the project frontage.

Attachments

Application- SUB-2021-0215, LU-2021-0218, and VAR-2021-0232

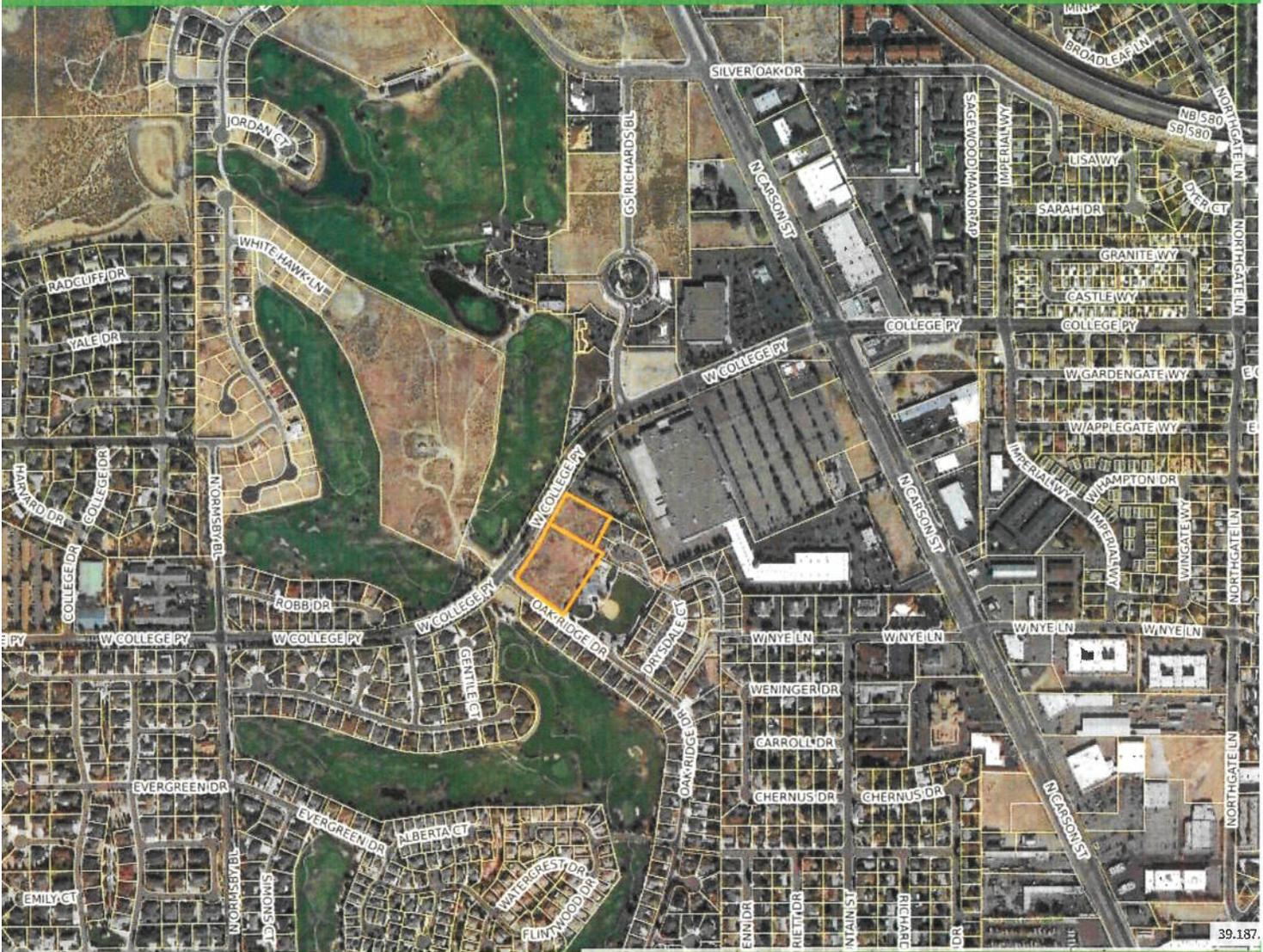
RECEIVED

JUL 01 2021

SILVER OAK AT COLLEGE PARKWAY

TENTATIVE SUBDIVISION MAP
SPECIAL USE PERMIT
MAJOR VARIANCE

JUNE 17, 2021
REVISED JUNE 30, 2021



Prepared For:

**Lanturn
Investments, LLC**

Prepared By:



241 Ridge Street, Suite 400
Reno, NV 89501

PROJECT LOCATION

The project site is located within the Silver Oak Planned Unit Development at the northeast corner of Oakridge Drive and West College Parkway. The total project area is 3.45 acres and is comprised of two separate parcels, APNs 007-46-217 (1.04 acres) and 007-46-216 (2.41 acres). The subject properties are currently undeveloped and are adjacent to existing residential and open space uses.

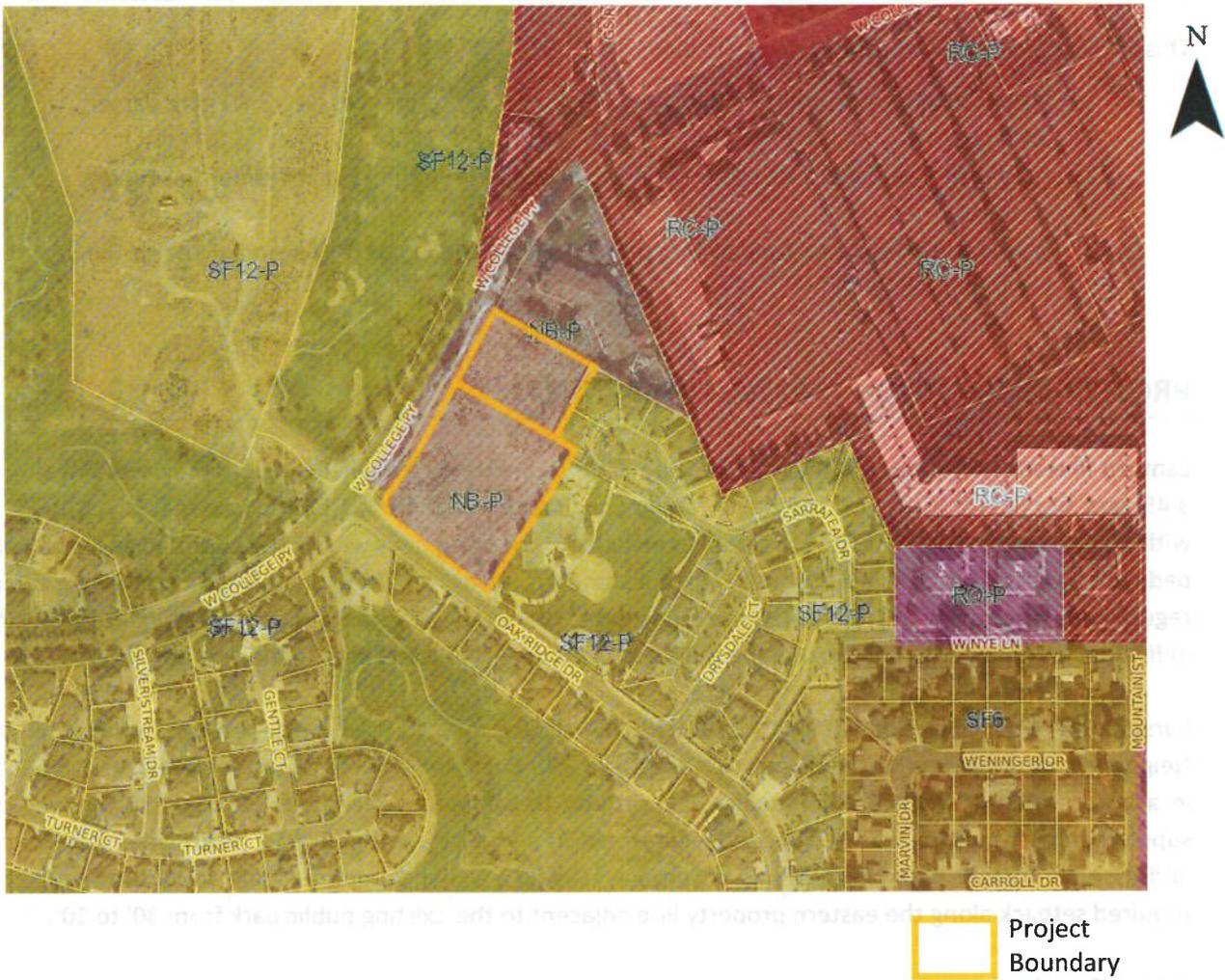
Figure 1: Project Location



 Project Site



Figure 3: Existing Zoning Designation: Neighborhood Business with PUD Overlay



The surrounding Master Plan designations, zoning, and current land uses are as depicted in Figure 4.

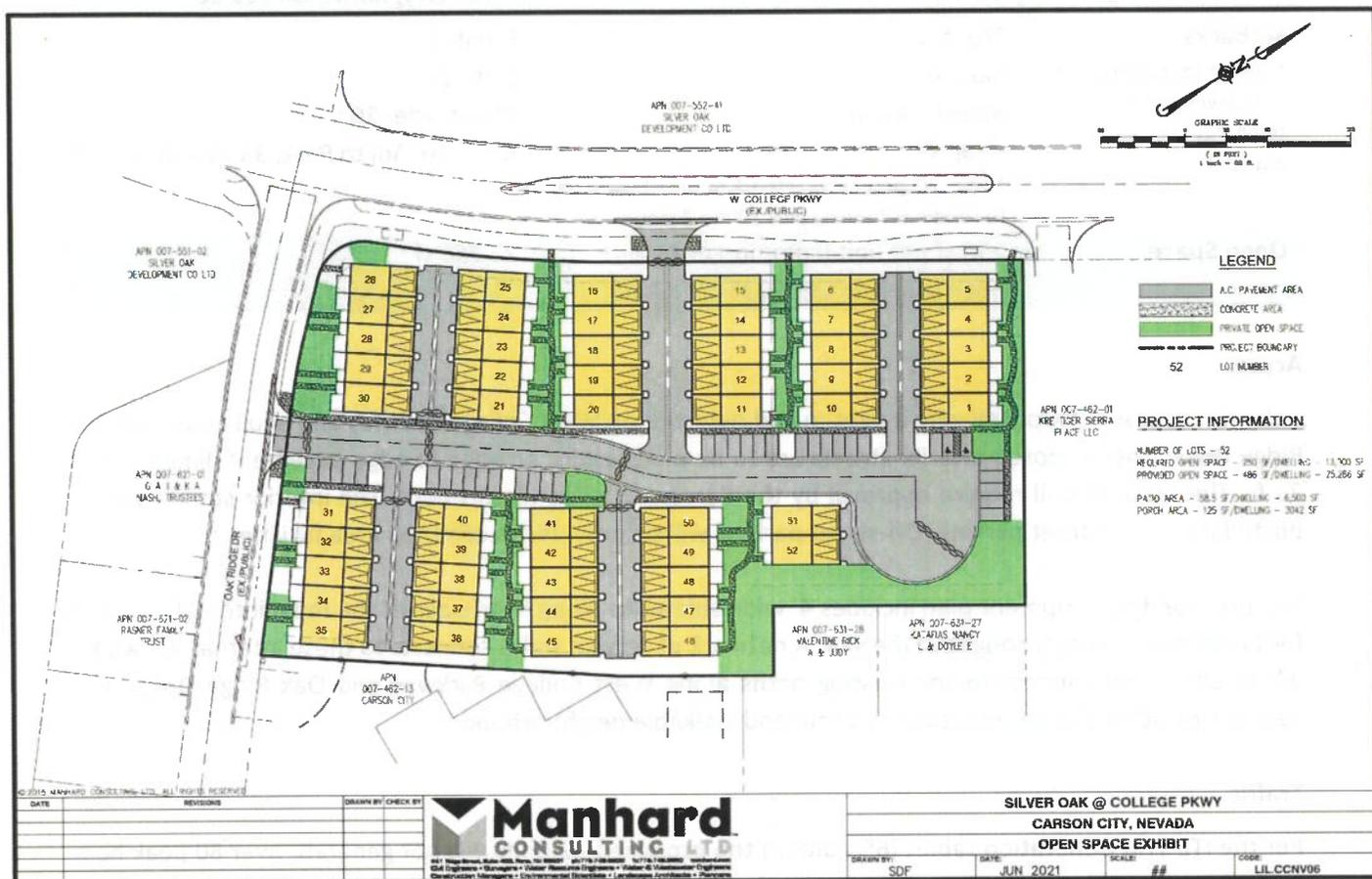
Figure 4: Surrounding Property Designations

| Direction | Master Plan | Zoning | Current Land Use |
|-----------|---|--------------------------------------|---|
| North | High Density Residential | NB-P | Senior Living Facility |
| South | Medium Density Residential and Open Space | Single Family 12,000 SF PUD (SF12-P) | Single Family Residential and Golf Course |
| East | Parks and Recreation | SF12-P | Single Family Residential and Park |
| West | Open Space | SF12-P | Golf Course |



In accordance with this provision, 13,000 sf (52 units x 250 sf/unit) of open space is required. The design exceeds the open space requirement by providing 25,266 sf as common open space within the site which will be maintained by a homeowner’s association, or similar entity. Please note that the common open space will be privately-owned (HOA or similar) and is intended for use by the Silver Oak and College Parkway residents. See Figure 5 for the Open Space Exhibit that depicts where the common open space is located. See Figure 6 for details of the provided Open Space.

Figure 5: Open Space Exhibit



Setbacks

The proposed lot configurations meet or exceed the setbacks for NB zoning within the interior and the perimeter of the development. The perimeter setbacks along Oak Ridge Drive and West College Parkway were measured, based on the Municipal Code and staff direction, from the zoning boundary (centerline of each road) and not the property boundary. Accommodating CCDS 1.18.4, the required 20’ setback when adjacent to residential zoning (SF12-P) plus 10’ additional setback for 2 stories is provided in the development where the proposed use is directly adjacent to existing residential structures. The setback for the remainder of the property line adjacent to residential zoning (SF12-P) is proposed to be 10’. A Major Variance is being applied for this reduced setback and the justification for such is addressed in further detail later in this document.

Water/Sewer

The site will be provided water and sewer services from the City. Water will be connected in a loop system to existing 12" main at West College Parkway and existing 10" main at Oak Ridge Drive. The onsite sanitary sewer will connect to an existing 8" main at the northeast corner of the subject property.

Drainage

On-site detention for the project has previously been accounted for in the Master Drainage Study for Silver Oak, which identifies connection to the fairway directly across West College Parkway from the project site. A small water quality basin is proposed on-site at the northeast corner of the property. This basin is intended to provide filtration of sediment before discharge to the golf course infrastructure via an existing 24" storm drainpipe.

Floodplain

The project area is designated as Flood Zone X, which indicates a minimal flood hazard.

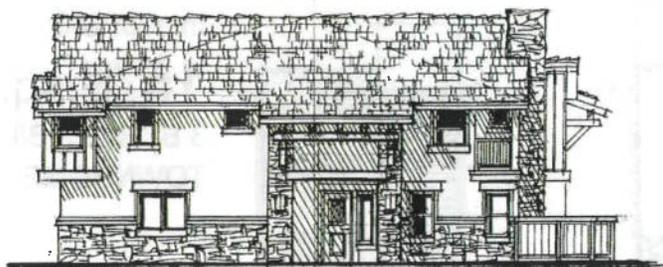
Phasing

No phasing is proposed with this submittal.

Architecture

Conceptual renderings for the proposal are being prepared and will be submitted at a later date. Preliminary elevations and floor plans for the proposed buildings were provided and can be found in Figure 8.

Figure 8: Proposed Building Elevations and Floor Plans (continued)



P-1

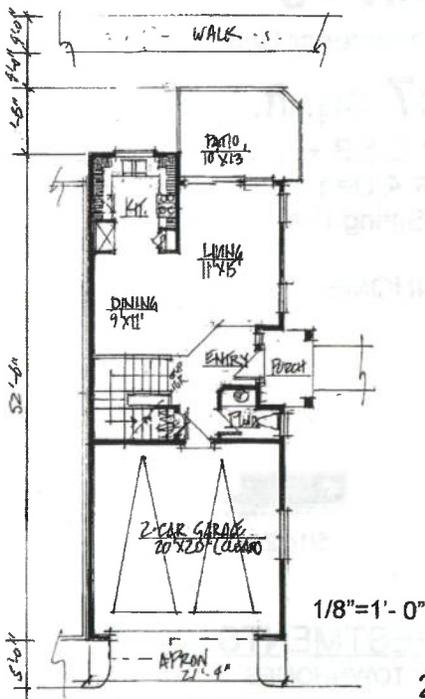
SIDE ELEVATION

1/8"=1'-0"

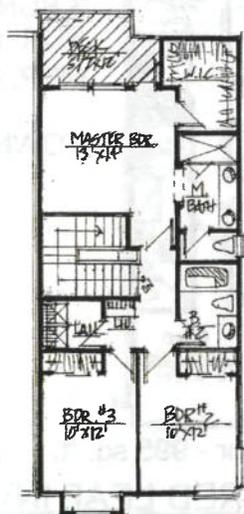
BUILDING - 1

6/23/21

RED LEAF INVESTMENTS
COLLEGE PARKWAY TOWNHOMES



1st. Floor - 612 sq. ft.



2nd. Floor - 917 sq. ft.

PLAN - 1

End Unit (only)

1529 sq. ft.

3 BDR./2.5 B

TOWNHOME



5/14/21

RED LEAF INVESTMENTS
COLLEGE PARKWAY TOWNHOMES

Parking

Two garage stalls are provided with each unit, which meets code requirements. Per code, the required guest parking to be provided for the proposed 52 units is 26 stalls. The proposed site plan includes an excess of guest parking with 35 stalls.

Figure 9: Parking Calculations

| CCMC Parking Requirement | # of Residential Units | Required Parking per CCMC | Provided Parking (guest stalls and garages) | Accessible Parking Provided |
|---|------------------------|---------------------------|--|-----------------------------|
| 2 per unit plus 1 guest stall for every 2 units | 52 | 130 (52 x 2.5) | 139 (104 garage stalls + 35 guest stalls) | 2 |

MASTER PLAN POLICY CHECKLIST/FINDINGS

The purpose of the Master Plan Policy Checklist is to provide a list of answers that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to this Tentative Map application. The Checklist is included with this letter. In addition, the following are included:

- Tentative Map Findings; and
- Special Use Permit Findings; and
- CCDS 18.1.18 - Residential Development in Non-Residential Districts Comments; and
- Major Variance Findings.

The project complies with the Master Plan and accomplishes the following objectives.

Chapter 3: A Balanced Land Use Pattern

1. Goal 1.1c-Water Conservation: The proposed project is expected to encourage water conservation efforts through low-water landscaping, low-flow fixtures, and/or other water saving devices.
2. Goal 1.1e-Sustainable Construction Techniques: The proposed project is expected to utilize sustainable building materials and construction techniques.
3. Goal 1.5d–Coordination of Services: The site location will allow the development to be adequately served by city services including fire and sheriff services.
4. Goal 3.3d-Floodplain and Hazard Area Development: The proposed development is not within the 100-year floodplain or other hazardous areas.
5. Mixed Use Employment Policy 1.4-Location: The site is located on existing collector and local streets.



TENTATIVE MAP FINDINGS

In accordance with Carson City Municipal Code Section 17.07.005, this project has been designed to consider the following:

1. **Environmental and health laws and regulations concerning water and air pollution, the disposal of solid waste, facilities to supply water, community or public sewage disposal and, where applicable, individual systems for sewage disposal.**

All environmental health laws and regulations regarding water, air pollution, and waste disposal will be incorporated into the proposed project.

2. **The availability of water which meets applicable health standards and is sufficient in quantity for the reasonably foreseeable needs of the subdivision.**

Water is available to the site. It will be provided by Carson City, conform to the applicable health standards, and fulfill quantity requirements for residences.

3. **The availability and accessibility of utilities.**

Public utilities are currently available to serve the proposed project.

4. **The availability and accessibility of public services such as schools, police protection, transportation, recreation and parks.**

Police services are currently provided by the Carson City Sheriff's Office. Fire protection will be provided by the Carson City Fire Department. The project meets the requirements of the Fire Department. The Regional Transportation Commission is responsible for transportation in and around the project area. Carson City Parks Department provides recreational and parks services, although this project is not expected to impact recreational services. Educational services are provided by Carson City School District.

5. **Access to public lands. Any proposed subdivision that is adjacent to public lands shall incorporate public access to those lands or provide an acceptable alternative.**

The project incorporates public access to the public park south east of the subject property via connection to an existing path network.

6. **Conformity with the zoning ordinance and land use element of the city's master plan.**

The proposed project is in conformance with the master plan designation of High Density Residential. The current zoning designation of Neighborhood Business (with a PUD overlay) permits attached single-family residences, but only with a special use permit (requested with this submittal package). The proposed residential development will complement the existing adjacent uses by providing a transition use between the less intense single-family detached homes to the south and more intense commercial uses to the north.

7. **General conformity with the city's master plan for streets and highways.**



intense commercial uses to the north. The Master Plan Policy Checklist is included in this application package with additional information.

- 2. Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties of the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare, or physical activity.**

The surrounding neighborhood is comprised of public park space, single-family detached residential, and commercial uses. The project proposes attached single-family residential units, which provides an ideal transition between commercial use to the north and single-family residential units to the south and east. Landscaping and open space will be in accordance with Carson City requirements, providing appropriate buffering of the development. Landscape/open space areas are shown on the Site Plan. Dust control during construction will be managed in accordance with Carson City requirements and the intended residential use should have no significant impact on surrounding development regarding noise, fumes, odors, or glare.

- 3. Will have little or no detrimental effect on vehicular or pedestrian traffic.**

Figure 7 includes the calculated vehicular trip generation in Average Daily Trips (ADT) as well as peak AM and PM hours per the ITE Trip Generation manual. The figures (305 ADT, 23 AM peak trips, 28 PM peak trips) represent a modest impact on traffic in the area and do not trigger a traffic impact study per Carson City Code.

- 4. Will not overburden existing public services and facilities, including schools, police and fire protection, water, sanitary sewer, public roads, storm drainage, and other public improvements.**

The site is located along a minor collector and a local street within the NB zoning district and is served by public services including schools, police and fire protection, water, and sanitary sewer. The addition of 52 residential units within a business zoning district will not overburden public services or facilities.

- 5. Meets the definition and specific standards set forth elsewhere in this Title for such particular use and meets the purpose statement of that district.**

Single-family attached dwellings are permitted in the NB zoning district subject to approval of a Special Use Permit (CCMC Section 18.04.120(3)). The proposed project meets the specific standards set forth in CCMC Section 18.04.120 and Title 18 Appendix 1.18, residential development standards in non-residential districts.

- 6. Will not be detrimental to the public health, safety, convenience and welfare.**

Providing new single-family dwellings with modern construction methods will not be detrimental to the public health, safety, and welfare because the area is intended for low intensity and residential uses.



The proposed setbacks within the interior and the perimeter of the development meet or exceed the setbacks for the NB district. The perimeter setbacks along Oak Ridge Drive and West College Parkway are 30', accommodating CCDS 1.18.4, which requires 20' setbacks adjacent to residential districts (SF12-P) plus an additional 10' for each story above one. The interior setbacks meet or exceed those required in the NB zoning district.

5. Required parking: Two (2) spaces per dwelling unit; and in compliance with the Development Standards Division 2, Parking and Loading.

The site design does not include on-street parking, so CCMC requires one stall per two units for guest parking in addition to the base requirement of two stalls per unit. As demonstrated in Figure 9: Parking Calculations, the design provides two garage stalls with each unit, which meets code requirements. Per code, the required guest parking to be provided for the proposed 52 units is 26 stalls. The proposed site plan includes an excess of guest parking with 35 stalls.

6. Open Space.

- a. **A minimum of one hundred fifty (150) square feet per dwelling unit of common open space must be provided. For projects of ten (10) or more units, areas of common open space may only include contiguous landscaped areas with no dimension less than fifteen (15) feet, and a minimum of one hundred (100) square feet per unit of the common open space area must be designed for recreation, which may include but not be limited to picnic areas, sports courts, a softscape surface covered with turf, sand or similar materials acceptable for use by young children, including play equipment and trees, with no dimension less than twenty-five (25) feet.**
- b. **A minimum of one hundred (100) square feet of additional open space must be provided for each unit either as private open space or common open space.**
- c. **Front and street side yard setback areas may not be included toward meeting the open space requirements.**

Please reference *Figure 6: Development Standards (for residential development in non-residential zoning districts)* for demonstration of meeting and exceeding compliance with these standards. Each residential lot includes a minimum 250 sf of common open space provided within the development.

7. Landscaping. Landscaping shall comply with the Carson City Development Standards Division 3, Landscaping.

The proposed landscaping plan was designed in accordance with CCMC.

8. Special Use Permit review standards. Where a residential use is a conditional use within a given zoning district, the Planning Commission shall make two (2) of the following findings in the affirmative in the review of the Special Use Permit in addition to the required findings of Section 18.02.080 of the Carson City Municipal Code.

- a. **The development is not situated on a primary commercial arterial street frontage.**



3. **That granting of the application will not, under the circumstances of the particular case, adversely affect to a material degree the health or safety of persons residing or working in the neighborhood of the subject property and will not be materially detrimental to the public welfare or materially injurious to property or improvements in the neighborhood of the su**

The granting of this application will not negatively affect the health or safety of people living or working in the neighborhood as the variance only affects the proximity of some of the proposed buildings in relation to existing public open space. The public open space will still be able to be utilized and enjoyed by area residents, with no negative affects to their health, safety and general welfare. Such a variance will not set any precedents that will reduce or hinder adjacent property rights and values in the future as there are not any neighboring properties that are zoned in a manner that would create the same unique situation that exists with subject project.



Carson City Planning Division
08 E. Proctor Street- Carson City NV 89701
Phone: (775) 887-2180 • E-mail: planning@ccnv.org

FOR OFFICE USE ONLY:
CCMC 18.02.085

FILE #

MAJOR VARIANCE

APPLICANT PHONE #
Mark Turner/Lanturn Investments 775-745-0881

FEE*: \$2,150.00 + noticing fee
*Dues after application is deemed complete by staff

MAILING ADDRESS, CITY, STATE, ZIP
1075 College Drive, Carson City, NV 89703

- SUBMITTAL PACKET – 4 Complete Packets (1 Unbound Original and 3 Copies)**
 - Application Form
 - Detailed Written Project Description
 - Site Plan
 - Building Elevation Drawings and Floor Plans
 - Variance Findings
 - Applicant's Acknowledgment Statement
 - Documentation of Taxes Paid-to-Date

EMAIL ADDRESS
silveroakmark@me.com

PROPERTY OWNER PHONE #
James and Sandra Foley Trust

- CD or USB DRIVE with complete application in PDF**

MAILING ADDRESS, CITY, STATE, ZIP
455 Combs Canyon Road, Carson City, NV 89703

Application Reviewed and Received By:

EMAIL ADDRESS

APPLICANT AGENT/REPRESENTATIVE PHONE #
Chris Baker/Manhard Consulting 775-321-6539

Submission Deadline: Planning Commission application submittal schedule.

MAILING ADDRESS, CITY, STATE, ZIP
141 Ridge Street, Suite 400, Reno, NV 89501

Note: Submittals must be of sufficient clarity and detail such that all departments are able to determine if they can support the request. Additional information may be required.

EMAIL ADDRESS
cbaker@manhard.com

| | |
|---|--|
| Project's Assessor Parcel Number(s): 007-462-16, 007-462-17 | Street Address 1147 W. College Parkway |
|---|--|

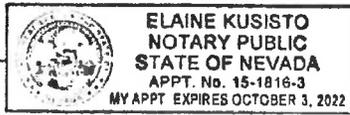
| | | |
|--|--|--|
| Project's Master Plan Designation High Density Residential | Project's Current Zoning Neighborhood Business - PUD Overlay | Nearest Major Cross Street(s) W. College Parkway and Oak Ridge Drive |
|--|--|--|

Please provide a brief description of your proposed project below. Provide additional pages to describe your request in more detail.
The applicant is proposing 52 attached single family residences on 3.45 acres. The site has a master plan designation of high density residential, is zoned neighborhood business with a PUD overlay and a special use permit will be needed for proposed use.

PROPERTY OWNER'S AFFIDAVIT
JAMES B. FOLEY, being duly deposed, do hereby affirm that I am the record owner of the subject property, and that I have knowledge of, and I agree to, the filing of this application.
James B Foley 1147 W. College Parkway 7/1/2021
 Signature Address Date
 Use additional page(s) if necessary for other names.

STATE OF NEVADA)
COUNTY CARSON CITY)
On JULY 1, 2021, JAMES B. FOLEY, personally appeared before me, a notary public, personally known (or proved) to me to be the person whose name is subscribed to the foregoing document and who acknowledged to me that she executed the foregoing document.

Elaine Kusisto
Notary Public



NOTE: If your project is located within the Historic District or airport area, it may need to be scheduled before the Historic Resources Commission or the Airport Authority in addition to being scheduled for review by the Planning Commission. Planning staff can help you make this determination.

there is any additional information that would provide a clearer picture of your proposal that you would like to add for presentation to the Planning Commission, please be sure to include it in your detailed description.

Please type and sign the statement on the following page at the end of your findings response.

ACKNOWLEDGMENT OF APPLICANT

I certify that the forgoing statements are true and correct to the best of my knowledge and belief. I agree to fully comply with all conditions as established by the Planning Commission. I am aware that this permit becomes null and void if the use is not initiated within one-year of the date of the Planning Commission's approval; and I understand that this permit may be revoked for violation of any of the conditions of approval. I further understand that approval of this application does not exempt me from all City code requirements.



Applicant's Signature

JAMES B FOLEY

Print Name

7/1/2021

Date

Carson City Planning Division
108 E. Proctor Street • Carson City NV 89701
Phone: (775) 887-2180 • E-mail: planning@carsoncitynv.gov

FOR OFFICE USE ONLY:
CCMC 18.02.080

FILE #

SPECIAL USE PERMIT

APPLICANT PHONE #
Mark Turner/Lanturn Investments 775-745-0881

FEE*: \$2,450.00 MAJOR
\$2,200.00 MINOR (Residential zoning districts)
+ noticing fee
*Due after application is deemed complete by staff

MAILING ADDRESS, CITY, STATE, ZIP
3075 College Drive, Carson City, NV 89703

EMAIL ADDRESS
silveroakmark@me.com

- SUBMITTAL PACKET – 4 Complete Packets (1 Unbound Original and 3 Copies) including:
 - Application Form
 - Detailed Written Project Description
 - Site Plan
 - Building Elevation Drawings and Floor Plans
 - Special Use Permit Findings
 - Master Plan Policy Checklist
 - Applicant's Acknowledgment Statement
 - Documentation of Taxes Paid-to-Date
 - Project Impact Reports (Engineering)
- CD or USB DRIVE with complete application in PDF

PROPERTY OWNER PHONE #
James and Sandra Foley Trust

MAILING ADDRESS, CITY, STATE, ZIP
1455 Combs Canyon Road, Carson City, NV 89703

EMAIL ADDRESS

APPLICANT AGENT/REPRESENTATIVE PHONE #
Chris Baker/Manhard Consulting 775-321-6539

Application Received and Reviewed By:

MAILING ADDRESS, CITY STATE, ZIP
241 Ridge Street, Suite 400, Reno, NV 89501

EMAIL ADDRESS

Submittal Deadline: Planning Commission application submittal

cbaker@manhard.com

Note: Submittals must be of sufficient clarity and detail for all departments to adequately review the request. Additional information may be required.

Project's Assessor Parcel Number(s):
007-462-16, 007-462-17

Street Address
1147 W. College Parkway

Project's Master Plan Designation
High Density Residential

Project's Current Zoning
Neighborhood Business - FW

Nearest Major Cross Street(s)
College Parkway and Oak Ridge Drive

Please provide a brief description of your proposed project and/or proposed use below. Provide additional pages to describe your request in more detail. The applicant is proposing 52 attached single family residences on 3.45 acres. The site has a master plan with a PUD overlay and a special use permit will be needed for proposed use.

PROPERTY OWNER'S AFFIDAVIT

James Foley, being duly deposed, do hereby affirm that I am the record owner of the subject property, and that I have knowledge of, and I agree to, the filing of this application.

James B. Foley
Signature

1147 W. College Parkway
Address

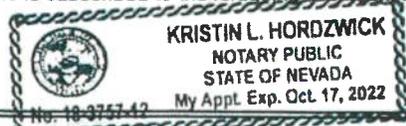
6/15/2021
Date

See additional page(s) if necessary for additional owners.

STATE OF NEVADA
COUNTY

In June 15, 2021, James B. Foley, personally appeared before me, a notary public, personally known (or proved) to me to be the person whose name is subscribed to the foregoing document and who acknowledged to me that he/she executed the foregoing document.

Kristin L. Hordzwick
Notary Public



NOTE: If your project is located within the Historic District or airport area, it may need to be scheduled before the Historic Resources Commission or the Airport Authority in addition to being scheduled for review by the Planning Commission. Planning staff can help you make this determination.

Carson City Planning Division
 108 E. Proctor Street· Carson City NV 89701
 Phone: (775) 887-2180 • E-mail: planning@carson.org

FILE #

APPLICANT **PHONE #**
 Mark Turner/Lanturn Investments 775-745-0881

MAILING ADDRESS, CITY, STATE, ZIP
 3075 College Drive, Carson City, NV 89703

EMAIL
 silveroakmark@me.com

PROPERTY OWNER **PHONE #**
 James and Sandra Foley Trust

MAILING ADDRESS, CITY, STATE, ZIP
 1455 Combs Canyon Road, Carson City, NV 89703

EMAIL

APPLICANT AGENT/REPRESENTATIVE **PHONE #**
 Chris Baker/Manhard Consulting 775-321-6539

MAILING ADDRESS, CITY, STATE, ZIP
 241 Ridge Street, Suite 400, Reno, NV 89501

EMAIL
 cbaker@manhard.com

Project's Assessor Parcel Number(s)
 007-462-16, 007-462-17

Project's Street Address
 1147 W. College Parkway

Nearest Major Cross Street(s)
 W. College Parkway and Oak Ridge Drive

Project's Master Plan Designation
 High Density Residential

Project's Current Zoning
 Neighborhood Business - PUD Overlay

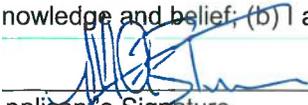
Project Name
 Silver Oak at College Parkway

| | | |
|---------------------------|-----------------------|-----------------------------|
| <u>Total Project Area</u> | <u>Number of Lots</u> | <u>Smallest Parcel Size</u> |
| 3.45 AC | 52 | 1.04 |

Please provide a brief description of your proposed project below. Provide additional pages to describe your request in more detail.
The applicant is proposing 52 attached single family residences on 3.45 acres. The site has a master plan designation of high density residential, is zoned neighborhood business with a PUD overlay and a special use permit will be needed for proposed use.

NOTE: If your project is located within the Historic District or airport area, it may need to be scheduled before the Historic Resources Commission or the Airport Authority in addition to being scheduled for review by the Planning Commission. Planning staff can help you make this determination.

ACKNOWLEDGMENT OF APPLICANT: (a) I certify that the foregoing statements are true and correct to the best of my knowledge and belief; (b) I agree to fulfill all conditions established by the Board of Supervisors.


 Applicant's Signature

FOR OFFICE USE ONLY:
 CCMC 17.06 and 17.07

TENTATIVE SUBDIVISION MAP

FEE*: \$3,500.00 + noticing fee
 *Due after application is deemed complete by staff

- SUBMITTAL PACKET – 5 Complete Packets (1 Unbound Original and 4 Copies) including:**
 - Application Form including Applicant's Acknowledgment
 - Property Owner Affidavit
 - Copy of Conceptual Subdivision Map Letter
 - Detailed Written Project Description
 - Proposed Street Names
 - Master Plan Policy Checklist
 - Wet Stamped Tentative Map (24" x 36")
 - Reduced Tentative Map (11" x 17")
 - Conceptual Drainage Study
 - Geotechnical Report
 - Traffic Study (if applicable)
 - Documentation of Taxes Paid to Date

CD or USB DRIVE with complete application in PDF

- STATE AGENCY SUBMITTAL including:**
 - 2 Wet-stamped copies of Tentative Map (24" x 36")
 - Check made out to NDEP for \$400.00 + \$3/lot
 - Check made out to Division of Water Resources for \$180.00 + \$1/lot

Application Reviewed and Received By:

Submission Deadline: Planning Commission application submittal [schedule](#).

Note: Submittals must be of sufficient clarity and detail for all departments to adequately review the request. Additional information may be required.

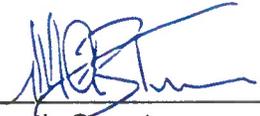
6/15/2021
 Date

If there is any additional information that would provide a clearer picture of your proposal that you would like to add for presentation to the Planning Commission, please be sure to include it in your detailed description.

Please type and sign the statement on the following page at the end of your findings response.

ACKNOWLEDGMENT OF APPLICANT

I certify that the forgoing statements are true and correct to the best of my knowledge and belief. I agree to fully comply with all conditions as established by the Planning Commission. I am aware that this permit becomes null and void if the use is not initiated within one-year of the date of the Planning Commission's approval; and I understand that this permit may be revoked for violation of any of the conditions of approval. I further understand that approval of this application does not exempt me from all City code requirements.



Applicant's Signature

MARK B TURNER

Print Name

6/15/2021

Date

PROPERTY OWNER'S AFFIDAVIT

James Foley

(Print Name)

, being duly deposed, do hereby affirm that I am the record owner of the

1147 W. College Parkway (007-462

subject property located at

(Property Address and APN)

, and that I have knowledge of, and I agree to, the

filling of this Tentative Subdivision Map application.

James B Foley
Signature

4455 Combs Canyon RD
Address *CARSON CITY, NV.*

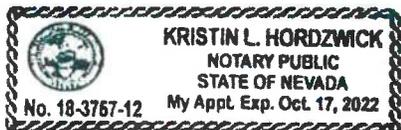
6/15/2021
Date

Use additional page(s) if necessary for other names.

STATE OF NEVADA)
COUNTY)

On *June 15, 2021*, personally appeared before me, a notary public,
James B. Foley, personally known (or proved) to me to be the person whose name is
subscribed to the foregoing document and who acknowledged to me that
he/she executed the foregoing document.

Kristin L. Hordzwick
Notary Public





Carson City Planning Division

108 E. Proctor Street

Carson City, Nevada 89701

(775) 887-2180-Hearing Impaired:711

www.carson.org

www.carson.org/planning

March 18, 2021

Louis Cariola
 Manhard Consulting
 241 Ridge Street, Suite 400
 Reno, NV 89501

Major Project Review: MPR-2021-0048

Project Description: Request for a residential use in a non-residential zoning district to allow for 52 attached single-family residences.

Review Date: March 2, 2021

Major Project Review Comments

The Major Project Review Committee has reviewed the proposed plans for a residential use in a non-residential zoning district to allow for 52 attached single family residences. The following requirements and comments are provided for your use in preparing final plans and submittals for the project. Please be advised that the comments presented in this letter are based on the plans submitted with the Major Project Review application and may not include all the requirements or conditions which may be placed on the project at the time of submittal of planning applications for approval (if applicable) or final plans for building permits. It is hoped, however, that this review will expedite the completion of your project.

Some of the requirements noted below may have already been shown or otherwise indicated in the plans and need only be submitted in the final improvement plan form. Final on- and off-site improvement plans shall be submitted to the Permit Center, (108 E. Proctor Street). These plans must contain all appropriate requirements of Development Engineering, Health, Utilities, Fire, and Planning Divisions/Departments.

Planning applications (if applicable), such as Master Plan Amendments, Zoning Changes, Special Use Permits, Variances, Lot Line Adjustments, Parcel Maps, etc. shall be submitted to the Planning Division (108 E. Proctor Street) for review and approval.

SITE INFORMATION:

Address: 1147 West College Parkway

APN: 007-462-16 and -17

Parcel Size: 3.45 acres

Master Plan Designation: High Density Residential (HDR)

oning: Neighborhood Business – Planned Unit Development (NB-P)

LANNING DIVISION

Contact Hope Sullivan, Planning Manager

Permitted Use - CCMC 18.04.120

multifamily dwellings are a conditional use in the Neighborhood Business zoning district. Therefore, the use may only establish upon issuance of a Special Use Permit.

The applicant indicated subdivision of land. The subdivision of land will require a tentative map approval, followed by a final map approval.

Setbacks CCMC 18.04.195 (Non-Residential) and Development Standards 1.18 (Residential Development Standards in a non-residential district)

A minimum setback of twenty feet is required adjacent to a residential zoning district, with an additional ten feet for each story above one (1) story. Property to the west, south and east of the property has a residential zoning district.

Staff will support a variance request relative to the setback from the park.

Please refer to the definition of adjacent in CCMC 18.03 to determine the point of measurement when the adjacent property is across the street.

Height - CCMC 18.04.195 (Non-Residential)

The maximum building height for the General Commercial zoning district is 26 feet. Additional height may be permitted subject to a Special Use Permit.

Signs - Carson City Development Standards, Division 4.7.2 Multi-family Residential Uses

All signs must be consistent with Division 4.7.2 of the Development Standards.

Landscaping - Carson City Development Standards, Division 3

Landscaping must be consistent with Division 3 of the Development Standards.

Parking and Loading – Carson City Development Standards, Division 2

The parking standard is 2 spaces per unit. All provisions of Division 2 of the Development Standards must be met.

Architectural Design - Carson City Development Standards, Division 1

Proposed structures must meet the architectural standards outlined in the Development Standards, Division 1.1.

Lighting - Carson City Development Standards, Division 1

Lighting must meet the standards outlined in Development Standards 1.3.

Roof-Mounted Equipment - Carson City Development Standards, Division 1

Roof mounted equipment must meet the standards outlined in Carson City Development Standards 1.1.7.

10. Trash Storage - Carson City Development Standards, Division 1

Trash storage must meet the standards outlined in Carson City Development Standards 1.2.6.

11. Residential Development in a Non-Residential Zoning District: - CCMC Development Standards Division 1.18

The project must meet the standards outlined in Carson City Development Standards 1.18. Staff will not support a reduction to the open space requirement based on existing open space at Silver Oak. Staff is open to other suggestions relative to a reduction in open space, including potential construction of additional parking for the neighboring park.

12. Growth Management - CCMC 18.12

Growth Management applies to all residential, commercial and industrial property that is required to be served by city water and/or sewer service within the consolidated municipality of Carson City.

Conclusion

Due to changing conditions of business and requirements for zoning, master plan and development codes of Carson City, this MPR information will expire and will need to be updated with a new MPR if the developer has not applied for a building permit within one year of the date of the MPR meeting.

When applying for a special use permit in relation to the proposed project in addition to the required plans, please submit the following:

- Copy of this MPR letter packet.
- Exterior light fixture details must be submitted with a building permit application for review and approval by the Planning Division prior to installation.
- Color palette for all proposed exterior colors of the buildings.
- Open space details.

ENGINEERING AND UTILITIES

Contact Stephen Pottley, Development Engineering

Project Specific Comments:

Transportation:

1. Please submit the overall traffic analysis for Silver Oak, with the next application. Please also provide a sealed trip generation memo which speaks to the change in estimated trips resulting from this development with respect to the overall Silver Oak traffic analysis. If changes from this project result in an increase to traffic at the intersections of College Parkway and Oak Ridge Drive or College Parkway and GS Richards Boulevard, the applicant must review those intersections. If either of these intersections are shown to have a failing level of service, a stop warrant and a signal warrant analysis

must also be provided for the failing intersections. Please contact Chris Martinovich for further scoping questions at 775-283-7367.

2. The subdivision must have two points of access. The access onto College Parkway may be limited to right-in and right-out only. The minimum spacing between driveways is 150 feet.
3. The drive isle widths shown are acceptable, however where the driving lanes are narrower than 26' wide, they must be signed as 15 mph speed limit.
4. The internal access ways must be private, as is proposed.
5. The parking and drive isles must meet Carson City Standard Details for parking lots.
6. A curb ramp meeting current ADA standards must be installed at intersection of College Parkway and Oak Ridge Drive.
7. All driveway aprons must meet Carson City Standard Details.

Water:

8. Due to minimal water information provided in the MPR application, additional requirements may apply.
9. Project shall comply with all City and State codes and standards.
10. The existing water main on the Oak Ridge Dr frontage is 10" PVC; the main in the W. College Parkway 12" PVC.
11. A wet stamped water main analysis must be submitted in accordance with CCDS 15.3.1(a) to show that adequate pressure will be delivered to the meter and fire flows meet the minimum requirements of the Carson City Fire Department.
12. No fire flow information is available for the subject parcel, the cost is \$79.80 per test, and results can take up to two weeks. Please contact the Water Operations Supervisor at (775) 283-7081 to schedule a fire hydrant flow test.
13. The subject project is located at the upper end of the 4960 zone. The applicant may wish to consider installing booster pumps to provide adequate pressures at the upper stories of the development. Booster pumps would be installed and maintained at the property owners expense.
14. The project shall be master metered for the water service. A looped water system is recommended due to the number of units in the development. Every water service shall be equipped with a reduced pressure principle backflow prevention assembly. Please refer to NRS 704.940 in regards to metering, charging and billing for water supplied to individual units.
15. A reduced pressure principle assembly backflow preventer will be required for the domestic water line. Fire sprinkler lines, if required, must have a double check valve backflow preventer if it is Class 1-3, or a reduced pressure principle assembly if it is Class 4-6. These backflow preventers must be above ground in a hot box, and must be located as close to the property line as possible. The irrigation service will need a reduced pressure backflow preventer if a vacuum breaker system cannot be designed to operate properly.
16. A separate fire loop may be required to meet fire flow requirements. This loop may be isolated from the City system with a single check valve as long as it only serves fire hydrants and does not serve any fire sprinklers.
17. Please show sufficient utility information to ensure that minimum spacing is met between water meters and dry utilities.

Sewer:

18. The sewer main on the west side of the property is 15 in PVC, and is approximately 30% full (d/D). The sewer main on the south side of the property is 8 in PVC and is approximately 5% full (d/D).
19. A wet stamped sewer main analysis must be submitted that includes addressing the effect of flows on the existing City system. See section 15.3.2 of CCDS.
20. There is 1,135 feet of 12" sewer at capacity in College Parkway between Granite and Imperial that will need to be replaced due to the project. The estimated increase in flows at this location is 1.6%. The estimated cost to replace the sewer main is \$600,000. The project will be required to enter into an agreement to pay it's pro rata share of the cost of this improvement.

Storm Drainage and Flooding:

21. The storm drain development standards have been revised and moved to a Carson City Drainage Manual which will be effective on July 1, 2021. These changes include a change in the detention design storm to a 10-year 24 hour event, and the inclusion of Low Impact Design requirements. A link to the drainage manual will be sent by email. If the project plans are submitted for a permit before July 1, 2021, the current drainage standards will apply.
22. With the next application map please provide the master drainage study. Please confirm that drainage for the proposed project will function as the drainage study originally contemplated, or provide an addendum to the study if necessary.
23. The existing drainage system location will need to be verified in the field. Storm water flow is flowing from College Parkway south toward Nye Lane.

City Lands:

24. There is a 10 ft public use easement on the north side of APN 00746217 which is approximately 10 ft to 30 ft into the property per Map 2904. There is an existing 24 inch RCP storm pipe in the easement. The storm drain must be relocated as shown, and the easement must be abandoned and relocated with the final map. The drainage easement is recorded as document #472814 and the Public Utility Easement Deed is recorded as document #472815.

General Comments:

25. Water and sewer connection fees must be paid. Please see CCMC 12.01.030 for the water connection fee schedule and 12.03.020 for the sewer connection fee schedule.
26. Any engineering work done on this project must be wet stamped and signed by an engineer licensed in Nevada. This will include site, grading, utility and erosion control plans as well as standard details.
27. Please reach out to Waste Management before applying for a building permit for approval of the parking and access layout.
28. All construction work must be to Carson City Development Standards (CCDS) and meet the requirements of the Carson City Standard Details.
29. Addresses for units will be provided during the building permit review process.
30. Fresh water must be used for Dust control. Contact the Water Operations Supervisor Public Works at 283-7382 for more information.
31. A private testing agreement will be necessary for the compaction and material testing in the street right of way. The form can be obtained through Carson City Permit Engineering.

32. An erosion control plan meeting section 13 of CCDS will be required in the plan set.
33. New electrical service must be underground.
34. Any work performed in the street right of way will require a traffic control plan and a time line type schedule to be submitted before the work can begin. A minimum of one week notice must be given before any work can begin in the street right of way.
35. Please show any easements on the construction drawings.
36. A Construction Stormwater Permit from the Nevada Division of Environmental Protection (NDEP) will be required for the construction of projects 1 acre or greater.

These comments are based on a very general site plan and do not indicate a complete review. All pertinent requirements of Nevada State Law, Carson City Code, and Carson City Development Standards will still apply whether mentioned in this letter or not.

FIRE DEPARTMENT

Contact Dave Ruben, Fire Marshall

1. Project must comply with the International Fire Code (IFC) and northern Nevada fire code amendments as adopted by Carson City.
2. Provide details on College Parkway gate. Electric gate must provide a Knox key switch.

PARKS DEPARTMENT

Contact Nick Wentworth, Project Manager

1. The City will not be responsible for any landscape or irrigation system maintenance on the project. All landscaping and landscape maintenance in the right of way will be the sole responsibility of the owner. The developer is required to maintain all common landscape and open space areas within the development including any landscaping in the street(s) right of ways on in perpetuity.
2. Carson City is a Bee City, USA. As a result, the developer shall use approximately 50% pollinator friendly plant material for any required landscaping on the project site. Also, any remaining landscape plant material selection needs to be consistent with the City's approved tree species list or other tree species, as approved by the City. The Carson City Pollinator Plant list and other plant selection resources can be found at www.carson.org/beecityusa

The City's approved tree species list for commercial projects can be found at <https://www.carson.org/Home/ShowDocument?id=15225>

3. Hoary Cress has been identified in abundance on the subject parcel and Russian Knapweed has a very strong presence in the Silver Oak area. The developer is required to incorporate "best management practices" into their construction documents and specifications to reduce the spread of noxious weeds. The spread of invasive and noxious weeds is a significant issue in construction projects that involve land disturbance. Earth moving activities contribute to the spread of weeds, as does the use of contaminated construction fill, seed, or erosion-control products. Experience has demonstrated that prevention is the least expensive and most effective way to halt the spread of noxious and invasive weeds. Preventing the establishment or spread of weeds relies upon:

- Educating workers about the importance of managing weeds on an ongoing basis;
- Properly identifying weed species to determine most appropriate treatment strategies;
- Avoiding or treating existing weed populations; and
- Incorporating measures into projects that prevent weed seeds or other plant parts from establishing new or bigger populations such as certification of weed-free products.
 - *All spoils from the site will be taken to the Carson City Landfill and will not be disposed of or utilized in any other fashion or in any other location(s).*

For more information on “best management practices” please contact The Carson City Parks, Rec. and Open Space Dept. by phone or email through the contacts listed at the top of this document.

4. Deciduous trees must be planted a minimum of 5’ from any city/public street, sidewalk or pathway. Evergreen trees must be planted a minimum of 10’ from any city/public street, sidewalk or pathway. Fruit bearing, “non-fruiting” flowering or any other trees that drop debris such as seed pods will not be permitted near or placed where they will eventually hang over city/public sidewalks or pathways.
5. Carson City Municipal Code: Title 18, Division 3 should be reviewed by any/all parties involved in the proposed landscape design prior to landscape plans being submitted to the city for final approval of a building permit. Note: Special care and consideration should be taken in the protection of existing trees on-site.
https://library.municode.com/nv/carson_city/codes/code_of_ordinances?nodeId=TIT18_APP_ENDIXCADEST_DIV3LA
6. Carson City may allow additional public parking spaces adjacent to John Mankins Park on Oak Ridge Drive to be constructed in exchange for acceptance of a smaller percentage of required open space within the development.
7. The project is subject to the collection of Residential Construction Tax (RCT), compliant with NRS Chapter 278 and Carson City Municipal Code (CCMC 15.60).

The aforementioned comments are based on the Major Project Review Committee’s review. If you have any questions, please feel free to contact the following members of staff, Monday through Friday 8:00 AM to 4:00 PM.

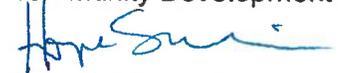
Planning Division –
 Hope Sullivan, Planning Manager
 (775) 283-7922
 Email: hsullivan@carson.org

Engineering Division –
 Stephen Pottey, Development Engineering
 (775) 283-7079
 Email: spottey@carson.org

Fire Prevention –
 Dave Ruben, Fire Marshall
 (775) 283-7153
 Email: druben@carson.org

Parks Department
Nick Wentworth, Project Manager
(775)283-7733
Email: nwentworth@carson.org

Sincerely,
Community Development Department, Planning Division



Hope Sullivan, AICP
Planning Manager

cc: MPR-2021-0048

Master Plan Policy Checklist

Special Use Permits & Major Project Reviews & Administrative Permits

PURPOSE

The purpose of a development checklist is to provide a list of questions that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to non-residential and multi-family residential development. This checklist is designed for developers, staff, and decision-makers and is intended to be used as a guide only.

Development Name: Silver Oak at College Parkway

Reviewed By: _____

Date of Review: _____

DEVELOPMENT CHECKLIST

The following five themes are those themes that appear in the Carson City Master Plan and which reflect the community's vision at a broad policy level. Each theme looks at how a proposed development can help achieve the goals of the Carson City Master Plan. A check mark indicates that the proposed development meets the applicable Master Plan policy. The Policy Number is indicated at the end of each policy statement summary. Refer to the Comprehensive Master Plan for complete policy language.

CHAPTER 3: A BALANCED LAND USE PATTERN



The Carson City Master Plan seeks to establish a balance of land uses within the community by providing employment opportunities, a diverse choice of housing, recreational opportunities, and retail services.

Is or does the proposed development:

- Meet the provisions of the Growth Management Ordinance (1.1d, Municipal Code 18.12)?
- Use sustainable building materials and construction techniques to promote water and energy conservation (1.1e, f)?
- N/A Located in a priority infill development area (1.2a)?
- Provide pathway connections and easements consistent with the adopted Unified Pathways Master Plan and maintain access to adjacent public lands (1.4a)?

2

Special Use Permit, Major Project Review, & Administrative Permit Development Checklist

- N/A Protect existing site features, as appropriate, including mature trees or other character-defining features (1.4c)?
- N/A At adjacent county boundaries or adjacent to public lands, coordinated with the applicable agency with regards to compatibility, access and amenities (1.5a, b)?
- N/A In identified Mixed-Use areas, promote mixed-use development patterns as appropriate for the surrounding context consistent with the land use descriptions of the applicable Mixed-Use designation, and meet the intent of the Mixed-Use Evaluation Criteria (2.1b, 2.2b, 2.3b, Land Use Districts, Appendix C)?
- Meet adopted standards (e.g. setbacks) for transitions between non-residential and residential zoning districts (2.1d)?
- N/A Protect environmentally sensitive areas through proper setbacks, dedication, or other mechanisms (3.1b)?
- Sited outside the primary floodplain and away from geologic hazard areas or follows the required setbacks or other mitigation measures (3.3d, e)?
- Provide for levels of services (i.e. water, sewer, road improvements, sidewalks, etc.) consistent with the Land Use designation and adequate for the proposed development (Land Use table descriptions)?
- N/A If located within an identified Specific Plan Area (SPA), meet the applicable policies of that SPA (Land Use Map, Chapter 8)?

CHAPTER 4: EQUITABLE DISTRIBUTION OF RECREATIONAL OPPORTUNITIES

The Carson City Master Plan seeks to continue providing a diverse range of park and recreational opportunities to include facilities and programming for all ages and varying interests to serve both existing and future neighborhoods.

Is or does the proposed development:

- Provide park facilities commensurate with the demand created and consistent with the City's adopted standards (4.1b)?
- Consistent with the Open Space Master Plan and Carson River Master Plan (4.3a)?

CHAPTER 5: ECONOMIC VITALITY

The Carson City Master Plan seeks to maintain its strong diversified economic base by promoting principles which focus on retaining and enhancing the strong employment base, include a broader range of retail services in targeted areas, and include the roles of technology, tourism, recreational amenities, and other economic strengths vital to a successful community.

Is or does the proposed development:

- Encourage a citywide housing mix consistent with the labor force and non-labor force populations (5.1j)
- N/A Encourage the development of regional retail centers (5.2a)
- N/A Encourage reuse or redevelopment of underused retail spaces (5.2b)?
- N/A Support heritage tourism activities, particularly those associated with historic resources, cultural institutions and the State Capitol (5.4a)?
- N/A Promote revitalization of the Downtown core (5.6a)?
- N/A Incorporate additional housing in and around Downtown, including lofts, condominiums, duplexes, live-work units (5.6c)?

CHAPTER 6: LIVABLE NEIGHBORHOODS AND ACTIVITY CENTERS



The Carson City Master Plan seeks to promote safe, attractive and diverse neighborhoods, compact mixed-use activity centers, and a vibrant, pedestrian-friendly Downtown.

Is or does the proposed development:

- Use durable, long-lasting building materials (6.1a)?
- N/A Promote variety and visual interest through the incorporation of varied building styles and colors, garage orientation and other features (6.1b)?
- Provide variety and visual interest through the incorporation of well-articulated building facades, clearly identified entrances and pedestrian connections, landscaping and other features consistent with the Development Standards (6.1c)?
- Provide appropriate height, density and setback transitions and connectivity to surrounding development to ensure compatibility with surrounding development for infill projects or adjacent to existing rural neighborhoods (6.2a, 9.3b 9.4a)?
- N/A If located in an identified Mixed-Use Activity Center area, contain the appropriate mix, size and density of land uses consistent with the Mixed-Use district policies (7.1a, b)?
- N/A If located Downtown:
 - Integrate an appropriate mix and density of uses (8.1a, e)?
 - Include buildings at the appropriate scale for the applicable Downtown Character Area (8.1b)?
 - Incorporate appropriate public spaces, plazas and other amenities (8.1d)?
- Incorporate a mix of housing models and densities appropriate for the project location and size (9.1a)?

CHAPTER 7: A CONNECTED CITY



The Carson City Master Plan seeks promote a sense of community by linking its many neighborhoods, employment areas, activity centers, parks, recreational

4

Special Use Permit, Major Project Review, & Administrative Permit Development Checklist

amenities and schools with an extensive system of interconnected roadways, multi-use pathways, bicycle facilities, and sidewalks.

Is or does the proposed development:

- Promote transit-supportive development patterns (e.g. mixed-use, pedestrian-oriented, higher density) along major travel corridors to facilitate future transit (11.2b)?
- Maintain and enhance roadway connections and networks consistent with the Transportation Master Plan (11.2c)?
- Provide appropriate pathways through the development and to surrounding lands, including parks and public lands, consistent with the Unified Pathways Master Plan (12.1a, c)?



Master Plan Policy Checklist

Conceptual & Tentative Subdivisions, PUD's & Parcel Maps

PURPOSE

The purpose of a development checklist is to provide a list of questions that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to subdivisions of property. This checklist is designed for developers, staff, and decision-makers and is intended to be used as a guide only.

Development Name: Silver Oak at College Parkway

Reviewed By: _____

Date of Review: _____

DEVELOPMENT CHECKLIST

The following five themes are those themes that appear in the Carson City Master Plan and which reflect the community's vision at a broad policy level. Each theme looks at how a proposed development can help achieve the goals of the Carson City Master Plan. A check mark indicates that the proposed development meets the applicable Master Plan policy. The Policy Number is indicated at the end of each policy statement summary. Refer to the Comprehensive Master Plan for complete policy language.

CHAPTER 3: A BALANCED LAND USE PATTERN



The Carson City Master Plan seeks to establish a balance of land uses within the community by providing employment opportunities, a diverse choice of housing, recreational opportunities, and retail services.

Is or does the proposed development:

- Consistent with the Master Plan Land Use Map in location and density?
- Meet the provisions of the Growth Management Ordinance (1.1d, Municipal Code 18.12)?
- Encourage the use of sustainable building materials and construction techniques to promote water and energy conservation (1.1e, f)?
- N/A Located in a priority infill development area (1.2a)?
- Provide pathway connections and easements consistent with the adopted Unified Pathways Master Plan and maintain access to adjacent public lands (1.4a)?

- Encourage cluster development techniques, particularly at the urban interface with surrounding public lands, as appropriate, and protect distinctive site features (1.4b, c, 3.2a)?
- N/A At adjacent county boundaries, coordinated with adjacent existing or planned development with regards to compatibility, access and amenities (1.5a)?
- Located to be adequately served by city services including fire and sheriff services, and coordinated with the School District to ensure the adequate provision of schools (1.5d)?
- N/A In identified Mixed-Use areas, promote mixed-use development patterns as appropriate for the surrounding context consistent with the land use descriptions of the applicable Mixed-Use designation, and meet the intent of the Mixed-Use Evaluation Criteria (2.1b, 2.2b, 2.3b, Land Use Districts, Appendix C)?
- Provide a variety of housing models and densities within the urbanized area appropriate to the development size, location and surrounding neighborhood context (2.2a, 9.1a)?
- N/A Protect environmentally sensitive areas through proper setbacks, dedication, or other mechanisms (3.1b)?
- N/A If at the urban interface, provide multiple access points, maintain defensible space (for fires) and are constructed of fire resistant materials (3.3b)?
- Sited outside the primary floodplain and away from geologic hazard areas or follow the required setbacks or other mitigation measures (3.3d, e)?
- Provide for levels of services (i.e. water, sewer, road improvements, sidewalks, etc.) consistent with the Land Use designation and adequate for the proposed development (Land Use table descriptions)?
- N/A If located within an identified Specific Plan Area (SPA), meet the applicable policies of that SPA (Land Use Map, Chapter 8)?

CHAPTER 4: EQUITABLE DISTRIBUTION OF RECREATIONAL OPPORTUNITIES



The Carson City Master Plan seeks to continue providing a diverse range of park and recreational opportunities to include facilities and programming for all ages and varying interests to serve both existing and future neighborhoods.

Is or does the proposed development:

- Provide park facilities commensurate with the demand created and consistent with the City's adopted standards (4.1b, c)?
- Consistent with the Open Space Master Plan and Carson River Master Plan (4.3a)?



CHAPTER 5: ECONOMIC VITALITY



The Carson City Master Plan seeks to maintain its strong diversified economic base by promoting principles which focus on retaining and enhancing the strong employment base, include a broader range of retail services in targeted areas, and include the roles of technology, tourism, recreational amenities, and other economic strengths vital to a successful community.

Is or does the proposed development:

- Incorporating public facilities and amenities that will improve residents' quality of life (5.5e)?
- N/A Promote revitalization of the Downtown core (5.6a)?
- N/A Incorporate additional housing in and around Downtown, including lofts, condominiums, duplexes, live-work units (5.6c)?

CHAPTER 6: LIVABLE NEIGHBORHOODS AND ACTIVITY CENTERS



The Carson City Master Plan seeks to promote safe, attractive and diverse neighborhoods, compact mixed-use activity centers, and a vibrant, pedestrian-friendly Downtown.

Is or does the proposed development:

- N/A Promote variety and visual interest through the incorporation of varied lot sizes, building styles and colors, garage orientation and other features (6.1b)?
- Provide variety and visual interest through the incorporation of well-articulated building facades, clearly identified entrances and pedestrian connections, landscaping and other features consistent with the Development Standards (6.1c)?
- Provide appropriate height, density and setback transitions and connectivity to surrounding development to ensure compatibility with surrounding development for infill projects or adjacent to existing rural neighborhoods (6.2a, 9.3b 9.4a)?
- N/A If located in an identified Mixed-Use Activity Center area, contain the appropriate mix, size and density of land uses consistent with the Mixed-Use district policies (7.1a, b)?
- N/A If located Downtown:
 - Integrate an appropriate mix and density of uses (8.1a, e)?
 - Include buildings at the appropriate scale for the applicable Downtown Character Area (8.1b)?
 - Incorporate appropriate public spaces, plazas and other amenities (8.1d)?

CHAPTER 7: A CONNECTED CITY



The Carson City Master Plan seeks promote a sense of community by linking its many neighborhoods, employment areas, activity centers, parks, recreational amenities and schools with an extensive system of interconnected roadways, multi-use pathways, bicycle facilities, and sidewalks.

Is or does the proposed development:

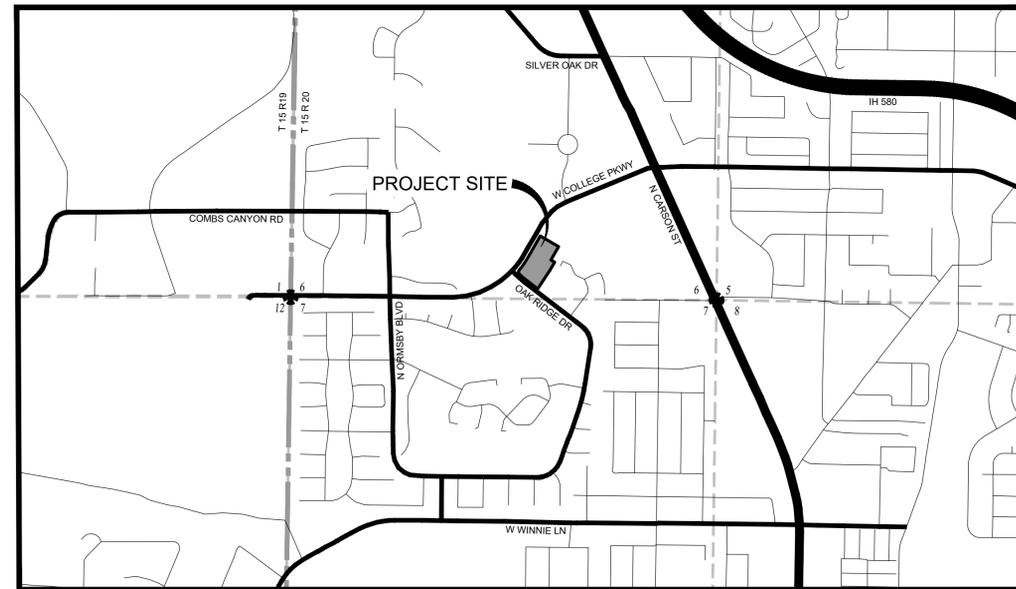
- Promote transit-supportive development patterns (e.g. mixed-use, pedestrian-oriented, higher density) along major travel corridors to facilitate future transit (11.2b)?
- Maintain and enhance roadway connections and networks consistent with the Transportation Master Plan (11.2c)?
- Provide appropriate pathways through the development and to surrounding lands, including parks and public lands, consistent with the Unified Pathways Master Plan (12.1a, c)?

SPECIAL USE PERMIT FOR SILVER OAK @ COLLEGE PKWY

APN: 007-462-16 & 007-462-17
CARSON CITY, NEVADA

STANDARD SYMBOLS

| EXISTING | | PROPOSED |
|----------------------|-----------------------------|----------|
| | STORM SEWER | |
| | SANITARY SEWER | |
| | WATER MAIN | |
| | GAS | |
| | ELECTRIC | |
| | TELEPHONE | |
| | SANITARY MANHOLE | |
| | SANITARY CLEANOUT | |
| | STORM MANHOLE | |
| | CATCH BASIN | |
| SWPPP FEATURES | | |
| | SWPPP FEATURES | |
| | FLARED END SECTION HEADWALL | |
| | STREET LIGHT | |
| | DITCH OR SWALE | |
| | DIRECTION OF FLOW | |
| | 2 FOOT CONTOURS | |
| | ROADWAY GRADE BREAK | |
| | CURB AND GUTTER | |
| | CONCRETE WALK | |
| ACCESSIBLE CURB RAMP | | |
| | PROPERTY LINE | |
| | SIGN | |
| | POWER POLE | |
| | GUY WIRE | |
| | GAS VALVE | |
| | ELECTRICAL BOX | |
| | TELEPHONE PEDISTAL | |
| | CHAIN-LINK FENCE | |
| | TOP OF CURB ELEVATION | |
| | EDGE OF PAVEMENT ELEVATION | |
| | TOP OF WALL ELEVATION | |
| | FINISH GRADE ELEVATION | |
| | GRADE BREAK ELEVATION | |
| | FLOWLINE ELEVATION | |
| | ROCKERY WALL | |
| | RETAINING WALL | |
| | LANDSCAPE WALL | |
| | CLASS "A" MONUMENT | |



VICINITY MAP
NTS

SHEET INDEX

| SHEET NO | SHEET NAME |
|----------|----------------------------------|
| 1 | TITLE SHEET |
| 2 | PRELIMINARY SITE PLAN |
| 3 | PRELIMINARY GRADING PLAN |
| 4 | PRELIMINARY UTILITY PLAN |
| 5 | PRELIMINARY EROSION CONTROL PLAN |

PROJECT DATA

| | |
|----------------------------------|-------------------------|
| ASSESSOR'S PARCEL NUMBER | 007-462-16 & 007-462-17 |
| TOTAL PROJECT AREA | 3.46 AC |
| LOT AREA | 1.48 AC |
| RIGHT-OF-WAY AREA | 0.00 AC |
| PRIVATE STREET AREA | 0.00 AC |
| COMMON AREA | 1.98 AC |
| TOTAL LOTS | 52 |
| LOT SIZE | 1,237 SF |
| GUEST PARKING | 35 |
| EXISTING ZONING | NB-P |
| EXISTING MASTER PLAN DESIGNATION | HDR |
| PROPOSED DENSITY | 15.03 UNITS/AC |

UTILITIES

| | |
|-------------|---------------------------|
| CABLE | CHARTER COMMUNICATIONS |
| PHONE | AT&T |
| ELECTRICAL | NV ENERGY |
| GAS | SOUTHWEST GAS CORPORATION |
| SEWER | CARSON CITY PUBLIC WORKS |
| STORM DRAIN | CARSON CITY PUBLIC WORKS |
| SOLID WASTE | CAPITOL SANITATION |
| WATER | CARSON CITY PUBLIC WORKS |

BASIS OF BEARINGS

GRID NORTH, MODIFIED NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983/1994 (NAD 83/94) DETERMINED USING REAL TIME KINEMATIC GPS (RTK GPS) OBSERVATIONS OF CARSON CITY CONTROL MONUMENTS CC075 AND CC029. COMBINED GRID TO GROUND FACTOR = 1.0002. ALL DISTANCES SHOWN HEREIN ARE GROUND VALUES.

BASIS OF ELEVATION

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), AS TAKEN FROM CITY OF CARSON CITY CONTROL MONUMENT CC029, HAVING A PUBLISHED ELEVATION OF 4732.41 U.S. FEET. CC020 IS DESCRIBED AS 2" BRASS DISK STAMPED "CC029" LOCATED AT THE NORTHWEST CORNER OF THE INTERSECTION OF WEST NYE LANE AND MOUNTAIN STREET.

LEGAL DESCRIPTION

ADJUSTED PARCELS 1 AND 2 AS DESCRIBED IN DOCUMENT NO. 472816 AND AS SHOWN ON THE RECORD OF SURVEY MAP LLA-16-169 ENTITLED "RECORD OF SURVEY IN SUPPORT OF A BOUNDARY LINE ADJUSTMENT FOR JAMES B. AND SANDY M. FOLEY AND SILVER OAK DEVELOPMENT, FILED IN BOOK 10, PAGE 2904 AS FILE NO. 472817, BOTH DOCUMENTS FILED ON MARCH 2, 2017 IN THE OFFICIAL RECORDS OF CARSON CITY, NEVADA.

ABBREVIATIONS

| | | | | | |
|----------|-----------------------------|-------|--------------------------------|-------|-------------------------------|
| AGG. | AGGREGATE GRAVEL | FL | FLOW LINE | PVT | POINT OF VERTICAL TANGENCY |
| B.A.M.A. | BIT. AGG. MIXTURE | FM | FORCE MAIN | R | RADIUS |
| B-B | BACK TO BACK | FG | FINISH GRADE | RCP | REINFORCED CONCRETE PIPE |
| BC | BEGINNING OF CURVE | GAS | GAS | ROW | RIGHT-OF-WAY |
| BFC | BACK FACE OF CURB | GW | GUY WIRE | RR | RAILROAD |
| BIT. | BITUMINOUS CONCRETE | HDWL | HEADWALL | SD | STORM DRAIN |
| BM | BENCHMARK | HH | HANDHOLE | SDMH | STORM DRAIN MANHOLE |
| B.O. | BY OTHERS | HP | HIGH POINT | SF | SQUARE FOOT |
| B/P | BOTTOM OF PIPE | HWL | HIGH WATER LEVEL | SHLD. | SHOULDER |
| BVC | BEGINNING OF VERTICAL CURVE | HYD. | HYDRANT | SL | STREET LIGHT |
| BW | BOTTOM OF WALL | I.E. | INVERT ELEVATION | SS | SANITARY SEWER |
| CB | CATCH BASIN | INL | INLET | SSMH | SANITARY SEWER MANHOLE |
| CL | CENTERLINE | INV. | INVERT | STA. | STATION |
| CMP | CORRUGATED METAL PIPE | IP | IRON PIPE | SY | SQUARE YARDS |
| CNTRL | CONTROL | LFF | LOWER FINISHED FLOOR | T | TELEPHONE |
| CONC. | CONCRETE | LGAR | LIP OF GARAGE | TBR | TO BE REMOVED |
| CY | CUBIC YARD | LXFG | LOWER EXTERIOR FINISHED GRADE | TC | TOP OF CURB |
| D | DITCH | LP | LOW POINT | TOS | TO OF SLAB |
| DIA. | DIAMETER | MAX. | MAXIMUM | T/P | TOP OF PIPE |
| DIP | DUCTILE IRON PIPE | MB | MAILBOX | TRANS | TRANSFORMER |
| DI | DUCTILE IRON | MIN. | MINIMUM | TW | TOP OF WALL |
| DT | DRAIN TILE | NWL | NORMAL WATER LEVEL | UFF | UPPER FINISHED FLOOR |
| (e) | EXISTING | P | PAVEMENT | UXFG | UPPER EXTERIOR FINISHED GRADE |
| E | ELECTRIC | PC | POINT OF CURVE | VB | VALVE BOX |
| EC | END OF CURVE | PCC | POINT OF COMPOUND CURVE | VV | VALVE VAULT |
| E-E | EDGE TO EDGE | PI | POINT OF INTERSECTION | WL | WATER LEVEL |
| ELEV. | ELEVATION | PL | PROPERTY LINE | WM | WATER MAIN |
| EP | EDGE OF PAVEMENT | PP | POWER POLE | | |
| EVC | END OF VERTICAL CURVE | PROP. | PROPOSED | | |
| EX. | EXISTING | PT | POINT OF TANGENCY | | |
| FES | FLARED END SECTION | PVC | POLYVINYL CHLORIDE PIPE | | |
| F-F | FACE TO FACE | PVC | POINT OF VERTICAL CURVE | | |
| FF | FINISHED FLOOR | PVI | POINT OF VERTICAL INTERSECTION | | |

Manhard CONSULTING LTD

241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-748-3500 fx:775.748.3500 manhard.com
Civil Engineers • Surveyors • Water Resources Engineers • Water & Wastewater Engineers
Construction Managers • Environmental Scientists • Landscape Architects • Planners

OWNER
JAMES B. & SANDRA M. FOLEY TRUST
4455 COMBS CANYON RD
CARSON CITY, NEVADA 89703

DEVELOPER
LANTURN INVESTMENTS
3075 COLLEGE DR
CARSON CITY, NEVADA 89703
775-745-0881

CIVIL
MANHARD CONSULTING, LTD
241 RIDGE STREET, SUITE 400
RENO, NEVADA 89501
(775) 746-3500

PLANNER
MANHARD CONSULTING, LTD
241 RIDGE STREET, SUITE 400
RENO, NEVADA 89501
(775) 746-3500

SURVEYOR
MANHARD CONSULTING, LTD
241 RIDGE STREET, SUITE 400
RENO, NEVADA 89501
(775) 746-3500

GEOTECH ENGINEER
PEZONELLA ASSOCIATES, INC.
520 EDISON WAY
RENO, NEVADA 89502
(775) 856-5566

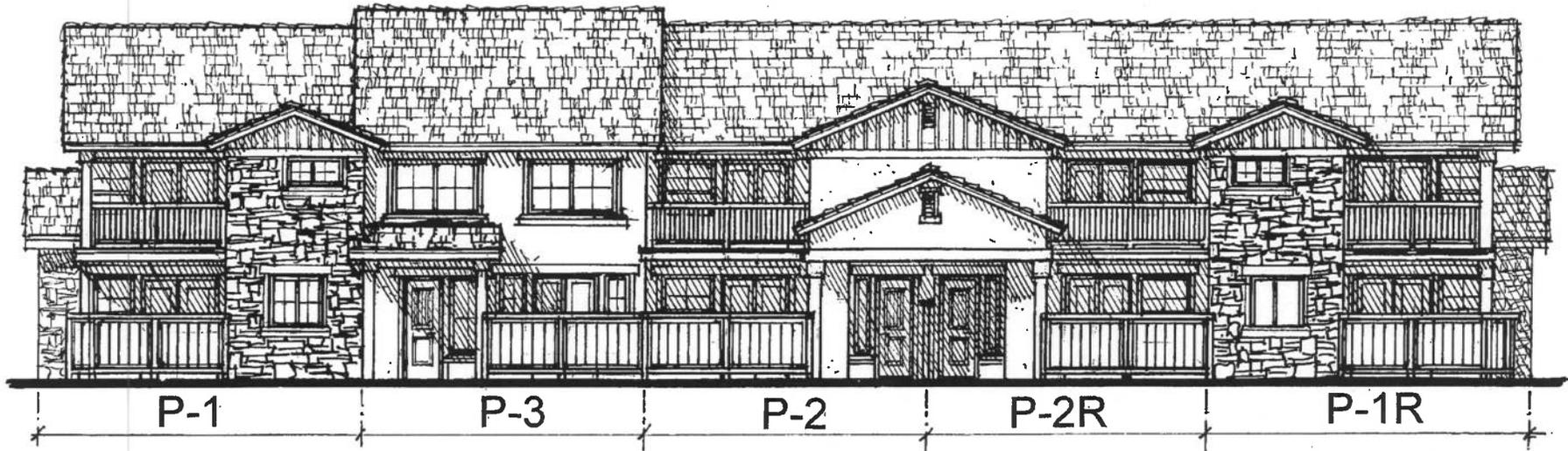
LANDSCAPE ARCHITECT
SANDRA WENDEL, RLA
880 MARION WAY
GARDNERVILLE, NV 89460
(775) 721-6630

Manhard CONSULTING LTD
241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-748-3500 fx:775.748.3500 manhard.com
Civil Engineers • Surveyors • Water Resources Engineers • Water & Wastewater Engineers
Construction Managers • Environmental Scientists • Landscape Architects • Planners

SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
TITLE SHEET

REGISTERED CIVIL ENGINEER - STATE OF NEVADA
SPENCER D. FELLOWS
Exp. 06-30-23
No. 027892

PROJ. MGR.: SDF
PROJ. ASSOC.: SDF
DRAWN BY: SDF
DATE: JUN 2021
SCALE: AS SHOWN
SHEET
1 OF 5
L.L.C. 027892



FRONT ELEVATION

1/8"=1'-0"

BUILDING - 1

FIVE UNITS

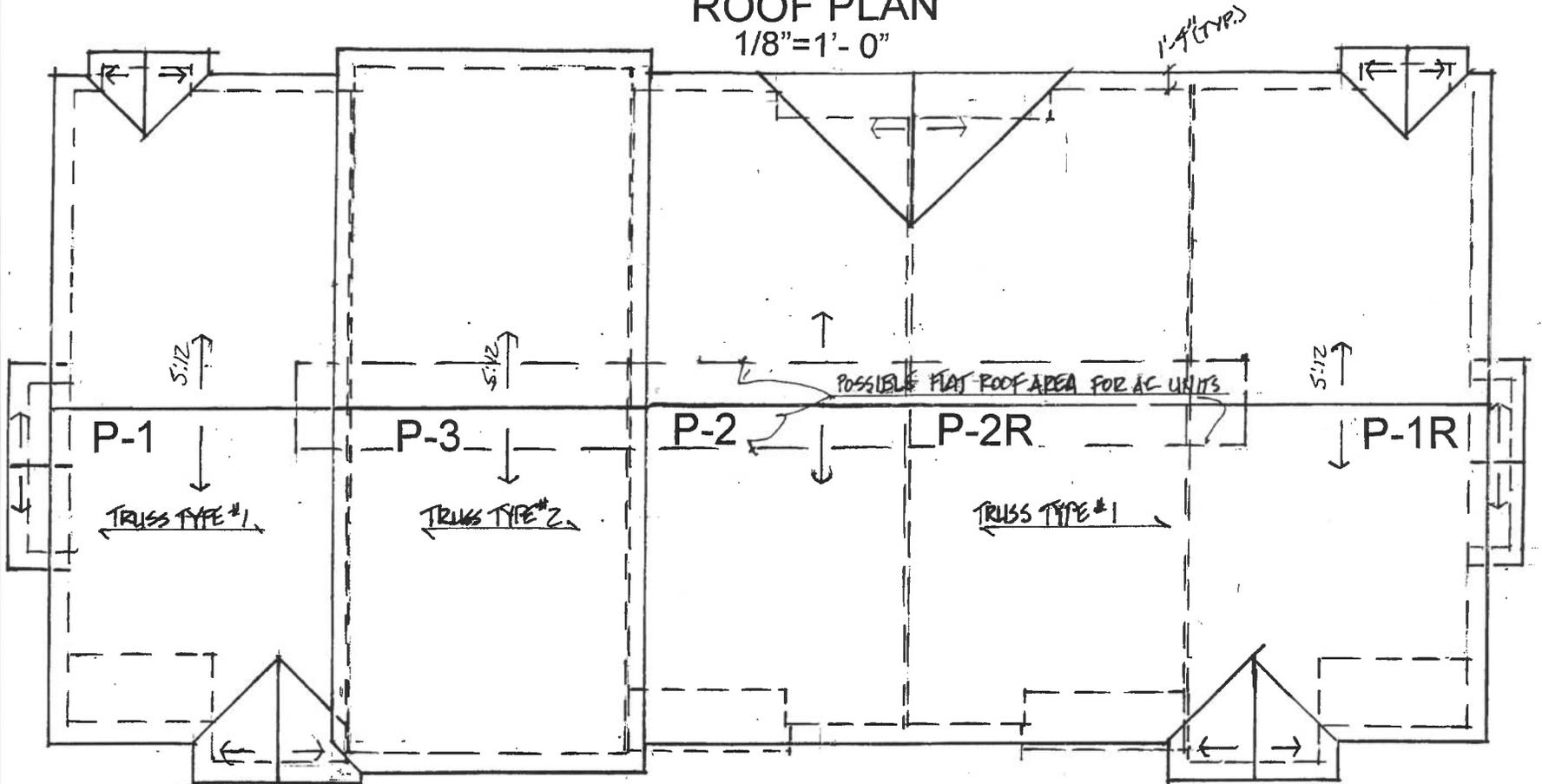
RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES

6/16/21

ROOF PLAN

1/8" = 1'-0"



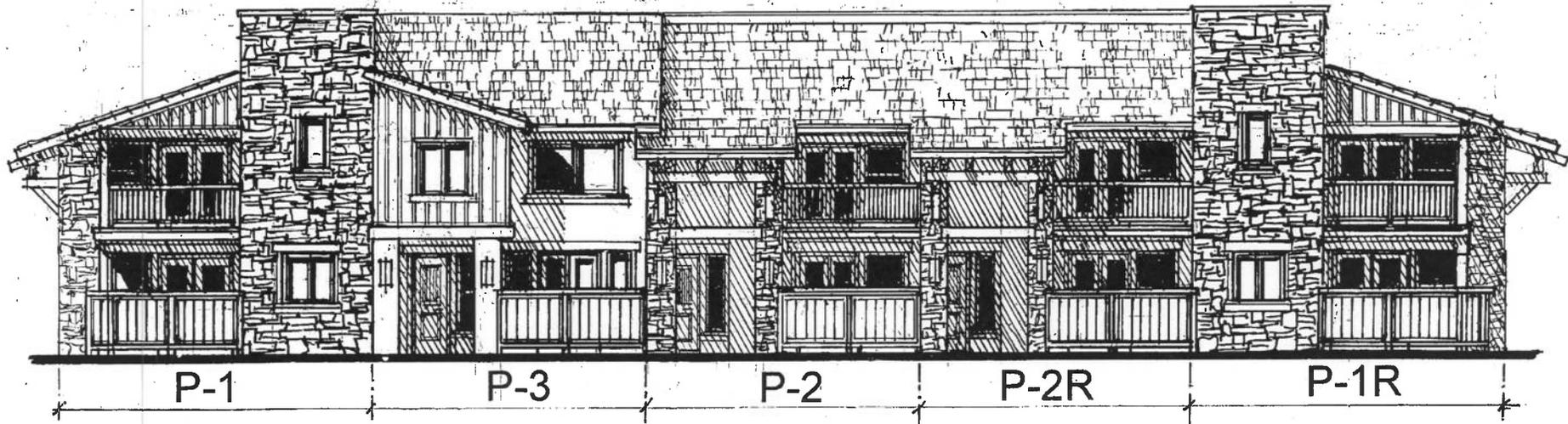
BUILDING - 1

FIVE UNITS

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES

6/16/21



FRONT ELEVATION

1/8"=1'-0"

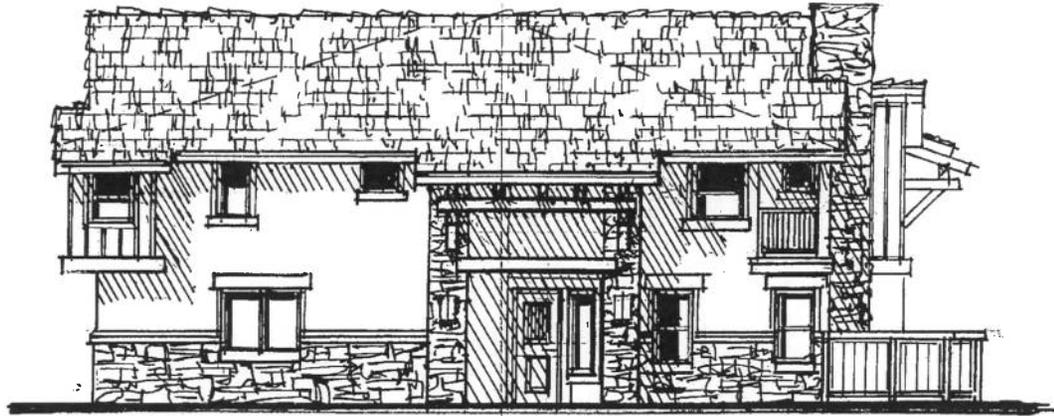
BUILDING - 1

FIVE UNITS

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES

6/23/21



P-1

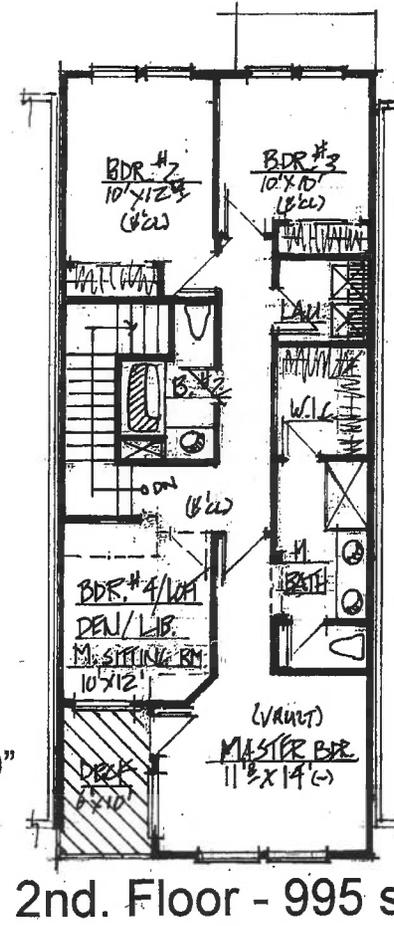
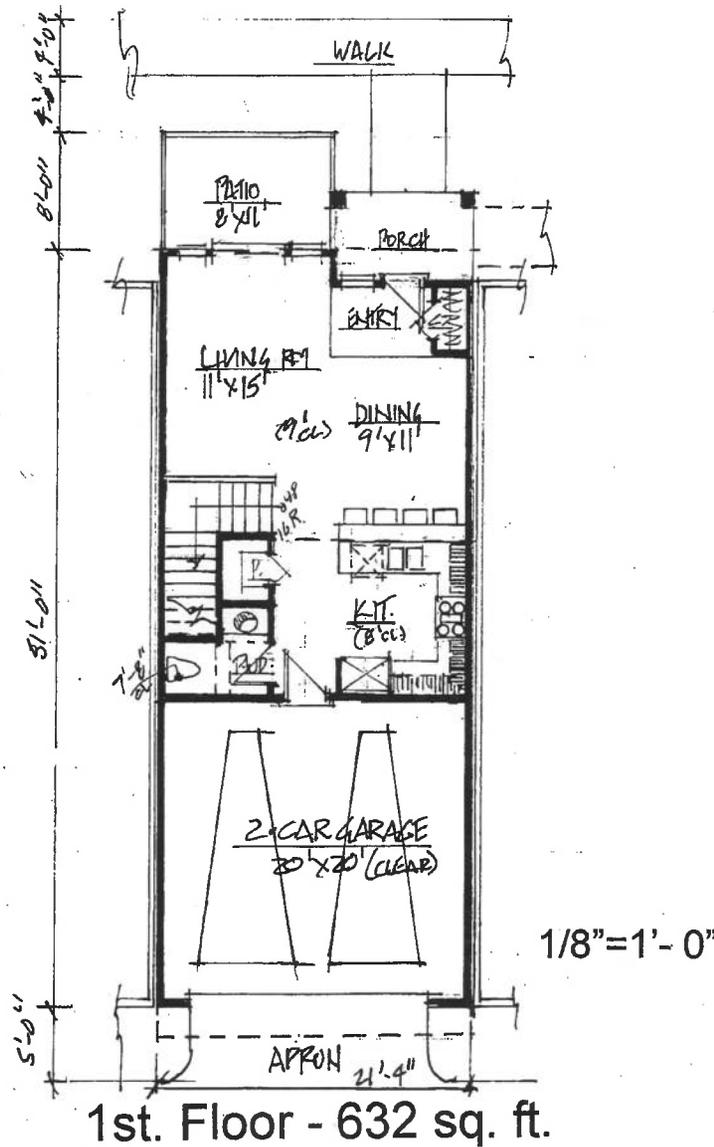
SIDE ELEVATION

1/8"=1'-0"

BUILDING - 1

RED LEAF INVESTMENTS
COLLEGE PARKWAY TOWNHOMES

6/23/21



PLAN - 3

End Unit/Interior Unit

1627 sq. ft.

3 BDR./2.5 B +
BDR. # 4/Den
MBR. Sitting Rm.

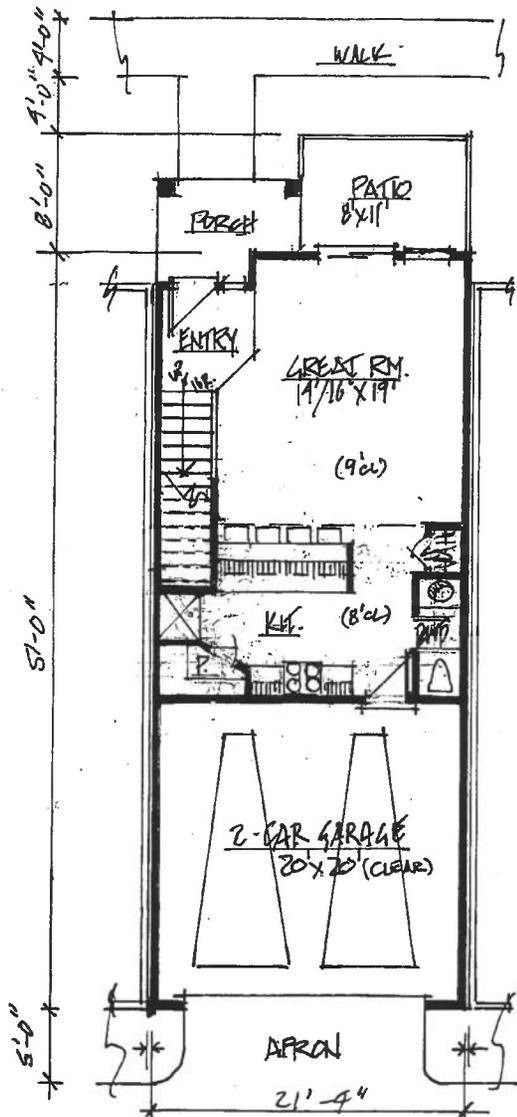
TOWNHOME



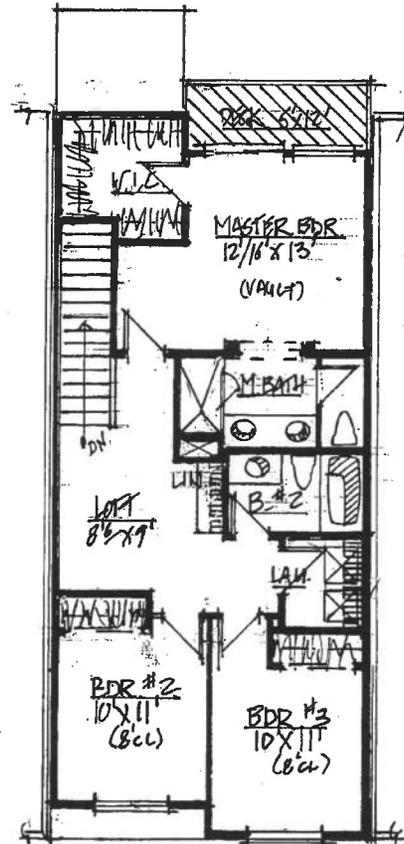
5/14/21

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES



1st. Floor - 629 sq. ft.



2nd. Floor - 950 sq. ft.

PLAN - 2

Interior Unit

1579 sq. ft.

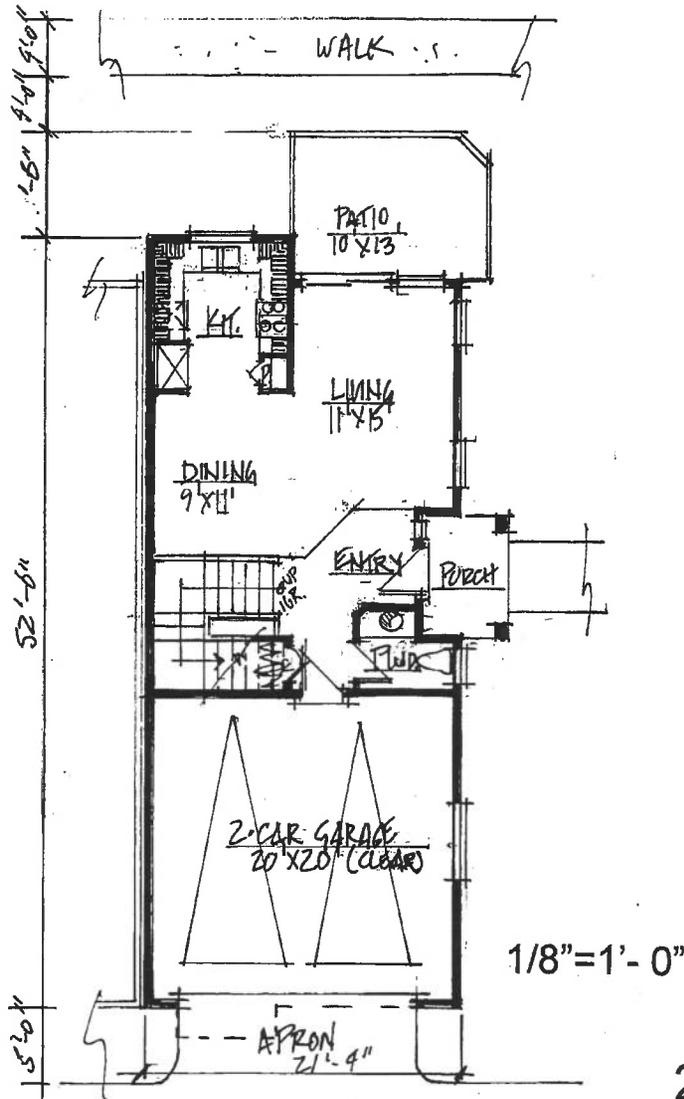
3 BDR./2.5 B/Loft
TOWNHOME



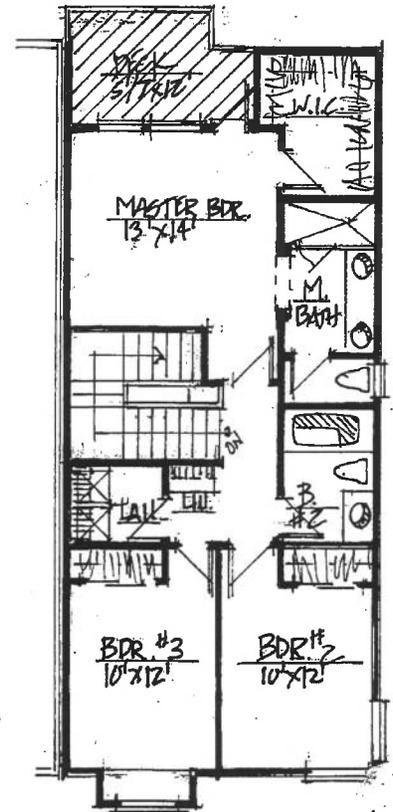
5/14/21

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES



1st. Floor - 612 sq. ft.



2nd. Floor - 917 sq. ft.

PLAN - 1

End Unit (only)

1529 sq. ft.

3 BDR./2.5 B

TOWNHOME



5/14/21

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES



CARSON CITY

Capital of Nevada

[Treasurer Home](#)
[Assessor Data Inquiry](#)
[Back to Last Page](#)

Secured Tax Inquiry Detail for Parcel # 007-462-16

Property Location: W COLLEGE PKWY
 Billed to: FOLEY, JAMES B & SANDRA M TRUST
 % JAMES B & SANDRA M FOLEY, IT
 4455 COMBS CANYON RD
 CARSON CITY, NV 89703-0000

Tax Year: 2019-20
 Roll #: 006046
 District: 2.4
 Tax Service:
 Land Use Code: 140

[Code Table](#)

Outstanding Taxes:

| Prior Year | Tax | Penalty/Interest | Total | Amount Paid | Total Due |
|---------------------|-----------------|------------------|-----------------|-----------------|-----------|
| Current Year | | | | | |
| 08/19/19 | 1,969.70 | | 1,969.70 | 1,969.70 | .00 |
| 10/07/19 | 1,967.00 | | 1,967.00 | 1,967.00 | .00 |
| 01/06/20 | 1,967.00 | | 1,967.00 | 1,967.00 | .00 |
| 03/02/20 | 1,967.00 | | 1,967.00 | 1,967.00 | .00 |
| Totals: | 7,870.70 | .00 | 7,870.70 | 7,870.70 | |

No Taxes Owning

[History](#)

Additional Information

| | 2019-20 | 2018-19 | 2017-18 | 2016-17 | 2015-16 |
|-----------------|---------|---------|---------|---------|---------|
| Tax Rate | 3.5700 | 3.5700 | 3.5700 | 3.5200 | 3.5200 |
| Tax Cap Percent | 4.8 | 4.2 | 2.6 | 2 | 3.2 |



CARSON CITY

Capital of Nevada

[Treasurer Home](#)
[Assessor Data Inquiry](#)
[Back to Last Page](#)

Secured Tax Inquiry Detail for Parcel # 007-462-17

Property Location: 1147 W COLLEGE PKWY
 Billed to: FOLEY, JAMES B & SANDRA M TRUST
 % JAMES & SANDRA FOLEY, TTEES
 4455 COMBS CANYON RD
 CARSON CITY, NV 89703-0000

Tax Year: 2019-20
 Roll #: 006047
 District: 2.4
 Tax Service:
 Land Use Code: 140

[Code Table](#)

Outstanding Taxes:

| Prior Year | Tax | Penalty/Interest | Total | Amount Paid | Total Due |
|---------------------|-----------------|------------------|-----------------|-----------------|-----------------------|
| <u>Current Year</u> | | | | | No Taxes Owing |
| 08/19/19 | 849.63 | | 849.63 | 849.63 | .00 |
| 10/07/19 | 849.00 | | 849.00 | 849.00 | .00 |
| 01/06/20 | 849.00 | | 849.00 | 849.00 | .00 |
| 03/02/20 | 849.00 | | 849.00 | 849.00 | .00 |
| Totals: | 3,396.63 | .00 | 3,396.63 | 3,396.63 | |

[History](#)

Additional Information

| | 2019-20 | 2018-19 | 2017-18 | 2016-17 | 2015-16 |
|-----------------|---------|---------|---------|---------|---------|
| Tax Rate | 3.5700 | 3.5700 | 3.5700 | 3.5200 | 3.5200 |
| Tax Cap Percent | 4.8 | 4.2 | 2.6 | .2 | 3.2 |



Manhard™

CONSULTING LTD

PRELIMINARY SEWER REPORT

FOR

SILVER OAK @ COLLEGE PKWY

CARSON CITY, NEVADA

Prepared for:

Lanturn Investments
Mr. Mark Turner
3075 College Dr.
Carson City, NV 89703

Prepared by:

Manhard Consulting Ltd.
241 Ridge St.
Suite 400
Reno, Nevada 89501



06/08/21

Project: LILCCNV06

Date: June 8, 2021

Table of Contents

| | | |
|---|--|---|
| 1 | INTRODUCTION | 1 |
| 2 | PROPOSED ALIGNMENT AND QUANTITY OF SERVICE | 1 |
| 3 | CONCLUSION | 3 |

Appendices

APPENDIX A - FLOWMASTER FLOW DATA

Figures

FIGURE 1 – VICINITY MAP

FIGURE 2 – SEWER MAIN LAYOUT

1 INTRODUCTION

1.1 Purpose of Analysis

This report represents a preliminary analysis of the proposed sanitary sewer system for Silver Oak @ College Pkwy. The purpose of this analysis is to establish peak flow rates and evaluate proposed sanitary sewer sizes for the subject property.

1.2 Project Location and Description

The proposed Silver Oak @ College Pkwy development is approximately 3.46 acres in size and located in the northwestern portion of Carson City and is west of North Carson Street, south of West College Parkway, and east of Oak Ridge Drive. The proposed project site is situated within the Southwest 1/4 of the Southeast 1/4 of Section 6, Township 15 North, and Range 20 East of the Mount Diablo Meridian (refer to Figure 1, Vicinity Map). The project site is within the existing parcels 007-462-16 and 007-462-17.

Figure 2, the Sewer Main Layout, illustrates the location and orientation of the project and its proposed lots and access locations.

1.3 Project Description

The Silver Oak @ College Pkwy development is a proposed subdivision which consists of 52 single-family residential units. The project site is currently zoned NB-P.

2 PROPOSED ALIGNMENT AND QUANTITY OF SERVICE

2.1 Project Wastewater Collection System

Sewage flow from Silver Oak @ College Pkwy will be conveyed via public 8" diameter PVC SDR-35 sewer mains to the collection point (manhole) located near the east corner of the development. The sanitary sewer main within the development flows east to the connection of the existing 8-inch sanitary sewer located on west edge of Silver Oak Phase 21. All of the mains within the proposed subdivision are located within the common area which will have a blanket public utility easement. The proposed sizes and locations of the sanitary sewers can be found on the *Sanitary Sewer Plan*, which is included in this report.

The minimum and maximum proposed slopes used within this development are 0.50% and 2.00%. The slope has been checked to ensure that it is within the Carson City required velocity of 2 fps and 10 fps during the peak flow condition.

2.2 Estimated Peak Sewage Flows

Calculations for the design of the sewer system were performed in accordance with Chapter 10, Section 11.243 of the Recommended Standards for Wastewater Facilities (10-State Standards), 2014 Edition and Division 15, Section 15.3.2 of the Carson City Development Standards and Carson City's Sewer System Master Plan Update, July 2017, by Atkins. According to analysis, the actual per capita flow was 148 gal/cap/day with a peaking factor ranging from 1.5 – 6.0 in wet weather conditions. Table 1 in the 10-State Standards suggests using a peaking factor of 2.5 based on the population of Carson City, Nevada. For this

analysis, the flow factors used in the calculations are 2.5 capita per dwelling unit for a single-family residential lot and 150 gal/cap/day to calculate average daily flow. A peaking factor of 2.5 is then applied to the daily average flow to compute the peak flow used in the design of the sanitary sewer. Complete peak flow calculations for Silver Oak @ College Pkwy are included within this report. The following table summarizes the results of the calculations of the peak daily flows for the residential subdivision:

| Units | Capita/DU | GPD/ Capita | Peaking Factor | Peak Flow (gpd) | Peak Flow (cfs) |
|-------|-----------|-------------|----------------|-----------------|-----------------|
| 52 | 2.5 | 150 | 2.5 | 48,750 | 0.08 |
| | | | Total | 48,750 | 0.08 |

2.3 Proposed Sewer Mains

Basic normal depth calculations for the proposed 8-inch sewer mains were done using open-channel pipe flow theory, the Manning’s Formula, and *Bentley FlowMaster® V8i® (FlowMaster)* software. A Manning’s Coefficient of 0.013 (assuming PVC pipe material) was used in all of these calculations. The *FlowMaster* worksheets that demonstrate these calculations are included within this report (Appendix A).

Per Carson City Development Standards, sewer mains are considered at capacity when peak flow is at $d/D=0.50$ for sewer mains that are 15” or less in diameter (Div. 15, Section 15.3.2.a.). In addition, the minimum velocity of 2 fps and the maximum velocity of 10 fps are required design conditions (Div 15, Section 15.3.2.e.). The *FlowMaster* calculations included within this report demonstrate that the various velocities of PVC sewer pipe at a d/D of 50% at the minimum and maximum slopes mentioned above are within the requirements for Carson City. The velocity of an 8-inch sewer main is 2.45 fps for a minimum pipe slope of 0.50%. All of the calculated velocities described above are within the Carson City required ranged of 2 fps to 10 fps. These velocity calculations can be found in the *FlowMaster* calculations included within this report.

In addition to evaluating the sewer velocities within this development, this report also analyzes maximum capacity within the proposed sewer pipes. As described above, the peak flow within the sewer main must remain at or below a normal depth of 50%. As shown in the *FlowMaster* calculations included within this report, an 8-inch PVC sewer at 0.50% can convey 276,116 gpd (0.43 cfs) at a maximum depth of 50%. Therefore, the contribution by the proposed Silver Oak @ College Pkwy will be less than the 50% full capacity requirement, and the contribution will be 48,750 gpd (0.08 cfs), which is less than the maximum allowed capacity of an 8-inch sewer. The size and locations of the proposed sanitary sewers mentioned above can be found on the *Sanitary Sewer Plan*, which is included in this report.

Carson City provided the estimated flow the existing sewer mains adjacent to the property which consists of a 8-inch sewer main to the south of the property flowing from west to east is at 0.05 (d/D) and a 15-inch sewer main to the west of the property flow south to north is at 0.30 (d/D). Connecting to the 8-inch sewer main, increases this flow to 0.22. Since connecting to either sewer pipe will contribute flow to the 12-inch pipe in between North Carson Street and Northgate Lane, which is at capacity, the project will need to contribute a pro-rated amount of 1.6% of the estimate improvement cost per Carson City’s MPR meeting comments.

3 CONCLUSION

The 8-inch sanitary sewer mains proposed herein will adequately serve the project as planned. The attached *FlowMaster* worksheet calculates the maximum capacity of the proposed 8-inch sewer mains at a minimum slope of 0.50% in accordance with the requirements of Carson City. The 8-inch sewer main at 0.50% have a capacity of 276,116 gpd (0.43 cfs) at a maximum depth of 50%, which will be able to adequately serve Silver Oak @ College Pkwy.

The proposed sanitary sewerage system within this report for the Silver Oak @ College Pkwy development has adequate capacity to carry the subject property's peak sewage flow in conformance with the guidelines outlined in the Carson City Development Standards and the Recommended Standards for Wastewater Facilities (10-State Standards), 2014, and the Sewer System Master Plan Update, July 2017, by Atkins.

SANITARY SEWER CALCULATIONS FOR SILVER OAK @ COLLEGE PKWY

The following calculations were performed in accordance with Chapter 10, Section 11.243 of the Recommended Standards for Wastewater Facilities, 2014 ed. (Ten-States Standards), Carson City Development Standards, and the Sewer System Master Plan Update, July 2017, by Atkins:

2.5 capita/dwelling unit
150 gal/capita/day

The site will consist of 149 dwelling units; therefore, the following equations are used:

Average flow = num. of dwellings * capita/dwelling * GPCD

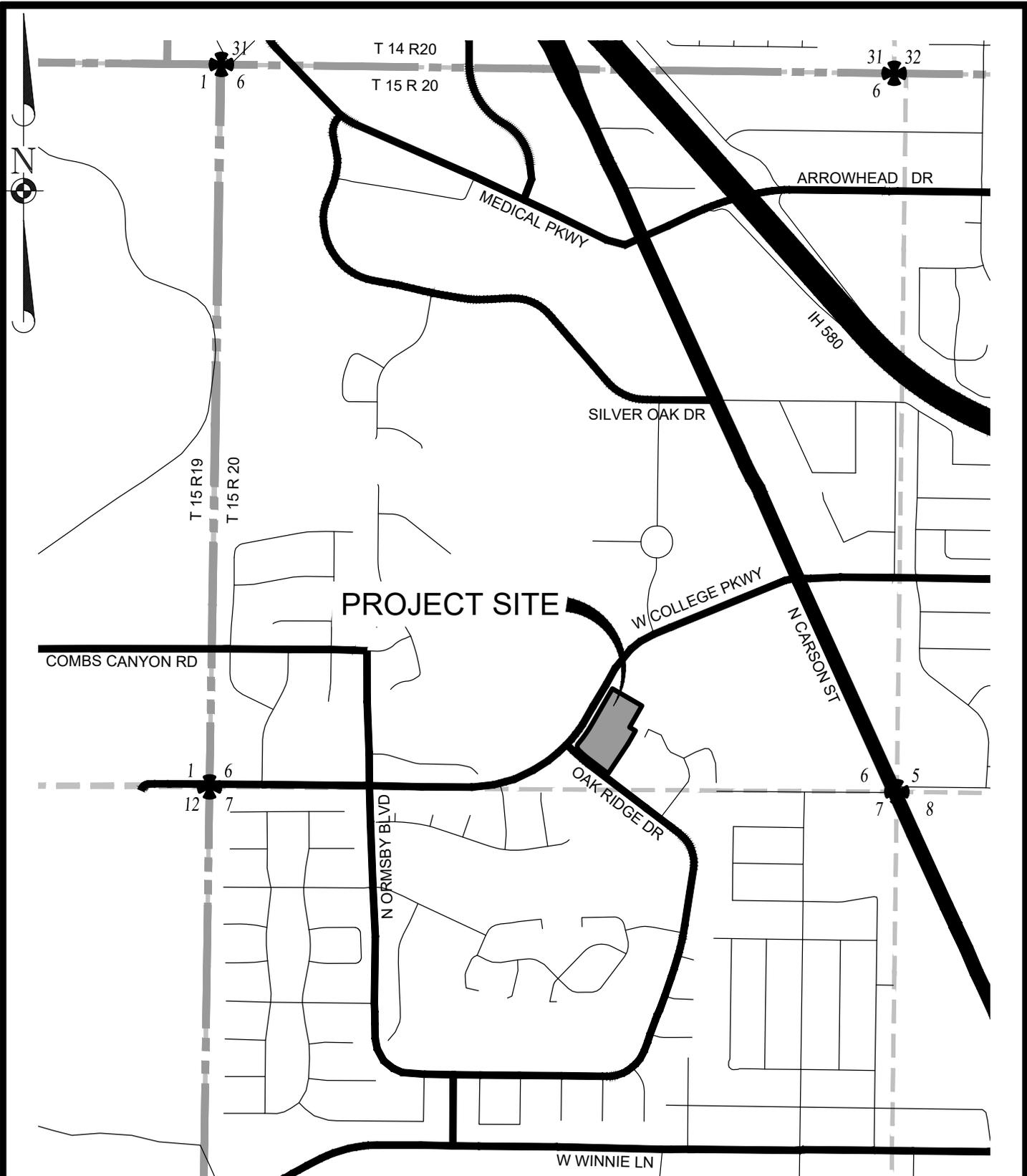
Average flow = 52 * 2.5 * 150 = 19,500 gpd = 0.03 cfs

Peak flow = Average flow * peaking factor

Peaking Factor = $(18 + P^{1/2}) / (4 + P^{1/2})$ where P = population in thousands (or use value off Table 1 based on population). The maximum peaking factor is 4.2 according to Table 1 in the 10-State Standards. Based on the population of Carson City, Nevada, a peaking factor of 2.5 is acceptable.

Peak flow = 19,500 * 2.5 = 48,750 gpd = 0.08 cfs

The design shall be for the peak flow; therefore, the design flow is 0.08 cfs.



© 2015 MANHARD CONSULTING, LTD. ALL RIGHTS RESERVED



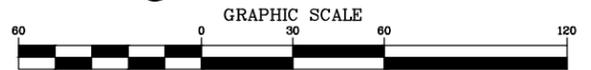
241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-748-3500 fx:775-748-3520 manhard.com
 Civil Engineers • Surveyors • Water Resource Engineers • Water & Wastewater Engineers
 Construction Managers • Environmental Scientists • Landscape Architects • Planners

SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
VICINITY MAP

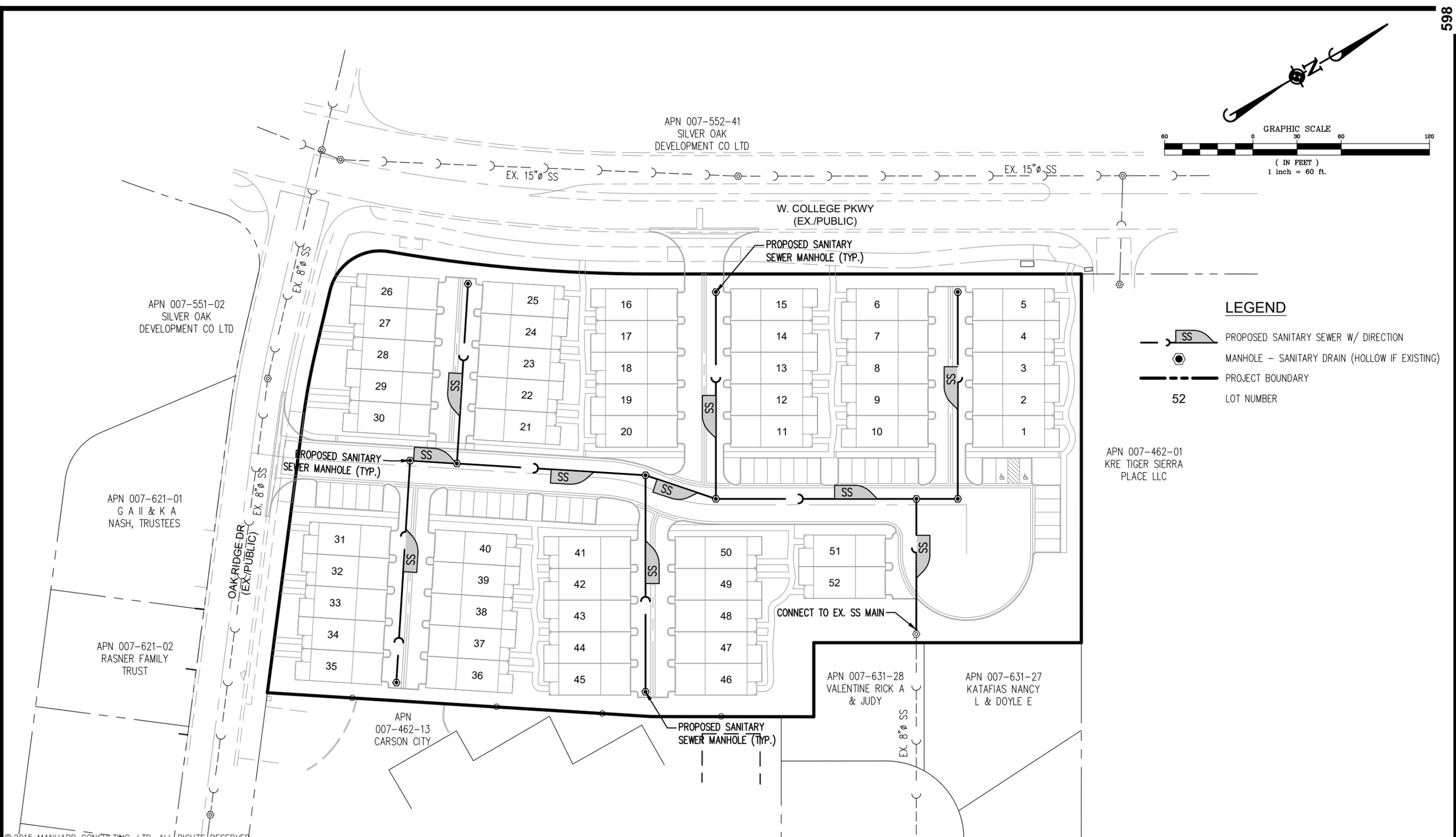
PROJ. MGR.: SDF
 DRAWN BY: SDF
 DATE: JUN 2021
 SCALE: N.T.S

SHEET
1 OF **2**
 LIL.CCNV06

Dwg Name: P:\lilccnv06\dwg\Eng\Final Drawings\Exhibits Eng\Vicinity Map.dwg Updated By: stellows 16:27



(IN FEET)
1 inch = 60 ft.



LEGEND

- PROPOSED SANITARY SEWER W/ DIRECTION
- MANHOLE - SANITARY DRAIN (HOLLOW IF EXISTING)
- PROJECT BOUNDARY
- 52** LOT NUMBER

© 2015 MANHARD CONSULTING, LTD. ALL RIGHTS RESERVED

| DATE | REVISIONS | DRAWN BY | CHECK BY |
|------|-----------|----------|----------|
| | | | |
| | | | |
| | | | |
| | | | |

Manhard
CONSULTING LTD

241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-748-3500 fx:775-748-3520 manhard.com
Civil Engineers • Surveyors • Water Resources Engineers • Water & Wastewater Engineers
Construction Managers • Environmental Scientists • Landscape Architects • Planners

SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
FIGURE 2 - SEWER MAIN LAYOUT

| | | | |
|------------------|-------------------|------------------|---------------------|
| DRAWN BY: SDF | DATE: JUN 2021 | SCALE: 1"=60' | CODE: LIL.CCNV06 |
|------------------|-------------------|------------------|---------------------|

APPENDIX A

FlowMaster Flow Data

Worksheet for 8" Sewer at 0.50% - Max Capacity

Project Description

| | |
|-----------------|-----------------|
| Friction Method | Manning Formula |
| Solve For | Discharge |

Input Data

| | | |
|-----------------------|---------|-------|
| Roughness Coefficient | 0.013 | |
| Channel Slope | 0.00500 | ft/ft |
| Normal Depth | 4.00 | in |
| Diameter | 8.00 | in |

Results

| | | |
|-------------------|-------------|--------------------|
| Discharge | 276116.36 | gal/day |
| Flow Area | 0.17 | ft ² |
| Wetted Perimeter | 1.05 | ft |
| Hydraulic Radius | 2.00 | in |
| Top Width | 0.67 | ft |
| Critical Depth | 3.66 | in |
| Percent Full | 50.0 | % |
| Critical Slope | 0.00680 | ft/ft |
| Velocity | 2.45 | ft/s |
| Velocity Head | 0.09 | ft |
| Specific Energy | 0.43 | ft |
| Froude Number | 0.84 | |
| Maximum Discharge | 0.92 | ft ³ /s |
| Discharge Full | 0.85 | ft ³ /s |
| Slope Full | 0.00125 | ft/ft |
| Flow Type | SubCritical | |

GVF Input Data

| | | |
|------------------|------|----|
| Downstream Depth | 0.00 | in |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

GVF Output Data

| | | |
|-----------------------------|----------|------|
| Upstream Depth | 0.00 | in |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Average End Depth Over Rise | 0.00 | % |
| Normal Depth Over Rise | 50.00 | % |
| Downstream Velocity | Infinity | ft/s |

Worksheet for 8" Sewer at 0.50% - Max Capacity

GVF Output Data

| | | |
|-------------------|----------|-------|
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 4.00 | in |
| Critical Depth | 3.66 | in |
| Channel Slope | 0.00500 | ft/ft |
| Critical Slope | 0.00680 | ft/ft |

Worksheet for 8" Sewer at 0.50% - 52 Lots

Project Description

| | |
|-----------------|-----------------|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

Input Data

| | | |
|-----------------------|----------|---------|
| Roughness Coefficient | 0.013 | |
| Channel Slope | 0.00500 | ft/ft |
| Diameter | 8.00 | in |
| Discharge | 48750.00 | gal/day |

Results

| | | |
|-------------------|-------------|--------------------|
| Normal Depth | 1.61 | in |
| Flow Area | 0.05 | ft ² |
| Wetted Perimeter | 0.62 | ft |
| Hydraulic Radius | 0.97 | in |
| Top Width | 0.53 | ft |
| Critical Depth | 1.50 | in |
| Percent Full | 20.1 | % |
| Critical Slope | 0.00664 | ft/ft |
| Velocity | 1.51 | ft/s |
| Velocity Head | 0.04 | ft |
| Specific Energy | 0.17 | ft |
| Froude Number | 0.87 | |
| Maximum Discharge | 0.92 | ft ³ /s |
| Discharge Full | 0.85 | ft ³ /s |
| Slope Full | 0.00004 | ft/ft |
| Flow Type | SubCritical | |

GVF Input Data

| | | |
|------------------|------|----|
| Downstream Depth | 0.00 | in |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

GVF Output Data

| | | |
|-----------------------------|----------|------|
| Upstream Depth | 0.00 | in |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Average End Depth Over Rise | 0.00 | % |
| Normal Depth Over Rise | 20.08 | % |
| Downstream Velocity | Infinity | ft/s |

Worksheet for 8" Sewer at 0.50% - 52 Lots

GVF Output Data

| | | |
|-------------------|----------|-------|
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 1.61 | in |
| Critical Depth | 1.50 | in |
| Channel Slope | 0.00500 | ft/ft |
| Critical Slope | 0.00664 | ft/ft |

Worksheet for 8" Sewer at 0.50% - 0.05 d/D plus 52 Lots

Project Description

| | |
|-----------------|-----------------|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

Input Data

| | | |
|-----------------------|----------|---------|
| Roughness Coefficient | 0.013 | |
| Channel Slope | 0.00500 | ft/ft |
| Diameter | 8.00 | in |
| Discharge | 55952.00 | gal/day |

Results

| | | |
|-------------------|-------------|--------------------|
| Normal Depth | 1.72 | in |
| Flow Area | 0.06 | ft ² |
| Wetted Perimeter | 0.64 | ft |
| Hydraulic Radius | 1.03 | in |
| Top Width | 0.55 | ft |
| Critical Depth | 1.61 | in |
| Percent Full | 21.5 | % |
| Critical Slope | 0.00656 | ft/ft |
| Velocity | 1.57 | ft/s |
| Velocity Head | 0.04 | ft |
| Specific Energy | 0.18 | ft |
| Froude Number | 0.87 | |
| Maximum Discharge | 0.92 | ft ³ /s |
| Discharge Full | 0.85 | ft ³ /s |
| Slope Full | 0.00005 | ft/ft |
| Flow Type | SubCritical | |

GVF Input Data

| | | |
|------------------|------|----|
| Downstream Depth | 0.00 | in |
| Length | 0.00 | ft |
| Number Of Steps | 0 | |

GVF Output Data

| | | |
|-----------------------------|----------|------|
| Upstream Depth | 0.00 | in |
| Profile Description | | |
| Profile Headloss | 0.00 | ft |
| Average End Depth Over Rise | 0.00 | % |
| Normal Depth Over Rise | 21.49 | % |
| Downstream Velocity | Infinity | ft/s |

Worksheet for 8" Sewer at 0.50% - 0.05 d/D plus 52 Lots

GVF Output Data

| | | |
|-------------------|----------|-------|
| Upstream Velocity | Infinity | ft/s |
| Normal Depth | 1.72 | in |
| Critical Depth | 1.61 | in |
| Channel Slope | 0.00500 | ft/ft |
| Critical Slope | 0.00656 | ft/ft |



Manhard™

CONSULTING LTD

PRELIMINARY WATER MAIN ANALYSIS REPORT

FOR

SILVER OAK @ COLLEGE PKWY

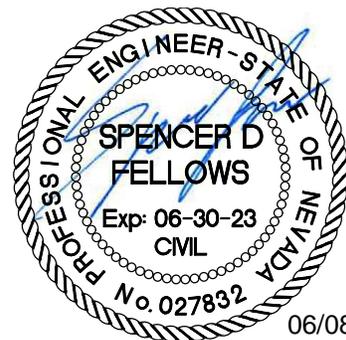
CARSON CITY, NEVADA

Prepared for:

Lanturn Investments
Mr. Mark Turner
3075 College Dr.
Carson City, NV 89703

Prepared by:

Manhard Consulting Ltd.
241 Ridge Street, Suite 400
Reno, Nevada 89501



06/08/21

Project: LIL.CCNV06

Date: June 8, 2021

Table of Contents

| | | |
|---|---|---|
| 1 | INTRODUCTION..... | 1 |
| 2 | PROPOSED ALIGNMENT AND QUANTITY OF SERVICE..... | 1 |
| 3 | CONCLUSION..... | 3 |

Appendices

APPENDIX A – WATERGEMS OUTPUT
APPENDIX B – FIRE FLOW DATA

Figures

FIGURE 1 – VICINITY MAP
FIGURE 2 – WATER MAIN LAYOUT

Tables

TABLE 1 – SILVER OAK @ COLLEGE PKWY PRESSURE SUMMARY

1 INTRODUCTION

1.1 Purpose of Analysis

This report represents a preliminary analysis of the proposed water main system for the Silver Oak @ College Pkwy. The report describes the water system and the criteria used for design. The purpose of this analysis is to establish the adequacy of the proposed water main pipe diameters and layout to meet the needs of the development.

1.2 Project Location and Description

The proposed Silver Oak @ College Pkwy development is approximately 3.46 acres in size and located in the northwestern portion of Carson City and is west of North Carson Street, south of West College Parkway, and east of Oak Ridge Drive. The proposed project site is situated within the Southwest 1/4 of the Southeast 1/4 of Section 6, Township 15 North, and Range 20 East of the Mount Diablo Meridian (refer to Figure 1, Vicinity Map). The project site is within the existing parcels 007-462-16 and 007-462-17.

Figure 2, the Water Main Layout, illustrates the location and orientation of the project and its proposed lots and roadway locations.

1.3 Project Description

The Silver Oak @ College Pkwy development is a proposed subdivision which consists of 52 single-family residential units. The project site is currently zoned within the NB-P zoning district. For purposes of this water main analysis the average lot size for this development is taken to be approximately 1,237 sf.

1.4 Methodologies

The Silver Oak @ College Pkwy water main analysis was analyzed using WaterGEMS, which employs the Hazen-Williams Method to determine headloss. The Hazen-Williams formula uses a pipe carrying capacity factor (C) based on piping materials. For the Silver Oak @ College Pkwy analysis, a C-value of 135 was used to model the proposed water main system.

2 PROPOSED ALIGNMENT AND QUANTITY OF SERVICE

2.1 Project Water Main System

Two connection points to the existing water system are being utilized for this project. The first connection point occurs on Oak Ridge Drive to the south of the project site and the second connection is to the west of the project on West College Parkway. At these points, a proposed 8" water main will connect to an existing stub or hot-tapped in the existing water main. This will loop the existing 8" water mains that surround the property. The Silver Oak @ College Pkwy development will be served by 8" water main that creates a water system loop for the project (refer to Figure 2, *Water Main Layout*).

2.2 Water Main Analysis

Pressure test data was provided by Carson City with the water main analysis. This hydrant test is located along West College Parkway near the project. See Appendix B for the Fire Flow Data.

Since this development is expanding the existing water system of Carson City with over 500 residential units, the average per lot demand (1.5 gpm/unit) was used in the analysis of the water main system from NAC 445A.66735(d). The average per lot demand of 1.5 gpm/unit was used instead of 1.0 gpm/unit to have a more conservative analysis even though the proposed services will be metered. A maximum day demand factor of 2.0 was applied to the average day demand to obtain the maximum day demand (per *Tentative Addendum*). The peak hour demand was calculated by applying a 1.5 global demand multiplier to the maximum day demands.

Irrigation demands are not known at this time for the park located in the northeast corner of the development. An assumed demand of 2 gpm will be used for the irrigation meter based on Arbor Villas irrigations demands to the west. This is an estimate and will be adjusted in final design.

In a separate analysis, a 1000 gpm fire flow requirement was applied to all the hydrants in the system. This 1000 gpm fire flow requirement was obtained from Section B105 and Table B105.1 of the 2018 International Fire Code. As a conservative analysis, it was assumed that all of the irrigation zones were active at the same time.

The following table provides the high and low pressures that were calculated using WaterGEMS (refer to Appendix A for WaterGEMS output) for each demand condition:

Table 1: Silver Oak @ College Pkwy Pressure Summary

| Condition | High Pressure (psi) | Low Pressure (psi) |
|-----------|---------------------|--------------------|
| Max Day | 70 | 67 |
| Peak Hour | 70 | 67 |
| Fire Flow | 68 | 61 |

The maximum day demand low pressure of 61 psi is above the NAC minimum of 40 psi. The peak hour demand low pressure is above the minimum of 60 psi listed in the *Carson City Development Standards – Title 18*. The pressure for the various scenarios can be found in the WaterGEMS output included in Appendix A of this report. The fire flow low pressures indicated in the table above are well above the NAC minimum requirement of 20 psi. The pressure at the hydrants EH-1 through H-1 can be found in the WaterGEMS output included in Appendix A of this report.

3 CONCLUSION

The analysis of the water system shows that the pipe sizes and layouts within Silver Oak @ College Pkwy are adequately designed to meet the demands of the development. The WaterGEMS analysis shows that the pressures are greater than the minimum requirement and below the maximum requirement for Carson City and the NAC requirements. Silver Oak @ College Pkwy complies and meets the minimum pressures per NAC 445A.6711 during maximum day, peak hour, and fire flow conditions.

WATER DEMAND CALCULATIONS FOR SILVER OAK @ COLLEGE PKWY

Number of units = 52

Average per lot demand = 1.5 gpm/lot

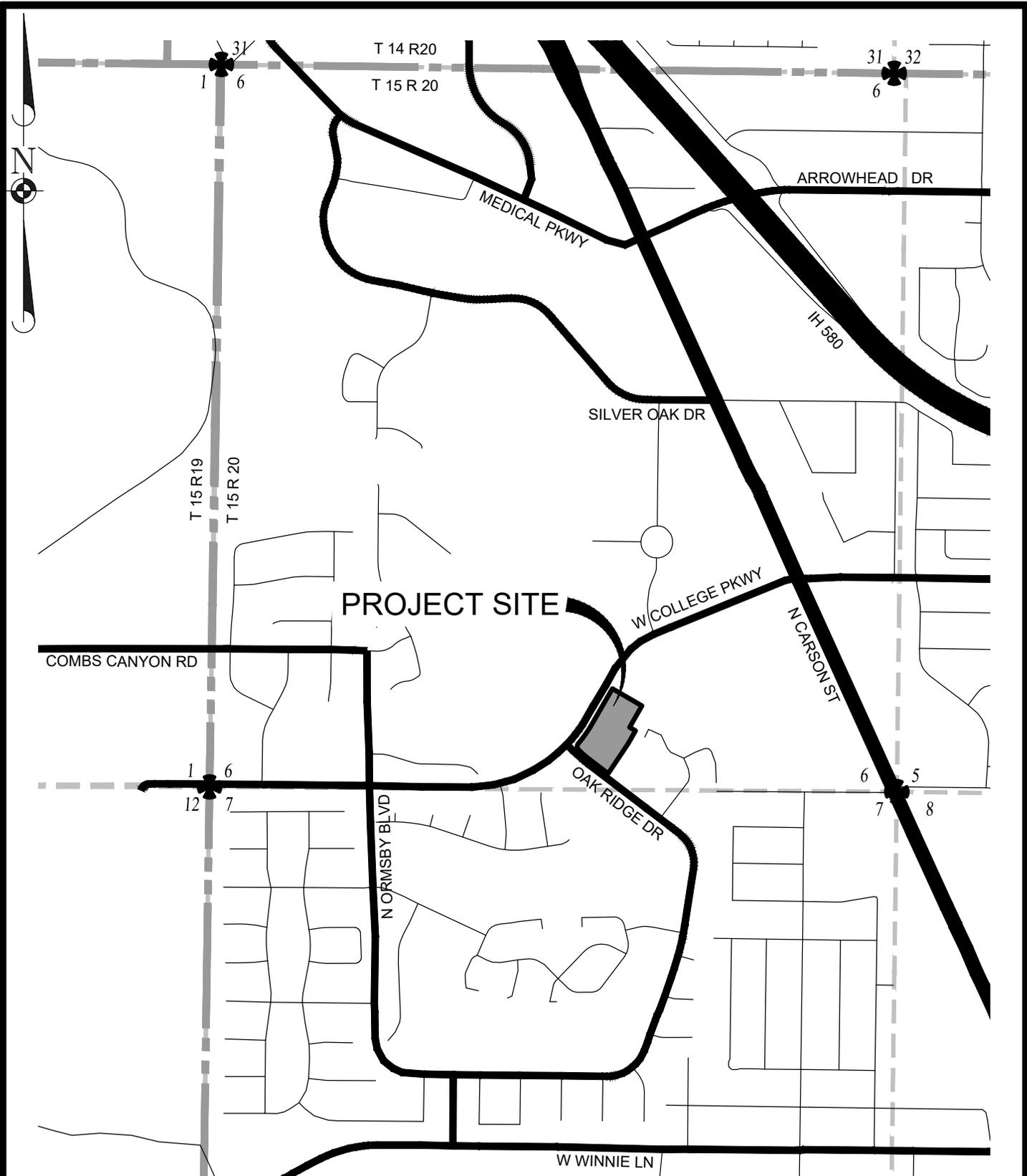
Maximum day demand factor = 2.0

Peak hour global demand multiplier = 1.5

Average demand = $52 * 1.5 = 78$ gpm

Maximum day demand = $78 * 2.0 = 156$ gpm

Peak hour demand = $156 * 1.5 = 234$ gpm



© 2015 MANHARD CONSULTING, LTD. ALL RIGHTS RESERVED



241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-748-3500 fx:775-748-3520 manhard.com
 Civil Engineers • Surveyors • Water Resource Engineers • Water & Wastewater Engineers
 Construction Managers • Environmental Scientists • Landscape Architects • Planners

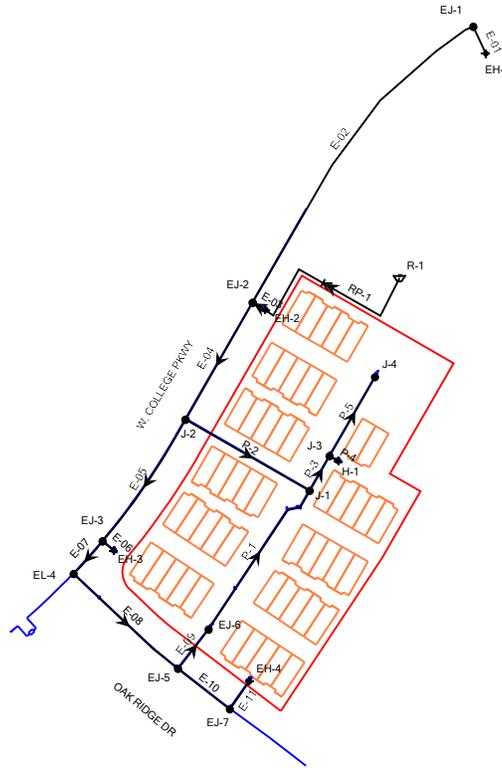
SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
VICINITY MAP

PROJ. MGR.: SDF
 DRAWN BY: SDF
 DATE: JUN 2021
 SCALE: N.T.S.

SHEET
1 OF **2**
 LIL.CCNV06

Dwg Name: P:\lilccnv06\dwg\Eng\Final Drawings\Exhibits Eng\Vicinity Map.dwg Updated By: stellows 16:27

Figure 2 - Watermain Layout



APPENDIX A

WaterGEMS Output

Scenario Summary Report

Scenario: ADD

| Scenario Summary | |
|---|------------------------------------|
| ID | 76 |
| Label | ADD |
| Notes | |
| Active Topology | <I> Base Active Topology |
| Physical | <I> Base Physical |
| Demand | ADD |
| Initial Settings | <I> Base Initial Settings |
| Operational | <I> Base Operational |
| Age | <I> Base Age |
| Constituent | <I> Base Constituent |
| Trace | <I> Base Trace |
| Fire Flow | <I> Base Fire Flow |
| Energy Cost | <I> Base Energy Cost |
| Transient | <I> Base Transient |
| Pressure Dependent Demand | <I> Base Pressure Dependent Demand |
| Failure History | <I> Base Failure History |
| SCADA | <I> Base SCADA |
| User Data Extensions | <I> Base User Data Extensions |
| Steady State/EPS Solver Calculation Options | AVERAGE DAY |
| Transient Solver Calculation Options | <I> Base Calculation Options |

| Hydraulic Summary | | | |
|--------------------|----------------|--|-----------------|
| Time Analysis Type | Steady State | Use simple controls during steady state? | True |
| Friction Method | Hazen-Williams | Is EPS Snapshot? | False |
| Accuracy | 0.001 | Start Time | 12:00:00 AM |
| Trials | 40 | Calculation Type | Hydraulics Only |

FlexTable: Junction Table

| Label | Elevation (ft) | Demand (gpm) | Hydraulic Grade (ft) | Pressure (psi) |
|-------|----------------|--------------|----------------------|----------------|
| EL-4 | 4,753.30 | 0.0 | 4,899.96 | 63 |
| EJ-3 | 4,750.51 | 0.0 | 4,899.96 | 65 |
| EJ-5 | 4,745.39 | 0.0 | 4,899.96 | 67 |
| EJ-6 | 4,744.40 | 0.0 | 4,899.96 | 67 |
| J-2 | 4,744.30 | 0.0 | 4,899.96 | 67 |
| EJ-7 | 4,742.62 | 0.0 | 4,899.96 | 68 |
| J-1 | 4,741.40 | 60.0 | 4,899.95 | 69 |
| J-3 | 4,740.00 | 0.0 | 4,899.95 | 69 |
| EJ-2 | 4,738.88 | 0.0 | 4,899.96 | 70 |
| J-4 | 4,736.90 | 20.0 | 4,899.94 | 71 |
| EJ-1 | 4,731.00 | 0.0 | 4,899.96 | 73 |

FlexTable: Pipe Table

| Label | Length (Scaled) (ft) | Start Node | Stop Node | Hazen-Williams C | Flow (Absolute) (gpm) | Velocity (ft/s) |
|-------|-------------------------|------------|-----------|---------------------|--------------------------|--------------------|
| E-01 | 42 | EJ-1 | EH-1 | 135.0 | 0.0 | 0.00 |
| E-02 | 512 | EJ-2 | EJ-1 | 135.0 | 0.0 | 0.00 |
| E-03 | 21 | EJ-2 | EH-2 | 135.0 | 80.0 | 0.91 |
| E-04 | 192 | J-2 | EJ-2 | 135.0 | 80.0 | 0.23 |
| E-05 | 210 | EJ-3 | J-2 | 135.0 | 32.2 | 0.09 |
| E-06 | 21 | EJ-3 | EH-3 | 135.0 | 0.0 | 0.00 |
| E-07 | 62 | EL-4 | EJ-3 | 135.0 | 32.2 | 0.09 |
| E-08 | 201 | EL-4 | EJ-5 | 135.0 | 32.2 | 0.13 |
| E-09 | 71 | EJ-5 | EJ-6 | 135.0 | 32.2 | 0.21 |
| E-10 | 94 | EJ-5 | EJ-7 | 135.0 | 0.0 | 0.00 |
| E-11 | 49 | EJ-7 | EH-4 | 135.0 | 0.0 | 0.00 |
| P-1 | 250 | EJ-6 | J-1 | 135.0 | 32.2 | 0.21 |
| P-2 | 204 | J-1 | J-2 | 135.0 | 47.8 | 0.31 |
| P-3 | 57 | J-1 | J-3 | 135.0 | 20.0 | 0.13 |
| P-4 | 14 | J-3 | H-1 | 135.0 | 0.0 | 0.00 |
| P-5 | 130 | J-3 | J-4 | 135.0 | 20.0 | 0.23 |
| RP-1 | 283 | R-1 | EH-2 | 135.0 | 80.0 | 0.23 |

Scenario Summary Report

Scenario: MDD

| Scenario Summary | |
|---|------------------------------------|
| ID | 81 |
| Label | MDD |
| Notes | |
| Active Topology | <I> Base Active Topology |
| Physical | <I> Base Physical |
| Demand | ADD |
| Initial Settings | <I> Base Initial Settings |
| Operational | <I> Base Operational |
| Age | <I> Base Age |
| Constituent | <I> Base Constituent |
| Trace | <I> Base Trace |
| Fire Flow | <I> Base Fire Flow |
| Energy Cost | <I> Base Energy Cost |
| Transient | <I> Base Transient |
| Pressure Dependent Demand | <I> Base Pressure Dependent Demand |
| Failure History | <I> Base Failure History |
| SCADA | <I> Base SCADA |
| User Data Extensions | <I> Base User Data Extensions |
| Steady State/EPS Solver Calculation Options | MAX DAY |
| Transient Solver Calculation Options | <I> Base Calculation Options |

| Hydraulic Summary | | | |
|--------------------|----------------|--|-----------------|
| Time Analysis Type | Steady State | Use simple controls during steady state? | True |
| Friction Method | Hazen-Williams | Is EPS Snapshot? | False |
| Accuracy | 0.001 | Start Time | 12:00:00 AM |
| Trials | 40 | Calculation Type | Hydraulics Only |

FlexTable: Junction Table

| Label | Elevation (ft) | Demand (gpm) | Hydraulic Grade (ft) | Pressure (psi) |
|-------|----------------|--------------|----------------------|----------------|
| EL-4 | 4,753.30 | 0.0 | 4,899.85 | 63 |
| EJ-3 | 4,750.51 | 0.0 | 4,899.85 | 65 |
| EJ-5 | 4,745.39 | 0.0 | 4,899.85 | 67 |
| EJ-6 | 4,744.40 | 0.0 | 4,899.84 | 67 |
| J-2 | 4,744.30 | 0.0 | 4,899.86 | 67 |
| EJ-7 | 4,742.62 | 0.0 | 4,899.85 | 68 |
| J-1 | 4,741.40 | 120.0 | 4,899.81 | 69 |
| J-3 | 4,740.00 | 0.0 | 4,899.81 | 69 |
| EJ-2 | 4,738.88 | 0.0 | 4,899.87 | 70 |
| J-4 | 4,736.90 | 40.0 | 4,899.79 | 70 |
| EJ-1 | 4,731.00 | 0.0 | 4,899.87 | 73 |

FlexTable: Pipe Table

| Label | Length (Scaled) (ft) | Start Node | Stop Node | Hazen-Williams C | Flow (Absolute) (gpm) | Velocity (ft/s) |
|-------|-------------------------|------------|-----------|---------------------|--------------------------|--------------------|
| E-01 | 42 | EJ-1 | EH-1 | 135.0 | 0.0 | 0.00 |
| E-02 | 512 | EJ-2 | EJ-1 | 135.0 | 0.0 | 0.00 |
| E-03 | 21 | EJ-2 | EH-2 | 135.0 | 160.0 | 1.82 |
| E-04 | 192 | J-2 | EJ-2 | 135.0 | 160.0 | 0.45 |
| E-05 | 210 | EJ-3 | J-2 | 135.0 | 64.3 | 0.18 |
| E-06 | 21 | EJ-3 | EH-3 | 135.0 | 0.0 | 0.00 |
| E-07 | 62 | EL-4 | EJ-3 | 135.0 | 64.3 | 0.18 |
| E-08 | 201 | EL-4 | EJ-5 | 135.0 | 64.3 | 0.26 |
| E-09 | 71 | EJ-5 | EJ-6 | 135.0 | 64.3 | 0.41 |
| E-10 | 94 | EJ-5 | EJ-7 | 135.0 | 0.0 | 0.00 |
| E-11 | 49 | EJ-7 | EH-4 | 135.0 | 0.0 | 0.00 |
| P-1 | 250 | EJ-6 | J-1 | 135.0 | 64.3 | 0.41 |
| P-2 | 204 | J-1 | J-2 | 135.0 | 95.7 | 0.61 |
| P-3 | 57 | J-1 | J-3 | 135.0 | 40.0 | 0.26 |
| P-4 | 14 | J-3 | H-1 | 135.0 | 0.0 | 0.00 |
| P-5 | 130 | J-3 | J-4 | 135.0 | 40.0 | 0.45 |
| RP-1 | 283 | R-1 | EH-2 | 135.0 | 160.0 | 0.45 |

Scenario Summary Report

Scenario: MDD plus FF

Scenario Summary

| | |
|---|------------------------------------|
| ID | 82 |
| Label | MDD plus FF |
| Notes | |
| Active Topology | <I> Base Active Topology |
| Physical | <I> Base Physical |
| Demand | ADD |
| Initial Settings | <I> Base Initial Settings |
| Operational | <I> Base Operational |
| Age | <I> Base Age |
| Constituent | <I> Base Constituent |
| Trace | <I> Base Trace |
| Fire Flow | Fire Flow |
| Energy Cost | <I> Base Energy Cost |
| Transient | <I> Base Transient |
| Pressure Dependent Demand | <I> Base Pressure Dependent Demand |
| Failure History | <I> Base Failure History |
| SCADA | <I> Base SCADA |
| User Data Extensions | <I> Base User Data Extensions |
| Steady State/EPS Solver Calculation Options | MAX DAY PLUS FIRE |
| Transient Solver Calculation Options | <I> Base Calculation Options |

Hydraulic Summary

| | | | |
|--------------------|----------------|--|-------------|
| Time Analysis Type | Steady State | Use simple controls during steady state? | True |
| Friction Method | Hazen-Williams | Is EPS Snapshot? | False |
| Accuracy | 0.001 | Start Time | 12:00:00 AM |
| Trials | 40 | Calculation Type | Fire Flow |

FlexTable: Junction Table

| Label | Elevation (ft) | Demand (gpm) | Hydraulic Grade (ft) | Pressure (psi) |
|-------|----------------|--------------|----------------------|----------------|
| EL-4 | 4,753.30 | 0.0 | 4,899.85 | 63 |
| EJ-3 | 4,750.51 | 0.0 | 4,899.85 | 65 |
| EJ-5 | 4,745.39 | 0.0 | 4,899.85 | 67 |
| EJ-6 | 4,744.40 | 0.0 | 4,899.84 | 67 |
| J-2 | 4,744.30 | 0.0 | 4,899.86 | 67 |
| EJ-7 | 4,742.62 | 0.0 | 4,899.85 | 68 |
| J-1 | 4,741.40 | 120.0 | 4,899.81 | 69 |
| J-3 | 4,740.00 | 0.0 | 4,899.81 | 69 |
| EJ-2 | 4,738.88 | 0.0 | 4,899.87 | 70 |
| J-4 | 4,736.90 | 40.0 | 4,899.79 | 70 |
| EJ-1 | 4,731.00 | 0.0 | 4,899.87 | 73 |

FlexTable: Pipe Table

| Label | Length (Scaled) (ft) | Start Node | Stop Node | Hazen-Williams C | Flow (Absolute) (gpm) | Velocity (ft/s) |
|-------|-------------------------|------------|-----------|---------------------|--------------------------|--------------------|
| E-01 | 42 | EJ-1 | EH-1 | 135.0 | 0.0 | 0.00 |
| E-02 | 512 | EJ-2 | EJ-1 | 135.0 | 0.0 | 0.00 |
| E-03 | 21 | EJ-2 | EH-2 | 135.0 | 160.0 | 1.82 |
| E-04 | 192 | J-2 | EJ-2 | 135.0 | 160.0 | 0.45 |
| E-05 | 210 | EJ-3 | J-2 | 135.0 | 64.3 | 0.18 |
| E-06 | 21 | EJ-3 | EH-3 | 135.0 | 0.0 | 0.00 |
| E-07 | 62 | EL-4 | EJ-3 | 135.0 | 64.3 | 0.18 |
| E-08 | 201 | EL-4 | EJ-5 | 135.0 | 64.3 | 0.26 |
| E-09 | 71 | EJ-5 | EJ-6 | 135.0 | 64.3 | 0.41 |
| E-10 | 94 | EJ-5 | EJ-7 | 135.0 | 0.0 | 0.00 |
| E-11 | 49 | EJ-7 | EH-4 | 135.0 | 0.0 | 0.00 |
| P-1 | 250 | EJ-6 | J-1 | 135.0 | 64.3 | 0.41 |
| P-2 | 204 | J-1 | J-2 | 135.0 | 95.7 | 0.61 |
| P-3 | 57 | J-1 | J-3 | 135.0 | 40.0 | 0.26 |
| P-4 | 14 | J-3 | H-1 | 135.0 | 0.0 | 0.00 |
| P-5 | 130 | J-3 | J-4 | 135.0 | 40.0 | 0.45 |
| RP-1 | 283 | R-1 | EH-2 | 135.0 | 160.0 | 0.45 |

Fire Flow Node FlexTable: Fire Flow Report

| Label | Fire Flow Iterations | Flow (Total Needed) (gpm) | Pressure (Calculated Residual @ Total Flow Needed) (psi) | Fire Flow (Available) (gpm) | Pressure (Calculated Residual) (psi) |
|-------|----------------------|---------------------------|--|-----------------------------|--------------------------------------|
| EH-1 | 4 | 1,000.0 | 69 | 4,316.5 | 20 |
| EH-2 | 6 | 1,000.0 | 68 | 7,411.2 | 26 |
| EH-3 | 4 | 1,000.0 | 61 | 4,516.8 | 20 |
| EH-4 | 4 | 1,000.0 | 64 | 3,780.1 | 20 |
| H-1 | 4 | 1,000.0 | 65 | 4,205.3 | 20 |

Scenario Summary Report

Scenario: PHD

| Scenario Summary | |
|---|------------------------------------|
| ID | 84 |
| Label | PHD |
| Notes | |
| Active Topology | <I> Base Active Topology |
| Physical | <I> Base Physical |
| Demand | ADD |
| Initial Settings | <I> Base Initial Settings |
| Operational | <I> Base Operational |
| Age | <I> Base Age |
| Constituent | <I> Base Constituent |
| Trace | <I> Base Trace |
| Fire Flow | <I> Base Fire Flow |
| Energy Cost | <I> Base Energy Cost |
| Transient | <I> Base Transient |
| Pressure Dependent Demand | <I> Base Pressure Dependent Demand |
| Failure History | <I> Base Failure History |
| SCADA | <I> Base SCADA |
| User Data Extensions | <I> Base User Data Extensions |
| Steady State/EPS Solver Calculation Options | PEAK HOUR |
| Transient Solver Calculation Options | <I> Base Calculation Options |

| Hydraulic Summary | | | |
|--------------------|----------------|--|-----------------|
| Time Analysis Type | Steady State | Use simple controls during steady state? | True |
| Friction Method | Hazen-Williams | Is EPS Snapshot? | False |
| Accuracy | 0.001 | Start Time | 12:00:00 AM |
| Trials | 40 | Calculation Type | Hydraulics Only |

FlexTable: Junction Table

| Label | Elevation (ft) | Demand (gpm) | Hydraulic Grade (ft) | Pressure (psi) |
|-------|----------------|--------------|----------------------|----------------|
| EL-4 | 4,753.30 | 0.0 | 4,899.69 | 63 |
| EJ-3 | 4,750.51 | 0.0 | 4,899.69 | 65 |
| EJ-5 | 4,745.39 | 0.0 | 4,899.67 | 67 |
| EJ-6 | 4,744.40 | 0.0 | 4,899.66 | 67 |
| J-2 | 4,744.30 | 0.0 | 4,899.70 | 67 |
| EJ-7 | 4,742.62 | 0.0 | 4,899.67 | 68 |
| J-1 | 4,741.40 | 180.0 | 4,899.60 | 68 |
| J-3 | 4,740.00 | 0.0 | 4,899.60 | 69 |
| EJ-2 | 4,738.88 | 0.0 | 4,899.73 | 70 |
| J-4 | 4,736.90 | 60.0 | 4,899.55 | 70 |
| EJ-1 | 4,731.00 | 0.0 | 4,899.73 | 73 |

FlexTable: Pipe Table

| Label | Length (Scaled) (ft) | Start Node | Stop Node | Hazen-Williams C | Flow (Absolute) (gpm) | Velocity (ft/s) |
|-------|-------------------------|------------|-----------|---------------------|--------------------------|--------------------|
| E-01 | 42 | EJ-1 | EH-1 | 135.0 | 0.0 | 0.00 |
| E-02 | 512 | EJ-2 | EJ-1 | 135.0 | 0.0 | 0.00 |
| E-03 | 21 | EJ-2 | EH-2 | 135.0 | 240.0 | 2.72 |
| E-04 | 192 | J-2 | EJ-2 | 135.0 | 240.0 | 0.68 |
| E-05 | 210 | EJ-3 | J-2 | 135.0 | 96.5 | 0.27 |
| E-06 | 21 | EJ-3 | EH-3 | 135.0 | 0.0 | 0.00 |
| E-07 | 62 | EL-4 | EJ-3 | 135.0 | 96.5 | 0.27 |
| E-08 | 201 | EL-4 | EJ-5 | 135.0 | 96.5 | 0.39 |
| E-09 | 71 | EJ-5 | EJ-6 | 135.0 | 96.5 | 0.62 |
| E-10 | 94 | EJ-5 | EJ-7 | 135.0 | 0.0 | 0.00 |
| E-11 | 49 | EJ-7 | EH-4 | 135.0 | 0.0 | 0.00 |
| P-1 | 250 | EJ-6 | J-1 | 135.0 | 96.5 | 0.62 |
| P-2 | 204 | J-1 | J-2 | 135.0 | 143.5 | 0.92 |
| P-3 | 57 | J-1 | J-3 | 135.0 | 60.0 | 0.38 |
| P-4 | 14 | J-3 | H-1 | 135.0 | 0.0 | 0.00 |
| P-5 | 130 | J-3 | J-4 | 135.0 | 60.0 | 0.68 |
| RP-1 | 283 | R-1 | EH-2 | 135.0 | 240.0 | 0.68 |

APPENDIX B

Fire Flow Data

Fire Flow Test Data Sheet



Location of Test (Street and Cross Street): College Parkway and Oak Ridge Drive
 Address Nearest Residual Hydrant: 1147 W College Parkway
 Test Date: 5/19/2021 Test Time: _____
 Testing Personnel: CH, DR, NT
 Pressure Zone: 4960 Main Size: 12"
 Comments: _____

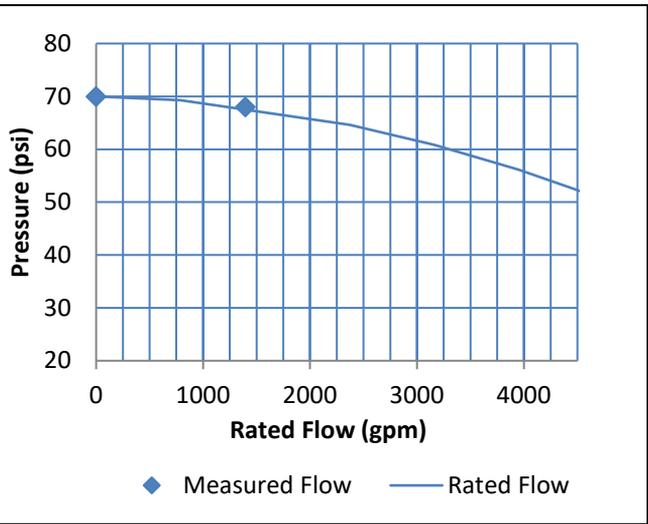
Test Results:

| Residual Hydrant | | Flow Hydrant(s) | | | | | |
|------------------|--------|-----------------|-------------------|----------------------|-------------------------|-------------------|------------------|
| Static: | 70 psi | | Testing Apparatus | Pitot Pressure (psi) | Discharge Diameter (in) | Outlet Coeff. (c) | Pitot Flow (gpm) |
| Residual: | 68 psi | | | | | | |
| Pressure Drop: | 2 psi | Flow 1 | HM2 | 19 | 2 | 1.307 | 680 |
| | 3 % | Flow 2 | HM1 | 21 | 2 | 1.307 | 715 |
| | | Flow 3 | | | | | |
| Total | | | | | | | 1395 |

Area Map



Rated Flow



Rated Pressure (for Rated Capacity Calculation) 20 psi
Rated Capacity at 20 psi residual pressure. 7,900 gpm

Based on NFPA 291 - 2019 Edition and APWA Manual 17 - Fourth Edition
 Pursuant to NFPA 291, fire flow test data over five years old should not be used.

Hydrant OBJECTID: 721
 Data Sheet File Name: College Pkwy-Oak Ridge1.pdf



Manhard™

CONSULTING LTD

CONCEPTUAL DRAINAGE STUDY

FOR

SILVER OAK @ COLLEGE PKWY

CARSON CITY, NEVADA

Prepared for:

Lanturn Investments
Mr. Mark Turner
3075 College Dr.
Carson City, NV 89703

Prepared by:

Manhard Consulting Ltd.
241 Ridge Street, Suite 400
Reno, NV 89501



06/08/21

TABLE OF CONTENTS

I. INTRODUCTION

II. EXISTING AND PROPOSED HYDROLOGY

III. PROPOSED DRAINAGE FACILITIES

IV. CONCLUSIONS

V. FIGURES

FIGURE 1 – VICINITY MAP

FIGURE 2 – EXISTING HYDROLOGIC CONDITIONS

FIGURE 3 – PROPOSED HYDROLOGIC CONDITIONS

VI. APPENDICES

APPENDIX A – SUPPORTING CALCULATION DATA

**APPENDIX B – MASTER DRAINAGE STUDY FOR SILVER OAK
DEVELOPMENT BY SIERRA RESOURCE ENGINEERING, INC.
DATED MARCH 4, 1994**

I. INTRODUCTION

- B.** The following report is a Conceptual Drainage Study for Silver Oak @ College Pkwy dated June 2021.
- C.** The contact person for the preparation of this report is Spencer D. Fellows, P.E. at Manhard Consulting, 775-746-3500.
- D.** The project consists of 52 single family units, common areas, and associated roadways.
- E.** The existing Silver Oak @ College Pkwy parcel numbers are APN 007-462-16 and 007-462-17 and are 3.46 acres in combined size. The parcel slopes from the west to the east at approximately 3.5% within the confines of the project site. The proposed project site is situated within the Southwest 1/4 of the Southeast 1/4 of Section 6, Township 15 North, and Range 20 East of the Mount Diablo Meridian in Carson City, Nevada. Currently, the parcel is undeveloped and is proposed to be fully developed.

The subject property is currently zoned NB-P within Carson City and is adjacent to developed areas:

North: Sierra Place Senior Living, zoned NB-P

South: Silver Oak – Phase 17, zoned SF12-P

East: John Mankins Park and Silver Oak – Phase 21, zoned SF12-P

West: Silver Oak Golf Course, zoned SF12-P

- F.** Reference the included Vicinity Map (Figure #1).

II EXISTING AND PROPOSED HYDROLOGY

- A.** The intent of this hydrology study is to set a basis for the existing conditions for comparison to the proposed conditions, and prove that the discharge created by the proposed development was alleviated via a detention structure prior to discharging into the existing storm drain main located at the east corner of the proposed project site.

There are a total of 2 existing drainage basins, 2 proposed drainage basins, and 1 detention basin for the proposed project. Basins are represented by their boundary as well as existing and proposed conditions. Reference Figure 2 (Existing Hydrologic Conditions) and Figure 3 (Proposed Hydrologic Conditions) for a visual representation of existing basins, proposed basins, and detention basin.

- B.** The Rational Method was used to determine storm flow discharge. Data used for the Rational Method was derived from the following: NOAA Atlas 14 precipitation intensity values for a 10-minute time of concentration and runoff coefficients are from the 2009 Truckee Meadows Regional Drainage Manual.

The Modified Rational Method was used to determine the storage volume required for the increase of peak storm runoff. Data used for the Modified Rational Method was derived from the following: NOAA Atlas 14 precipitation intensity values for the 5-year and 100-year storm, and runoff curve numbers are from the 2009 Truckee Meadows Regional Drainage Manual.

The following is a description of each basin and its data characteristics. E. represents the existing basin and P. represents the proposed basin.

BASIN E-1 – The basin is 1.15 acres in size. A runoff coefficient of 0.20 was used for the 5-year storm event, and a runoff coefficient value of 0.50 was used for the 100-year storm event (based on undeveloped range area) for the existing conditions. Using a 10-minute time of concentration, the intensity value for the 5-year storm event is 1.50 inches/hour, and the intensity value for the 100-year storm event is 3.62 inches/hour, respectively. Discharge sheet flows across the proposed project site in the existing condition in a southwest to northeast direction at approximately 3.5% discharging into John Mankins Park and the existing concrete valley gutter surrounding Silver Oak Phase 21.

BASIN E-2 – The basin is 2.31 acres in size. A runoff coefficient of 0.20 was used for the 5-year storm event, and a runoff coefficient value of 0.50 was used for the 100-year storm event (based on undeveloped range area) for the existing conditions. Using a 10-

minute time of concentration, the intensity value for the 5-year storm event is 1.50 inches/hour, and the intensity value for the 100-year storm event is 3.62 inches/hour, respectively. Discharge sheet flows across the proposed project site in the existing condition in a southwest to northeast direction at approximately 3.5% discharging into the existing concrete valley gutter surrounding Silver Oak Phase 21.

BASIN P-1 – The basins total 1.08 acres in size. A runoff coefficient of 0.60 was used for the 5-year storm event, and a runoff coefficient value of 0.78 was used for the 100-year storm event (based 1/8-acre or Less (Multi-Unit)). Using a 10-minute time of concentration, the intensity value for the 5-year storm event is 1.50 inches/hour, and the intensity value for the 100-year storm event is 3.62 inches/hour, respectively. Discharge flows along the proposed driveways at a slope of 0.5% to 4.0% and enters the proposed storm drain network at a catch basin located in the east corner of the proposed project. The discharge will exit in the existing storm drain main located in the east corner of the proposed project site.

BASIN P-2 – The basins total 2.14 acres in size. A runoff coefficient of 0.60 was used for the 5-year storm event, and a runoff coefficient value of 0.78 was used for the 100-year storm event (based 1/8-acre or Less (Multi-Unit)). Using a 10-minute time of concentration, the intensity value for the 5-year storm event is 1.50 inches/hour, and the intensity value for the 100-year storm event is 3.62 inches/hour, respectively. Discharge flows along the proposed roads at a slope of 1.0% to 4.0% and enters the proposed storm drain network at the proposed detention basin located in the east corner of the proposed project. The discharge will exit the detention basin at a rate that equal to or less than the discharge in the existing conditions ending up in the existing storm drain main located in the east corner of the proposed project site.

Below are the analyzed values for the existing and proposed 5-yr and 100-yr storm events.

TABLE 1 – RUNOFF FLOWS (Q-CFS)

| | AREA (acres) | EXISTING (5-YR) | EXISTING (100-YR) | PROPOSED (5-YR) | PROPOSED (100-YR) |
|---------|-----------------|--------------------|----------------------|--------------------|----------------------|
| E-1 | 1.15 | 0.35 | 2.08 | | |
| E-1 | 2.31 | 0.69 | 4.18 | | |
| E-Total | 3.46 | 1.04 | 6.26 | | |
| | | | | | |
| P-1 | 1.08 | | | 0.97 | 3.05 |
| P-2 | 2.38 | | | 2.14 | 6.72 |
| P-Total | 3.46 | | | 3.11 | 9.77 |

- C. The downstream drainage consists a 5-foot wide concrete valley gutter along the property line of the Silver Oak Phase 21 Development and well as a 24-inch storm drain pipe within Phase 21, which leads to West Nye Lane and farther more to the storm drain along North Carson Street.
- D. There is an existing drainage problem for the proposed project site as the site is currently in a localized low point and is not currently tied into the storm drain system running through the property. The proposed detention basin with outlets tying into the existing storm will reduce and/or prevent runoff from going into Silver Oak Phase 21 Development.
- E. The project site lies in Shaded Zone X (area of the 500-year storm event).
- F. There is no existing irrigation on the proposed site.
- G. Reference Figure 2 (Existing Hydrologic Conditions) and Figure 3 (Proposed Hydrologic Conditions) for the tributary areas of existing basin, proposed basins, and detention basin.

III. PROPOSED DRAINAGE FACILITIES

- A. The project site will be graded to allow drainage to flow into the proposed detention facility located in the east corner of the project site, into catch basins that enter manholes, and discharge through the existing storm drain network. Discharge will exit the detention

basin in a condition less than or equal to the existing condition and enter the existing storm drain network. (Reference Figure 3, Proposed Hydrologic Conditions for a graphical interpretation of the proposed flow direction).

- B.** Detention will be accomplished by meeting the requirements set forth in Division 14 of the Title 18 Appendix - Carson City Development Standards. Based on the proposed verses existing conditions, the following table dictates the required detention for all storm events as per Section 14.4 of the Carson City Development Standards Table 3 illustrates the overall increase in all storm events for the entire 3.46-acre property in the existing verses the proposed conditions.

TABLE 2 – DETENTION VOLUME (V-CF)

| Storm Event | Volume Required (cf) | Volume Provided (cf) |
|-------------|----------------------|----------------------|
| 5 | 1394 | |
| 100 | 2122 | 3,181 |

Sizing was performed using the Modified Rational Method for a 5-year and 100-year 10-minute time of concentration and the difference in storage rate (see Appendix A for calculations). The larger runoff volume increase of the two storms was used and an outlet structure was sized to control the flow to be equal to or below pre-development flows. The 100-year overflow will be flowing into the existing valley gutter to the east of the project.

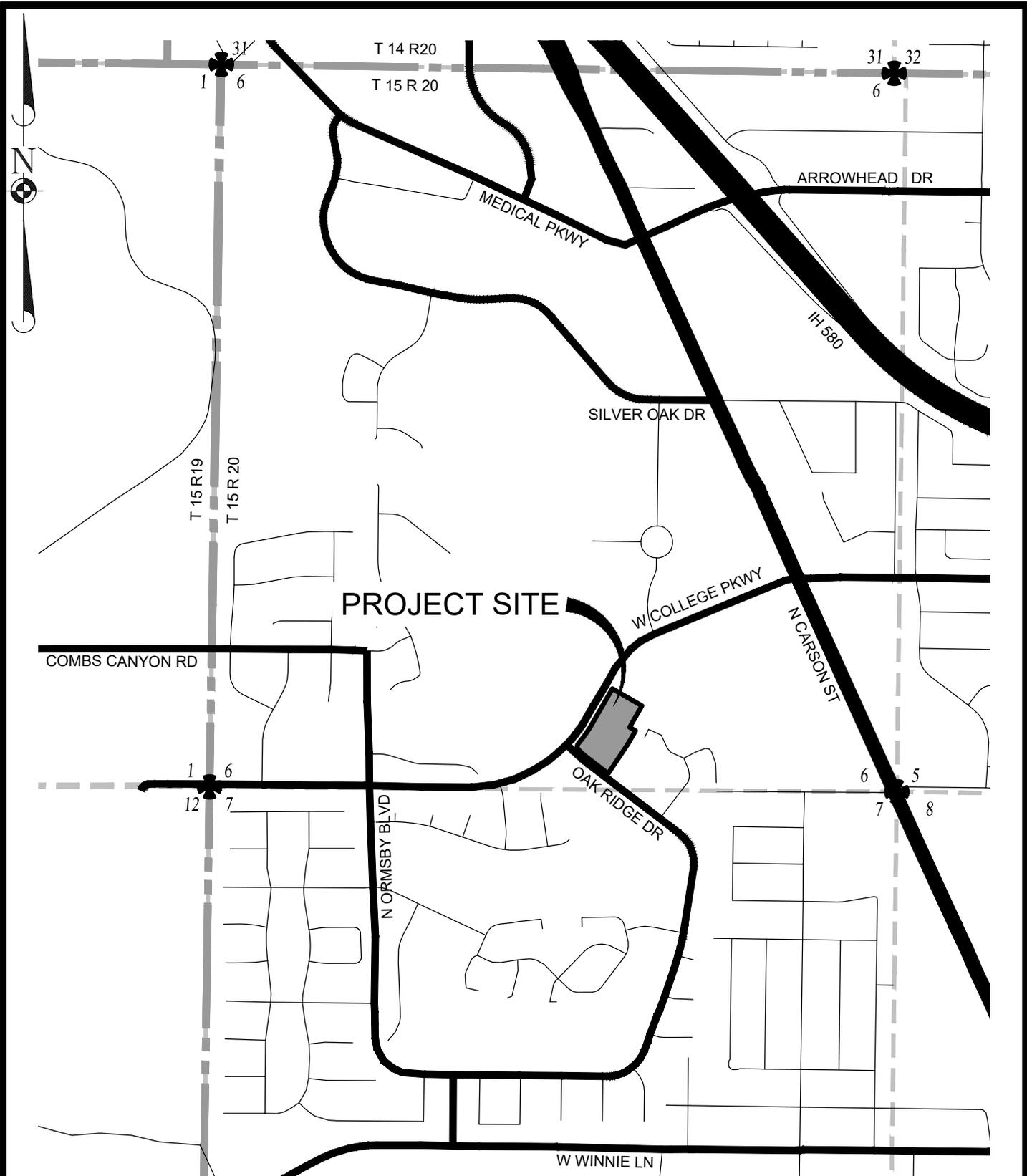
This detention volume is in addition to the overall detention provided by the Silver Oak Development. In the Master Drainage Plan for Silver Oak Development by Sierra Resource Engineering, Inc. dated March 4, 1994, (See Appendix B) the project area appears to be included in the overall design; however, the master report doesn't specifically mention project area. The proposed detention basin on-site was added in case the 3.46-acre site was overlooked or was changed from the original design.

IV. CONCLUSIONS

- A.** This report has been prepared in compliance with Division 14 of the Title 18 Appendix - Carson City Development Standards.

- B.** This report is compliant with the most current FEMA standards. Reference the included FEMA FIRMette from map #3200010084F and #3200010092G included in Appendix A.

- C.** According to the analysis contained within this report, the addition of a detention facility will detain the required amount of discharge in the required storm event with no negative impact to downstream facilities and surrounding areas.



© 2015 MANHARD CONSULTING, LTD. ALL RIGHTS RESERVED



241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-748-3500 fx:775-748-3520 manhard.com
 Civil Engineers • Surveyors • Water Resource Engineers • Water & Wastewater Engineers
 Construction Managers • Environmental Scientists • Landscape Architects • Planners

SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
VICINITY MAP

PROJ. MGR.: SDF
 DRAWN BY: SDF
 DATE: JUN 2021
 SCALE: N.T.S.

SHEET
1 OF **2**
 LIL.CCNV06

Dwg Name: P:\lilccnv06\dwg\Eng\Final Drawings\Exhibits Eng\Vicinity Map.dwg Updated By: stellows 16:27

APPENDIX A

SUPPORTING CALCULATION DATA



NOAA Atlas 14, Volume 1, Version 5
Location name: Carson City, Nevada, USA*
Latitude: 39.1875°, Longitude: -119.778°
Elevation: 4747.5 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Tryppaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

| PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)¹ | | | | | | | | | | |
|---|--|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Duration | Average recurrence interval (years) | | | | | | | | | |
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | 1.19 (0.780-1.40) | 1.48 (1.28-1.75) | 1.97 (1.69-2.34) | 2.44 (2.08-2.89) | 3.22 (2.65-3.80) | 3.91 (3.13-4.68) | 4.75 (3.67-5.74) | 5.76 (4.27-7.07) | 7.36 (5.15-9.23) | 8.81 (5.86-11.3) |
| 10-min | 0.900 (0.780-1.07) | 1.12 (0.978-1.33) | 1.50 (1.28-1.78) | 1.86 (1.58-2.20) | 2.44 (2.02-2.90) | 2.98 (2.38-3.56) | 3.62 (2.80-4.36) | 4.39 (3.25-5.38) | 5.60 (3.92-7.03) | 6.70 (4.46-8.56) |
| 15-min | 0.744 (0.644-0.880) | 0.928 (0.804-1.10) | 1.24 (1.06-1.47) | 1.54 (1.30-1.82) | 2.02 (1.67-2.40) | 2.46 (1.97-2.94) | 2.99 (2.31-3.61) | 3.62 (2.69-4.44) | 4.63 (3.24-5.80) | 5.54 (3.69-7.08) |
| 30-min | 0.502 (0.434-0.594) | 0.626 (0.542-0.742) | 0.834 (0.716-0.990) | 1.03 (0.880-1.22) | 1.36 (1.12-1.61) | 1.66 (1.33-1.98) | 2.01 (1.55-2.43) | 2.44 (1.81-2.99) | 3.12 (2.18-3.91) | 3.73 (2.48-4.76) |
| 60-min | 0.311 (0.268-0.367) | 0.387 (0.336-0.459) | 0.516 (0.443-0.612) | 0.640 (0.544-0.757) | 0.842 (0.694-0.999) | 1.03 (0.820-1.23) | 1.25 (0.962-1.50) | 1.51 (1.12-1.85) | 1.93 (1.35-2.42) | 2.31 (1.54-2.95) |
| 2-hr | 0.209 (0.186-0.240) | 0.260 (0.231-0.298) | 0.331 (0.292-0.378) | 0.394 (0.344-0.450) | 0.489 (0.415-0.560) | 0.574 (0.476-0.664) | 0.669 (0.541-0.784) | 0.786 (0.615-0.934) | 0.987 (0.738-1.22) | 1.17 (0.848-1.49) |
| 3-hr | 0.167 (0.150-0.188) | 0.208 (0.188-0.235) | 0.261 (0.233-0.294) | 0.304 (0.269-0.342) | 0.365 (0.318-0.412) | 0.417 (0.357-0.476) | 0.476 (0.399-0.548) | 0.551 (0.453-0.645) | 0.675 (0.537-0.821) | 0.792 (0.614-1.00) |
| 6-hr | 0.117 (0.105-0.131) | 0.146 (0.131-0.164) | 0.181 (0.162-0.202) | 0.209 (0.186-0.233) | 0.246 (0.216-0.276) | 0.275 (0.238-0.311) | 0.305 (0.259-0.349) | 0.339 (0.283-0.393) | 0.389 (0.316-0.458) | 0.434 (0.345-0.519) |
| 12-hr | 0.077 (0.069-0.087) | 0.097 (0.086-0.109) | 0.122 (0.108-0.137) | 0.141 (0.125-0.159) | 0.168 (0.146-0.189) | 0.188 (0.162-0.214) | 0.208 (0.177-0.240) | 0.229 (0.191-0.267) | 0.258 (0.209-0.306) | 0.280 (0.222-0.338) |
| 24-hr | 0.051 (0.046-0.056) | 0.064 (0.058-0.071) | 0.080 (0.073-0.089) | 0.094 (0.085-0.104) | 0.113 (0.101-0.125) | 0.127 (0.114-0.141) | 0.143 (0.126-0.159) | 0.159 (0.139-0.177) | 0.181 (0.156-0.203) | 0.198 (0.169-0.224) |
| 2-day | 0.031 (0.027-0.034) | 0.038 (0.034-0.043) | 0.049 (0.044-0.055) | 0.057 (0.051-0.065) | 0.069 (0.061-0.078) | 0.079 (0.069-0.089) | 0.089 (0.077-0.101) | 0.099 (0.086-0.114) | 0.114 (0.096-0.132) | 0.125 (0.105-0.147) |
| 3-day | 0.022 (0.020-0.025) | 0.028 (0.025-0.032) | 0.036 (0.032-0.041) | 0.043 (0.038-0.048) | 0.052 (0.046-0.059) | 0.059 (0.052-0.068) | 0.067 (0.058-0.077) | 0.076 (0.065-0.087) | 0.087 (0.073-0.101) | 0.097 (0.080-0.113) |
| 4-day | 0.018 (0.016-0.021) | 0.023 (0.021-0.026) | 0.030 (0.027-0.034) | 0.036 (0.031-0.040) | 0.043 (0.038-0.049) | 0.050 (0.043-0.057) | 0.057 (0.049-0.065) | 0.064 (0.054-0.073) | 0.074 (0.062-0.086) | 0.082 (0.068-0.096) |
| 7-day | 0.012 (0.011-0.014) | 0.016 (0.014-0.018) | 0.020 (0.018-0.023) | 0.024 (0.021-0.027) | 0.029 (0.026-0.033) | 0.033 (0.029-0.038) | 0.038 (0.033-0.043) | 0.042 (0.036-0.049) | 0.049 (0.041-0.057) | 0.054 (0.045-0.063) |
| 10-day | 0.010 (0.008-0.011) | 0.012 (0.011-0.014) | 0.016 (0.014-0.018) | 0.019 (0.016-0.021) | 0.023 (0.020-0.026) | 0.026 (0.022-0.029) | 0.029 (0.025-0.033) | 0.032 (0.028-0.037) | 0.037 (0.031-0.043) | 0.040 (0.034-0.047) |
| 20-day | 0.006 (0.005-0.007) | 0.008 (0.007-0.008) | 0.010 (0.009-0.011) | 0.011 (0.010-0.013) | 0.014 (0.012-0.015) | 0.015 (0.014-0.017) | 0.017 (0.015-0.019) | 0.019 (0.016-0.021) | 0.021 (0.018-0.024) | 0.023 (0.020-0.027) |
| 30-day | 0.005 (0.004-0.005) | 0.006 (0.005-0.006) | 0.007 (0.007-0.008) | 0.009 (0.008-0.010) | 0.010 (0.009-0.012) | 0.012 (0.010-0.013) | 0.013 (0.011-0.015) | 0.014 (0.012-0.016) | 0.016 (0.014-0.018) | 0.017 (0.015-0.020) |
| 45-day | 0.004 (0.003-0.004) | 0.005 (0.004-0.005) | 0.006 (0.005-0.006) | 0.007 (0.006-0.008) | 0.008 (0.007-0.009) | 0.009 (0.008-0.010) | 0.010 (0.009-0.011) | 0.011 (0.009-0.012) | 0.012 (0.010-0.013) | 0.013 (0.011-0.014) |
| 60-day | 0.003 (0.003-0.003) | 0.004 (0.004-0.004) | 0.005 (0.005-0.006) | 0.006 (0.005-0.007) | 0.007 (0.006-0.008) | 0.008 (0.007-0.008) | 0.008 (0.007-0.009) | 0.009 (0.008-0.010) | 0.010 (0.009-0.011) | 0.010 (0.009-0.012) |

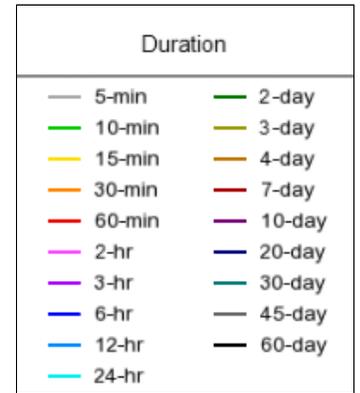
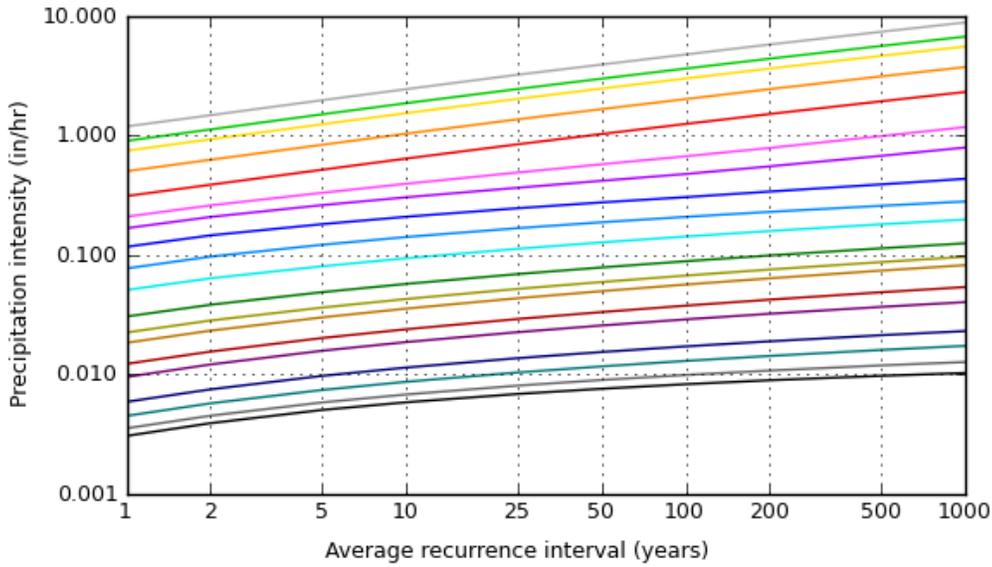
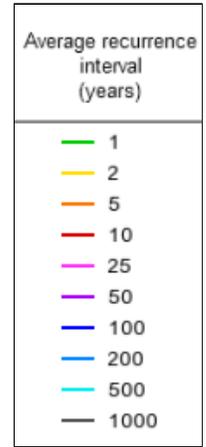
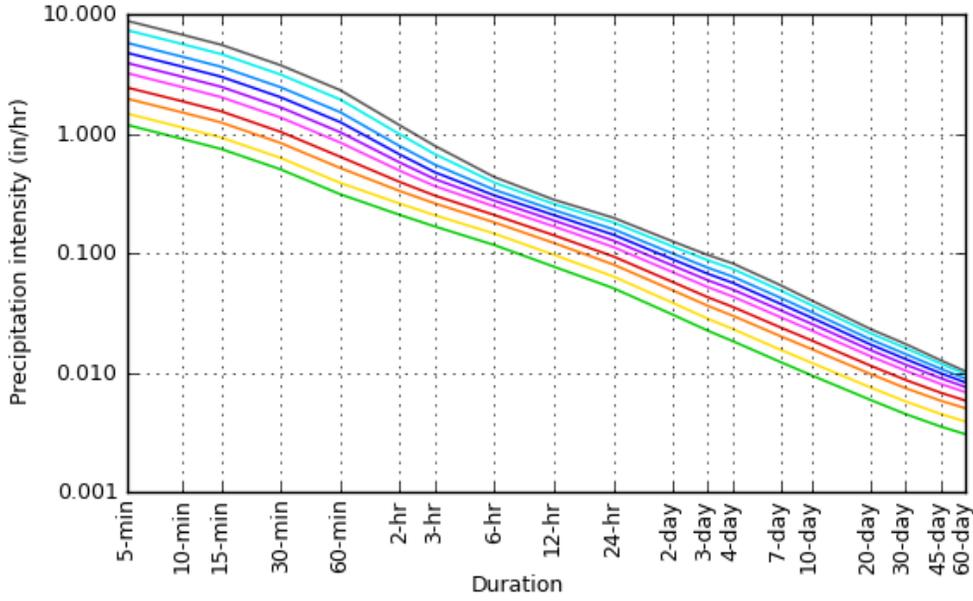
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

PDS-based intensity-duration-frequency (IDF) curves

Latitude: 39.1875°, Longitude: -119.7780°



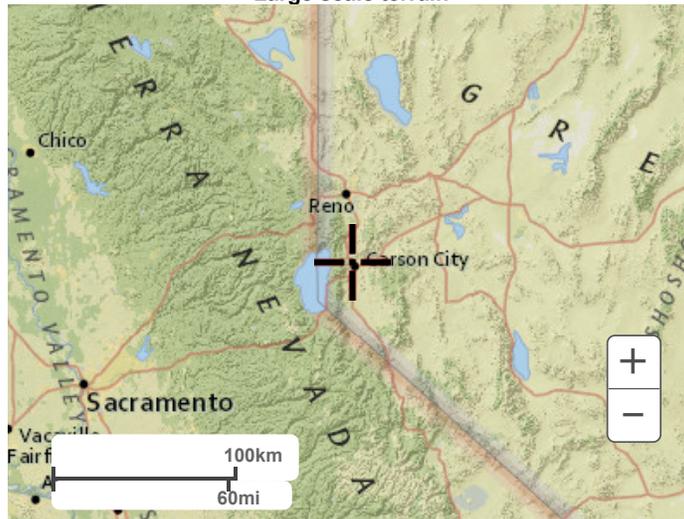
[Back to Top](#)

Maps & arials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)



NOAA Atlas 14, Volume 1, Version 5
Location name: Carson City, Nevada, USA*
Latitude: 39.1875°, Longitude: -119.778°
Elevation: 4747.5 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Tryppaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

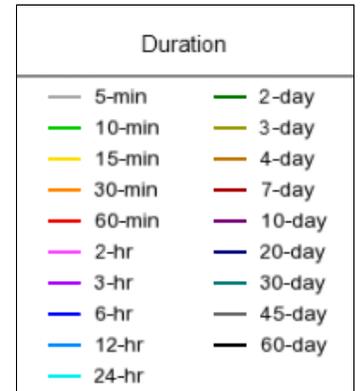
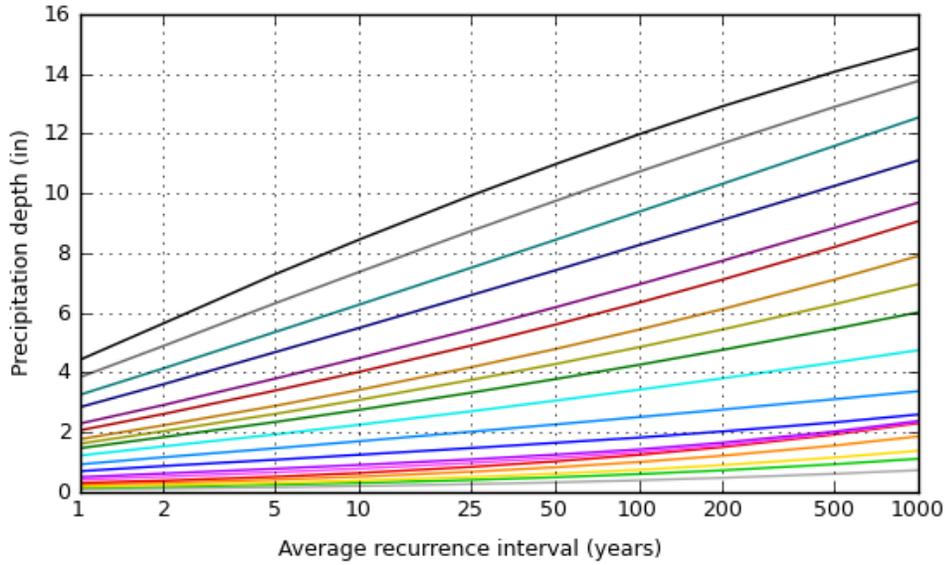
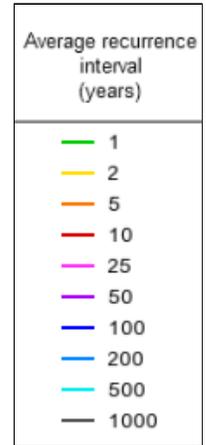
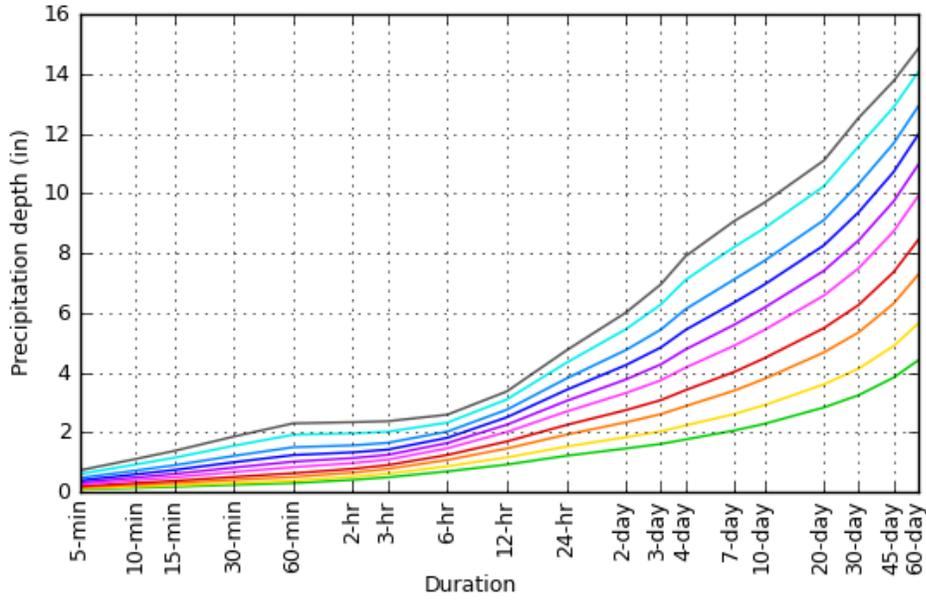
| PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹ | | | | | | | | | | |
|--|--|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Duration | Average recurrence interval (years) | | | | | | | | | |
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | 0.099 (0.085-0.117) | 0.123 (0.107-0.146) | 0.164 (0.141-0.195) | 0.203 (0.173-0.241) | 0.268 (0.221-0.317) | 0.326 (0.261-0.390) | 0.396 (0.306-0.478) | 0.480 (0.356-0.589) | 0.613 (0.429-0.769) | 0.734 (0.488-0.938) |
| 10-min | 0.150 (0.130-0.178) | 0.187 (0.163-0.222) | 0.250 (0.214-0.296) | 0.310 (0.263-0.366) | 0.407 (0.336-0.483) | 0.497 (0.397-0.593) | 0.604 (0.466-0.727) | 0.731 (0.542-0.897) | 0.933 (0.653-1.17) | 1.12 (0.744-1.43) |
| 15-min | 0.186 (0.161-0.220) | 0.232 (0.201-0.275) | 0.310 (0.265-0.367) | 0.384 (0.326-0.454) | 0.505 (0.417-0.599) | 0.616 (0.492-0.735) | 0.748 (0.577-0.902) | 0.906 (0.672-1.11) | 1.16 (0.809-1.45) | 1.39 (0.922-1.77) |
| 30-min | 0.251 (0.217-0.297) | 0.313 (0.271-0.371) | 0.417 (0.358-0.495) | 0.517 (0.440-0.612) | 0.681 (0.561-0.807) | 0.829 (0.663-0.990) | 1.01 (0.777-1.22) | 1.22 (0.904-1.50) | 1.56 (1.09-1.95) | 1.87 (1.24-2.38) |
| 60-min | 0.311 (0.268-0.367) | 0.387 (0.336-0.459) | 0.516 (0.443-0.612) | 0.640 (0.544-0.757) | 0.842 (0.694-0.999) | 1.03 (0.820-1.23) | 1.25 (0.962-1.50) | 1.51 (1.12-1.85) | 1.93 (1.35-2.42) | 2.31 (1.54-2.95) |
| 2-hr | 0.418 (0.373-0.480) | 0.520 (0.462-0.595) | 0.662 (0.584-0.756) | 0.788 (0.687-0.899) | 0.978 (0.830-1.12) | 1.15 (0.953-1.33) | 1.34 (1.08-1.57) | 1.57 (1.23-1.87) | 1.97 (1.48-2.44) | 2.35 (1.70-2.98) |
| 3-hr | 0.503 (0.451-0.565) | 0.625 (0.564-0.706) | 0.784 (0.699-0.882) | 0.912 (0.809-1.03) | 1.10 (0.955-1.24) | 1.25 (1.07-1.43) | 1.43 (1.20-1.65) | 1.66 (1.36-1.94) | 2.03 (1.61-2.47) | 2.38 (1.85-3.01) |
| 6-hr | 0.701 (0.630-0.783) | 0.874 (0.786-0.980) | 1.08 (0.970-1.21) | 1.25 (1.11-1.40) | 1.47 (1.29-1.66) | 1.65 (1.43-1.87) | 1.82 (1.55-2.09) | 2.03 (1.69-2.35) | 2.33 (1.89-2.75) | 2.60 (2.07-3.11) |
| 12-hr | 0.930 (0.829-1.04) | 1.17 (1.04-1.31) | 1.47 (1.30-1.65) | 1.70 (1.50-1.91) | 2.02 (1.76-2.28) | 2.26 (1.95-2.58) | 2.51 (2.13-2.89) | 2.77 (2.30-3.22) | 3.11 (2.52-3.69) | 3.38 (2.68-4.07) |
| 24-hr | 1.22 (1.11-1.35) | 1.53 (1.39-1.70) | 1.93 (1.75-2.13) | 2.25 (2.04-2.49) | 2.70 (2.42-2.99) | 3.06 (2.72-3.38) | 3.43 (3.03-3.81) | 3.81 (3.34-4.25) | 4.34 (3.74-4.87) | 4.75 (4.04-5.39) |
| 2-day | 1.47 (1.31-1.65) | 1.84 (1.65-2.07) | 2.35 (2.10-2.64) | 2.75 (2.45-3.10) | 3.32 (2.94-3.75) | 3.78 (3.32-4.28) | 4.26 (3.71-4.84) | 4.76 (4.11-5.46) | 5.46 (4.63-6.32) | 6.02 (5.03-7.04) |
| 3-day | 1.62 (1.44-1.83) | 2.04 (1.82-2.30) | 2.62 (2.33-2.96) | 3.09 (2.74-3.49) | 3.75 (3.30-4.25) | 4.28 (3.74-4.86) | 4.85 (4.19-5.53) | 5.44 (4.66-6.24) | 6.28 (5.28-7.27) | 6.96 (5.76-8.14) |
| 4-day | 1.77 (1.57-2.01) | 2.24 (1.99-2.53) | 2.89 (2.56-3.28) | 3.42 (3.02-3.88) | 4.17 (3.66-4.74) | 4.78 (4.16-5.45) | 5.43 (4.68-6.21) | 6.13 (5.21-7.03) | 7.11 (5.93-8.23) | 7.90 (6.50-9.24) |
| 7-day | 2.07 (1.83-2.34) | 2.62 (2.32-2.96) | 3.40 (3.01-3.85) | 4.02 (3.55-4.55) | 4.90 (4.30-5.56) | 5.60 (4.88-6.37) | 6.34 (5.47-7.24) | 7.11 (6.09-8.16) | 8.20 (6.91-9.49) | 9.06 (7.53-10.6) |
| 10-day | 2.29 (2.03-2.59) | 2.92 (2.59-3.30) | 3.80 (3.36-4.29) | 4.49 (3.95-5.07) | 5.43 (4.76-6.15) | 6.18 (5.37-7.01) | 6.95 (6.00-7.90) | 7.74 (6.62-8.84) | 8.83 (7.46-10.2) | 9.69 (8.09-11.3) |
| 20-day | 2.84 (2.53-3.18) | 3.61 (3.22-4.06) | 4.68 (4.18-5.24) | 5.49 (4.89-6.15) | 6.58 (5.82-7.37) | 7.41 (6.52-8.32) | 8.26 (7.21-9.31) | 9.11 (7.90-10.3) | 10.2 (8.78-11.7) | 11.1 (9.41-12.8) |
| 30-day | 3.25 (2.91-3.64) | 4.14 (3.70-4.63) | 5.35 (4.78-5.98) | 6.27 (5.59-7.00) | 7.50 (6.64-8.37) | 8.43 (7.42-9.43) | 9.37 (8.20-10.5) | 10.3 (8.95-11.7) | 11.6 (9.93-13.2) | 12.5 (10.6-14.4) |
| 45-day | 3.84 (3.44-4.28) | 4.89 (4.38-5.44) | 6.31 (5.66-7.01) | 7.36 (6.59-8.17) | 8.73 (7.77-9.70) | 9.73 (8.63-10.8) | 10.7 (9.46-12.0) | 11.7 (10.3-13.1) | 12.9 (11.2-14.5) | 13.8 (11.9-15.6) |
| 60-day | 4.42 (3.95-4.93) | 5.65 (5.05-6.30) | 7.28 (6.51-8.10) | 8.45 (7.54-9.39) | 9.91 (8.82-11.0) | 11.0 (9.73-12.2) | 12.0 (10.6-13.4) | 12.9 (11.4-14.5) | 14.1 (12.3-15.9) | 14.8 (13.0-16.8) |

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 39.1875°, Longitude: -119.7780°



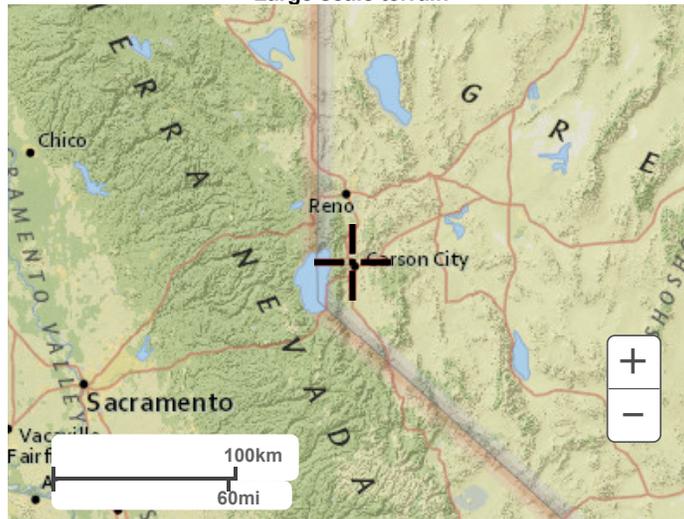
[Back to Top](#)

Maps & arials

Small scale terrain



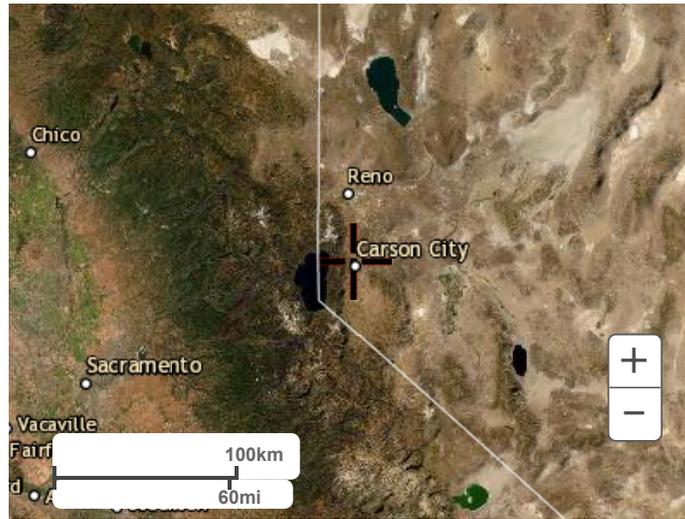
Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

**RATIONAL FORMULA METHOD
RUNOFF COEFFICIENTS**

| Land Use or Surface Characteristics | Aver. % Impervious Area | Runoff Coefficients | |
|--|---|--------------------------|------------------------------|
| | | 5-Year (C ₅) | 100-Year (C ₁₀₀) |
| <u>Business/Commercial:</u> | | | |
| Downtown Areas | 85 | .82 | .85 |
| Neighborhood Areas | 70 | .65 | .80 |
| <u>Residential:</u> (Average Lot Size) | | | |
| 1/8 Acre or Less (Multi-Unit) | 65 | .60 | .78 |
| 1/4 Acre | 38 | .50 | .65 |
| 1/8 Acre | 30 | .45 | .60 |
| 1/2 Acre | 25 | .40 | .55 |
| 1 Acre | 20 | .35 | .50 |
| <u>Industrial:</u> | | | |
| | 72 | .68 | .82 |
| <u>Open Space:</u> (Lawns, Parks, Golf Courses) | | | |
| | 5 | .05 | .30 |
| <u>Undeveloped Areas:</u> | | | |
| Range | 0 | .20 | .50 |
| Forest | 0 | .05 | .30 |
| <u>Streets/Roads:</u> | | | |
| Paved | 100 | .88 | .93 |
| Gravel | 20 | .25 | .50 |
| <u>Drives/Walks:</u> | | | |
| | 95 | .87 | .90 |
| <u>Roof:</u> | | | |
| | 90 | .85 | .87 |
| Notes: | | | |
| 1. Composite runoff coefficients shown for Residential, Industrial, and Business/Commercial Areas assume irrigated grass landscaping for all pervious areas. For development with landscaping other than irrigated grass, the designer must develop project specific composite runoff coefficients from the surface characteristics presented in this table. | | | |
| VERSION: April 30, 2009 | REFERENCE: | | TABLE |
| WRC ENGINEERING, INC. | USDCM, DROCOG, 1969 (with modifications) | | 701 |

RUNOFF CURVE NUMBERS FOR URBAN AREAS¹

Runoff Curve Numbers

| Cover Type and Hydrologic Condition | Aver. % Impervious Area ² | Soil Comp A | Soil Comp B | Soil Comp C | Soil Comp D |
|--|--------------------------------------|-------------|-------------|-------------|-------------|
| <i>Fully developed urban area (vegetation established)</i> | | | | | |
| Open space (lawns, parks, golf courses, cemeteries, etc.) ³ | | | | | |
| Poor condition (grass cover < 50%) | | 68 | 79 | 86 | 89 |
| Fair condition (grass cover 50 to 75%) | | 49 | 69 | 79 | 84 |
| Good condition (grass cover > 75%) | | 39 | 61 | 74 | 80 |
| Impervious areas: | | | | | |
| Paved parking lots, roofs, driveways, etc. (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Streets and roads: | | | | | |
| Paved; curbs and storm sewers (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Paved; open ditches (including right-of-way) | | 83 | 89 | 92 | 93 |
| Gravel (including right-of-way) | | 76 | 85 | 89 | 91 |
| Dirt (including right-of-way) | | 72 | 82 | 87 | 89 |
| Western desert urban areas: | | | | | |
| Natural desert landscaping (pervious areas only) ⁴ | | 63 | 77 | 85 | 88 |
| Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders) | | 96 | 96 | 96 | 96 |
| Urban districts: | | | | | |
| Commercial and business | 85 | 89 | 92 | 94 | 95 |
| Industrial | 72 | 81 | 88 | 91 | 93 |
| Residential districts by average lot size: | | | | | |
| 1/8 acre or less (town houses) | 65 | 77 | 85 | 90 | 92 |
| 1/4 acre | 38 | 61 | 75 | 83 | 87 |
| 1/3 acre | 30 | 57 | 72 | 81 | 86 |
| 1/2 acre | 25 | 54 | 70 | 80 | 85 |
| 1 acre | 20 | 51 | 68 | 79 | 84 |
| 2 acres | 12 | 46 | 65 | 77 | 82 |
| <i>Developing urban areas</i> | | | | | |
| Newly graded areas (pervious only, no vegetation) ⁵ | | 77 | 86 | 91 | 94 |
| Idle lands (CNs are determined using cover types similar to those Table 702 - 3 of 4) | | | | | |

¹Average runoff condition, and $I_a = 0.2S$

²The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CNs for other combinations of conditions may be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986).

³CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space cover type.

⁴Composite CNs for natural desert landscaping should be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986) based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.

⁵Composite CNs to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986) based on the degree of development (impervious area percentage) and the CNs for the newly graded pervious areas.

VERSION: April 30, 2009

REFERENCE:

210-VI-TR-55, Second Edition, June 1986

TABLE

702

1 of 4

WRC ENGINEERING, INC.

RUNOFF CURVE NUMBERS FOR CULTIVATED AGRICULTURAL LANDS¹

Runoff Curve Numbers

| Cover type | Treatment ² | Hydrologic condition ³ | Soil Comp A | Soil Comp B | Soil Comp C | Soil Comp D |
|--|--------------------------------------|-----------------------------------|-------------|-------------|-------------|-------------|
| Fallow | Bare soil Crop residue cover (CR) | - | 77 | 86 | 91 | 94 |
| | | Poor | 76 | 85 | 90 | 93 |
| | | Good | 74 | 83 | 88 | 90 |
| Row crops | Straight row (SR) | Poor | 72 | 81 | 88 | 91 |
| | | Good | 67 | 78 | 85 | 89 |
| | SR + CR | Poor | 71 | 80 | 87 | 90 |
| | | Good | 64 | 75 | 82 | 85 |
| | Contoured (C) | Poor | 70 | 79 | 84 | 88 |
| | | Good | 65 | 75 | 82 | 86 |
| | C + CR | Poor | 69 | 78 | 83 | 87 |
| | | Good | 64 | 74 | 81 | 85 |
| | Contoured & terraced (C&T) | Poor | 66 | 74 | 80 | 82 |
| | | Good | 62 | 71 | 78 | 81 |
| C&T + CR | Poor | 65 | 73 | 79 | 81 | |
| | Good | 61 | 70 | 77 | 80 | |
| Small grain | SR | Poor | 65 | 76 | 84 | 88 |
| | | Good | 63 | 75 | 83 | 87 |
| | SR + CR | Poor | 64 | 75 | 83 | 86 |
| | | Good | 60 | 72 | 80 | 84 |
| | C | Poor | 63 | 74 | 82 | 85 |
| | | Good | 61 | 73 | 81 | 84 |
| | C + CR | Poor | 62 | 73 | 81 | 84 |
| | | Good | 60 | 72 | 80 | 83 |
| | C&T | Poor | 61 | 72 | 79 | 82 |
| | | Good | 59 | 70 | 78 | 81 |
| C&T + CR | Poor | 60 | 71 | 78 | 81 | |
| | Good | 58 | 69 | 77 | 80 | |
| Close-seeded or broadcast legumes or rotation meadow | SR | Poor | 66 | 77 | 85 | 89 |
| | | Good | 58 | 72 | 81 | 85 |
| | C | Poor | 64 | 75 | 83 | 85 |
| | | Good | 55 | 69 | 78 | 83 |
| | C&T | Poor | 63 | 73 | 80 | 83 |
| | | Good | 51 | 67 | 76 | 80 |

¹Average runoff condition, and $I_a = 0.2S$

²Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

³Hydrologic condition is based on combination of factors that affect infiltration and runoff, including: (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

VERSION: April 30, 2009

WRC ENGINEERING, INC.

REFERENCE:

210-VI-TR-55, Second Edition, June 1986

TABLE

702

2 of 4

RUNOFF CURVE NUMBERS FOR OTHER AGRICULTURAL LANDS¹

Runoff Curve Numbers

| Cover Type | Hydrologic Condition | Soil Comp A | Soil Comp B | Soil Comp C | Soil Comp D |
|---|----------------------|-----------------|-------------|-------------|-------------|
| Pasture, grassland, or range – continuous forage for grazing ² | Poor | 68 | 79 | 86 | 89 |
| | Fair | 49 | 69 | 79 | 84 |
| | Good | 39 | 61 | 74 | 80 |
| Meadow – continuous grass, protected from grazing and generally mowed for hay | - | 30 | 58 | 71 | 78 |
| Brush – brush-weed-grass mixture with brush the major element ³ | Poor | 48 | 67 | 77 | 83 |
| | Fair | 35 | 56 | 70 | 77 |
| | Good | 30 ⁴ | 48 | 65 | 73 |
| Woods – grass combination (orchard or tree farm) ⁵ | Poor | 57 | 73 | 82 | 86 |
| | Fair | 43 | 65 | 76 | 82 |
| | Good | 32 | 58 | 72 | 79 |
| Woods ⁶ | Poor | 45 | 66 | 77 | 83 |
| | Fair | 36 | 60 | 73 | 79 |
| | Good | 30 ⁴ | 55 | 70 | 77 |
| Farmsteads – buildings, lanes, driveways, and surrounding lots | - | 59 | 74 | 82 | 86 |

¹Average runoff condition, and $I_a = 0.2S$

²*Poor*: < 50% ground cover or heavily grazed with no mulch
Fair: 50 to 75% ground cover and not heavily grazed
Good: > 75% ground cover and lightly or only occasionally grazed

³*Poor*: < 50% ground cover
Fair: 50 to 75% ground cover
Good: >75% ground cover

⁴Actual curve number is less than 30; use CN = 30 for runoff computations.

⁵CNs shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CNs for woods and pasture.

⁶*Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

VERSION: April 30, 2009

WRC ENGINEERING, INC.

REFERENCE:

210-VI-TR-55, Second Edition, June 1986

TABLE

702
3 of 4

RUNOFF CURVE NUMBERS FOR ARID AND SEMIARID RANGELANDS¹
Runoff Curve Numbers

| Cover Description | Hydrologic Condition ² | Soil Comp A ³ | Soil Comp B | Soil Comp C | Soil Comp D |
|--|-----------------------------------|--------------------------|-------------|-------------|-------------|
| Herbaceous – mixture of grass, weeds, and low-growing brush, with brush the minor element. | Poor | | 80 | 87 | 93 |
| | Fair | | 71 | 81 | 89 |
| | Good | | 62 | 74 | 85 |
| Oak-aspen – mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush | Poor | | 66 | 74 | 79 |
| | Fair | | 48 | 57 | 63 |
| | Good | | 30 | 41 | 48 |
| Pinyon-juniper – pinyon, juniper, or both; grass understory | Poor | | 75 | 85 | 89 |
| | Fair | | 58 | 73 | 80 |
| | Good | | 41 | 61 | 71 |
| Sagebrush with grass understory | Poor | | 67 | 80 | 85 |
| | Fair | | 51 | 63 | 70 |
| | Good | | 35 | 47 | 55 |
| Desert shrub – major plants include saltbrush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus | Poor | 63 | 77 | 85 | 88 |
| | Fair | 55 | 72 | 81 | 86 |
| | Good | 49 | 68 | 79 | 84 |

¹Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use Table 702 - 3 of 4.

²*Poor*: < 30% ground cover (litter, grass, and brush overstory)

Fair: 30 to 70% ground cover

Good: > 70% ground cover

³Curve numbers for group A have been developed only for desert shrub.

National Flood Hazard Layer FIRMette



119°47'1"W 39°11'29"N



119°46'23"W 39°11'12"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- | | | |
|------------------------------------|--|--|
| SPECIAL FLOOD HAZARD AREAS | | Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i> |
| | | With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i> |
| | | Regulatory Floodway |
| OTHER AREAS OF FLOOD HAZARD | | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i> |
| | | Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i> |
| | | Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i> |
| | | Area with Flood Risk due to Levee <i>Zone D</i> |
| OTHER AREAS | | NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i> |
| | | Effective LOMRs |
| | | Area of Undetermined Flood Hazard <i>Zone D</i> |
| GENERAL STRUCTURES | | Channel, Culvert, or Storm Sewer |
| | | Levee, Dike, or Floodwall |
| OTHER FEATURES | | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation |
| | | 17.5 |
| | | Coastal Transect |
| | | Base Flood Elevation Line (BFE) |
| | | Limit of Study |
| | | Jurisdiction Boundary |
| | | Coastal Transect Baseline |
| | | Profile Baseline |
| | | Hydrographic Feature |
| MAP PANELS | | Digital Data Available |
| | | No Digital Data Available |
| | | Unmapped |



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/17/2021 at 7:20 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

RATIONAL METHOD DISCHARGE RESULTS

| BASIN | RUNOFF COEFFICIENT (5-YEAR) | RUNOFF COEFFICIENT (100-YEAR) | INTENSITY (5-YEAR) | INTENSITY (100-YEAR) | AREA | Q5 | Q100 |
|---------|-----------------------------------|-------------------------------------|-----------------------|-------------------------|------|------|------|
| E-1 | 0.20 | 0.50 | 1.50 | 3.62 | 1.15 | 0.35 | 2.08 |
| E-2 | 0.20 | 0.50 | 1.50 | 3.62 | 2.31 | 0.69 | 4.18 |
| E-Total | | | | | 3.46 | 1.04 | 6.26 |

| | | | | | | | |
|---------|------|------|------|------|------|------|------|
| P-1 | 0.60 | 0.78 | 1.50 | 3.62 | 1.08 | 0.97 | 3.05 |
| P-2 | 0.60 | 0.78 | 1.50 | 3.62 | 2.38 | 2.14 | 6.72 |
| P-Total | | | | | 3.46 | 3.11 | 9.77 |

Equations: $Q = CiA$

Silver Oak @ College Pkwy: Modified Rational Method

Basin Description: Detention Basin 1

Calc by: SDF

Date: 5/26/21

Existing Conditions

$C_5 = 0.20$
 $C_{100} = 0.50$
 $T_c = 10.0 \text{ min.}$
 $I_5 = 1.50 \text{ in/hr}$
 $I_{100} = 3.62 \text{ in/hr}$
 $A = 3.46 \text{ acres}$

Allowable Release Rates:

$Q_5 = 1.04 \text{ cfs}$
 $Q_{100} = 6.26 \text{ cfs}$
 <-- Subbasin E-1

Proposed Runoff Coefficient Calculations

$C_5 = 0.60$
 $C_{100} = 0.78$

5-Year

| Storm Duration (hours) | Rain Intensity (in/hr) | Runoff Rate (cfs) | Release Rate (cfs) | Storage Rate (cfs) | Storage Required (acre-ft) |
|------------------------|------------------------|-------------------|--------------------|--------------------|----------------------------|
| t | I | $Q=Cr*I*A$ | Q_r | $Q_s=Q-Q_r$ | $Q_s*t/12$ |
| 0.08 | 1.97 | 4.09 | 1.04 | 3.05 | 0.0212 |
| 0.17 | 1.50 | 3.11 | 1.04 | 2.08 | 0.0288 |
| 0.25 | 1.24 | 2.57 | 1.04 | 1.54 | 0.0320 |
| 0.50 | 0.834 | 1.73 | 1.04 | 0.69 | 0.0289 |
| 1.00 | 0.516 | 1.07 | 1.04 | 0.03 | 0.0028 |

5-Yr Required Storage: 0.032 acre-ft = 1,394 cu ft

100-Year

| Storm Duration (hours) | Rain Intensity (in/hr) | Runoff Rate (cfs) | Release Rate (cfs) | Storage Rate (cfs) | Storage Required (acre-ft) |
|------------------------|------------------------|-------------------|--------------------|--------------------|----------------------------|
| t | I | $Q=Cr*I*A$ | Q_r | $Q_s=Q-Q_r$ | $Q_s*t/12$ |
| 0.08 | 4.75 | 12.82 | 6.26 | 6.56 | 0.0455 |
| 0.17 | 3.62 | 9.77 | 6.26 | 3.51 | 0.0487 |
| 0.25 | 2.99 | 8.07 | 6.26 | 1.81 | 0.0376 |
| 0.50 | 2.01 | 5.42 | 6.26 | -0.84 | -0.0349 |
| 1.00 | 1.25 | 3.37 | 6.26 | -2.89 | -0.2408 |

100-Yr Required Storage: 0.049 acre-ft = 2,122 cu ft

**Silver Oak @ College Parkway
Stage-Storage Summary Tables**

| | | | | | |
|------------------|---------------------|-------|-------|-------|-------|
| DETENTION | 5-Year Req'd Vol. | 0.032 | ac-ft | 1,394 | cu ft |
| BASIN | 100-Year Req'd Vol. | 0.049 | ac-ft | 2,122 | cu ft |

| stage | Δ elev. | area (sq. ft.) | area (ac.) | avg. area (ac.) | storage _i (ac-ft) | Σ storage _i (ac-ft) | Σ storage _i (cu-ft) |
|----------|----------------|-------------------|---------------|--------------------|---------------------------------|--|--|
| 4,737.20 | 0.00 | 16 | 0.00 | 0.00 | 0.00 | 0.00 | 0 |
| 4,737.70 | 0.50 | 499 | 0.01 | 0.01 | 0.00 | 0.00 | 129 |
| 4,738.20 | 0.50 | 770 | 0.02 | 0.01 | 0.01 | 0.01 | 446 |
| 4,738.70 | 0.50 | 1081 | 0.02 | 0.02 | 0.01 | 0.02 | 909 |
| 4,739.20 | 0.50 | 1431 | 0.03 | 0.03 | 0.01 | 0.04 | 1537 |
| 4,739.70 | 0.50 | 1821 | 0.04 | 0.04 | 0.02 | 0.05 | 2350 |
| 4,740.20 | 0.50 | 2249 | 0.05 | 0.05 | 0.02 | 0.08 | 3367 |

Weir Elev 4,740.20
Crest Elev 4,740.20

| | |
|----------------------|-------------------|
| Total Provided Vol.: | 0.08 ac-ft |
| | 3367 cu ft |

Worksheet for 5-yr Curb and Gutter

Results

| | | |
|-----------------|---------------|-------|
| Critical Depth | 0.28 | ft |
| Critical Slope | 0.00570 | ft/ft |
| Velocity | 2.14 | ft/s |
| Velocity Head | 0.07 | ft |
| Specific Energy | 0.33 | ft |
| Froude Number | 1.30 | |
| 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 | 0.26 | ft |
| Critical Depth | 0.28 | ft |
| Channel Slope | 0.01000 | ft/ft |
| Critical Slope | 0.00570 | ft/ft |

Rating Table for 5-yr Curb and Gutter

Input Data

| Channel Slope (ft/ft) | Discharge (ft ³ /s) | Velocity (ft/s) | Flow Area (ft ²) | Wetted Perimeter (ft) | Top Width (ft) |
|-----------------------|--------------------------------|-----------------|------------------------------|-----------------------|----------------|
| 0.04500 | 2.66 | 4.54 | 0.58 | 7.21 | 6.96 |
| 0.05000 | 2.80 | 4.79 | 0.58 | 7.21 | 6.96 |

Worksheet for 5-yr 3-Foot Valley Gutter

Results

| | | |
|-----------------|---------------|-------|
| Normal Depth | 0.26 | ft |
| Critical Depth | 0.28 | ft |
| Critical Slope | 0.00545 | ft/ft |
| Velocity | 2.20 | ft/s |
| Velocity Head | 0.08 | ft |
| Specific Energy | 0.34 | ft |
| Froude Number | 1.33 | |
| 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 | 0.26 | ft |
| Critical Depth | 0.28 | ft |
| Channel Slope | 0.01000 | ft/ft |
| Critical Slope | 0.00545 | ft/ft |

Rating Table for 5-yr 3-Foot Valley Gutter

Input Data

| Channel Slope (ft/ft) | Discharge (ft ³ /s) | Velocity (ft/s) | Flow Area (ft ²) | Wetted Perimeter (ft) | Top Width (ft) |
|-----------------------|--------------------------------|-----------------|------------------------------|-----------------------|----------------|
| 0.04000 | 5.25 | 4.41 | 1.19 | 14.05 | 14.00 |
| 0.04500 | 5.56 | 4.68 | 1.19 | 14.05 | 14.00 |
| 0.05000 | 5.86 | 4.93 | 1.19 | 14.05 | 14.00 |

Worksheet for 100yr Curb and Gutter

Results

| | | |
|-----------------|---------------|-------|
| Critical Depth | 0.48 | ft |
| Critical Slope | 0.00421 | ft/ft |
| Velocity | 4.72 | ft/s |
| Velocity Head | 0.35 | ft |
| Specific Energy | 0.73 | ft |
| Froude Number | 2.25 | |
| 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 | 0.38 | ft |
| Critical Depth | 0.48 | ft |
| Channel Slope | 0.02500 | ft/ft |
| Critical Slope | 0.00421 | ft/ft |

Rating Table for 100yr Curb and Gutter

Input Data

| Channel Slope (ft/ft) | Discharge (ft ³ /s) | Velocity (ft/s) | Flow Area (ft ²) | Wetted Perimeter (ft) | Top Width (ft) |
|-----------------------|--------------------------------|-----------------|------------------------------|-----------------------|----------------|
| 0.04500 | 11.29 | 6.34 | 1.78 | 13.33 | 12.98 |
| 0.05000 | 11.90 | 6.68 | 1.78 | 13.33 | 12.98 |

Worksheet for 100-yr 3-Foot Valley Gutter

Results

| | | |
|-----------------|---------------|-------|
| Normal Depth | 0.38 | ft |
| Critical Depth | 0.48 | ft |
| Critical Slope | 0.00402 | ft/ft |
| Velocity | 4.82 | ft/s |
| Velocity Head | 0.36 | ft |
| Specific Energy | 0.74 | ft |
| Froude Number | 2.29 | |
| 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 | 0.38 | ft |
| Critical Depth | 0.48 | ft |
| Channel Slope | 0.02500 | ft/ft |
| Critical Slope | 0.00402 | ft/ft |

Rating Table for 100-yr 3-Foot Valley Gutter

Input Data

| Channel Slope (ft/ft) | Discharge (ft ³ /s) | Velocity (ft/s) | Flow Area (ft ²) | Wetted Perimeter (ft) | Top Width (ft) |
|-----------------------|--------------------------------|-----------------|------------------------------|-----------------------|----------------|
| 0.04000 | 21.89 | 6.10 | 3.59 | 26.06 | 26.00 |
| 0.04500 | 23.22 | 6.47 | 3.59 | 26.06 | 26.00 |
| 0.05000 | 24.48 | 6.82 | 3.59 | 26.06 | 26.00 |

APPENDIX B

MASTER DRAINAGE STUDY FOR SILVER OAK DEVELOPMENT

BY SIERRA RESOURCE ENGINEERING, INC.
MARCH 4, 1994

94001

0615200.004

—Silver Oak Development Master Drainage Plan —

**SILVER OAK
DEVELOPMENT**

MASTER DRAINAGE PLAN

MARCH 4, 1994



34 LAKE BLVD. SUITE 101
DAYTON, NEVADA 89403

SIERRA RESOURCE ENGINEERING, INC.

CIVIL ENGINEERS
LAND SURVEYORS

WATER RIGHTS
LAND USE PLANNING

(702) 246-7300

Fax: (702) 246-7304

TABLE OF CONTENTS

| | |
|--|----|
| Introduction | 1 |
| Background | 1 |
| Hydrology | 2 |
| Phasing | 2 |
| Zone I | 3 |
| Detention Basin I | 3 |
| Zone II | 3 |
| Detention Basin II | 4 |
| Flood Routing (100 year) | 4 |
| Zone III | 5 |
| Detention Basin III | 5 |
| Detention Basin IV | 5 |
| Flood Routing (100 year) | 5 |
| Silver Oak Phase I | 6 |
| Summary | 6 |
| Summary of Results | 8 |
| Dedicated Detention Area Storage | 8 |
| Hydrography Summary | 9 |
| Phase I Calculations | 10 |
| Map Package | 11 |
| Historic Drainage (Off-site) | 12 |
| Master Drainage Plan | 13 |
| Hydrographs | 14 |

Introduction

This master drainage plan for Silver Oak outlines the background, hydrology, phasing, and flood routing for the entire development. Additionally, the specific hydrology and hydraulic calculations required for the approval of Silver Oak Phase I have been included.

All locations and sizes of hydraulic structures are approximate at this stage of development. While every effort has been made to produce a conservative model that will require little adjustment, modifications in the final design of the subdivision, commercial properties and golf course will inevitably lead to some minor changes in the drainage plan. The purpose of this plan is to illustrate the methodology of how we intend to deal with drainage issues as well as the plan feasibility of this plan based on design criteria.

Background

The master drainage plan for Silver Oak presented in this report is the result of a cooperative effort between Sierra Resource Engineering, Inc., and Carson City Public Works Department.

Developments are typically required to restrict flows to the pre-development condition of the construction site. The Carson City Public Works Department requested Sierra Resource Engineering to investigate the possibility of the Silver Oak Development limiting flows from drainage to the west of the development to 5 and 17 cfs for 5 and 25 year storms, respectively. These flow rates would reduce or eliminate potential flood problems to the east due to limited infrastructure.

A preliminary plan submitted to Public Works for review and comment listed design criteria as agreed upon by Carson City and Sierra Resource Engineering, storm hydrographs, results of literature research and on-site investigations, approximate locations detention basins and possible routing, as well as a basic outline for the working of the overall plan.

Our preliminary master drainage plan concluded that it was possible for the Silver Oak Development to exceed current requirements and limit flows to the above referenced amounts. This is possible only because of the extraordinary amount of open space created by the golf course. In the spirit of improving the community, the Silver Oak Development has agreed to limit these flows.

This report will address all comments made by Carson City regarding the preliminary study. We hope that this cooperative effort will provide a plan which services the development and improves the flood management program for the entire community.

Hydrology

Storm runoff has been calculated using an EDS (Engineering Design Software) design software package. This package offers both Rational and SCS methods to compute flood hydrographs. As per our agreement with Carson City, all models for storm detention have been generated using TR55 storm hydrographs based on a 25 year, 24 hour storm with IA rainfall distribution type. All CN numbers were chosen using the 1975 SCS soil survey.

Storm runoff values from the 1993 FEMA study for Carson City are appreciably higher than ours. This can be attributed to the study contractor using a SCS Type II rainfall distribution.

Phasing

Phasing of the drainage improvements will depend on the housing and golf course development. As such, it is difficult to forecast an exact time of construction. However, we can divide the project into three zones draining into different basins. Any new construction in any of these three zones would trigger the construction of the detention and metering structures servicing it. Each zone^{and} its hydraulic structures and requirements are as follows:

Zone I

Zone I will include almost all property south of Community College Parkway. This zone could require one detention basin (to be discussed in detail), a drainage easement, and drainage swales on the west property line to direct sheet flows to Winnie Lane and Community College Parkway. Sheet flows from off-site will be limited to those between Murphy Drive and the property boundary. This is due to the sever cut in Murphy Drive diverting flows to the south.

The Phase I development detention will be accommodated in this zone when Phase II begins construction. This is required due to the low elevations associated with Phase I. Detention for Phase I will be accommodated within the drainage easement should any further phases fail to be built.

Detention Basin I

This basin will detain all on-site flows to the south of Community College Parkway and southwest of the school site with the exception of Phase I. The flows from this basin will be metered along with those from Basin 2 to an approximate Q_{max} of 17 cfs for a 25 year, 24 hour event. The outlet control structure will be routed to the drainage easement along West Nye Lane. No flows from off-site will be routed to this basin. At the present, this basin is tentatively located in the 11th fairway. This is an approximate location. As the golf course design evolves, some of this volume may be distributed throughout the course as small ponds or depressions. Open channels directing flows to the basin are also approximate and subject to some change as the golf course design is developed.

Zone II

Zone II extends north from Community College Parkway to a line running east and west from approximately Country Club Drive to Radcliff Drive in University Heights Phase II. The detention basin in this zone primarily is

designed to accommodate flows from drainage Basin "B" (Combs Canyon).

Detention Basin II

This basin is tentatively located in the 10th fairway. Drainage Basin "B" storm flows from off-site will be routed across Ormsby via a culvert and through the open channel. Again, as with the channels leading to the #1 basin, the locations shown on this plan are approximate as subject to some adjustment to accommodate the final golf course and residential design. Flows from this basin will be metered along with the flows from Basin #1 to a ~~maximum~~ combine maximum flow of approximately 17 cfs and exit the project via the drainage easement along Nye Lane. *now 19'*

Flood Routing (100 year)

100 year floods will enter this zone at the culvert crossing on Ormsby; however, these flows will enter from the street surface as they will be entering the site from Combs Canyon Road. Flood paths for these storms will follow the open channel paths to the detention basin area; but, will most probably be incorporated into the entire fairway width. Instead of exiting the detention area via a culvert, they will be allowed to crest Community College Parkway and follow that path off-site. Due to the depressed section on Community College Parkway, flows will enter the K-Mart site at this low point and exit at the southeast end of their parking lot.

This depression in Community College Parkway was originally designed to act as a weir for flows in excess of a 10 year event, and assumed no improvements would be made adjacent to this collector. If no development were to occur north of Community College Parkway, flows would naturally be directed across the K-Mart site as dictated by the street design. At this stage in design, it would be reasonable to assume that 100 year flows be directed *will*

down this street and be allowed to drain off at the depression as the design intended.

Zone III

Zone III extends from the Zone II boundary to the northern edge of the project. This zone includes two detention basins (III and IV). Drainage swales along the western edge of this zone will collect off-site sheet flows and direct them to the open channel network connected to detention basin IV.

Detention Basin III

Basin III is located in the driving range and will accommodate flows from Combs Canyon (Basin C). Open channel improvements starting behind the 16th tee along the property line will be made to collect and divert flows from Combs Canyon to Basin #3. As with all open channels, the location is approximate and subject to some adjustment. Flows from this basin along with those with Basin #4 will be metered to a combined maximum Q of approximately 17 cfs.

Detention Basin IV

Basin #4 primarily accommodates flows from drainage basin D. Open channels route flows through the course to this basin. A culvert crossing behind the 9th tee carries flows across Silver Oak Drive to the basin.

Flows from this basin for a 25 year, 24 hour storm will be metered and combined with those from basin #3 for a combined Q_{max} of 17 cfs. These flows will exit the project at the broadleaf culvert.

Flood Routing (100 year)

100 year floods will enter this zone through the open channel improvements at the bottom of Combs Canyon and north end of University Heights. As with the Zone II path, this will also approximately follow the 25 year, 24 hour open channel except it will likely

extend the width of the fairway before entering the detention basin area. The detention area will fill until the water surface matches the elevation of Silver Oak Drive between the tourist and general commercial sites. Once this elevation is reached, Silver Oak Drive will carry these flows off-site.

Silver Oak Phase I

Zone III extends from the Zone II boundary to the northern edge of the project. This zone includes two detention basins (III and IV). Drainage swales along the western edge of this zone will collect off-site sheet flows & direct them to the open channel network connected to detention basin IV.

Phase I being a part of Zone I but lower than the elevation of the detention basin, presents some unique conditions. The detention requirements for this phase will ultimately be accommodated by metering flows from detention Basin I to make up the difference of direct flows released to the drainage easement. However, assuming these improvements are never built, we will bond for detention within the drainage easement adjacent to Nye Lane under a separate contract.

Hydrographs and critical cross sections for this phase of development are included in this section as required by Carson City Public Works.

Summary

While every effort has been made to present the plan in a format that is self-explanatory, some questions are bound to arise. We would be happy to answer these questions at any time.

Actual sizing of the outlet of the outlet control structures will commence immediately. As mentioned earlier, this will require coordination between golf course designers and our engineering staff.

Further analysis of the 100 year flood route will be required. This includes total volume of the golf course

west of the commercial development, soil investigation,
and possible firm map revisions.

Summary of Results

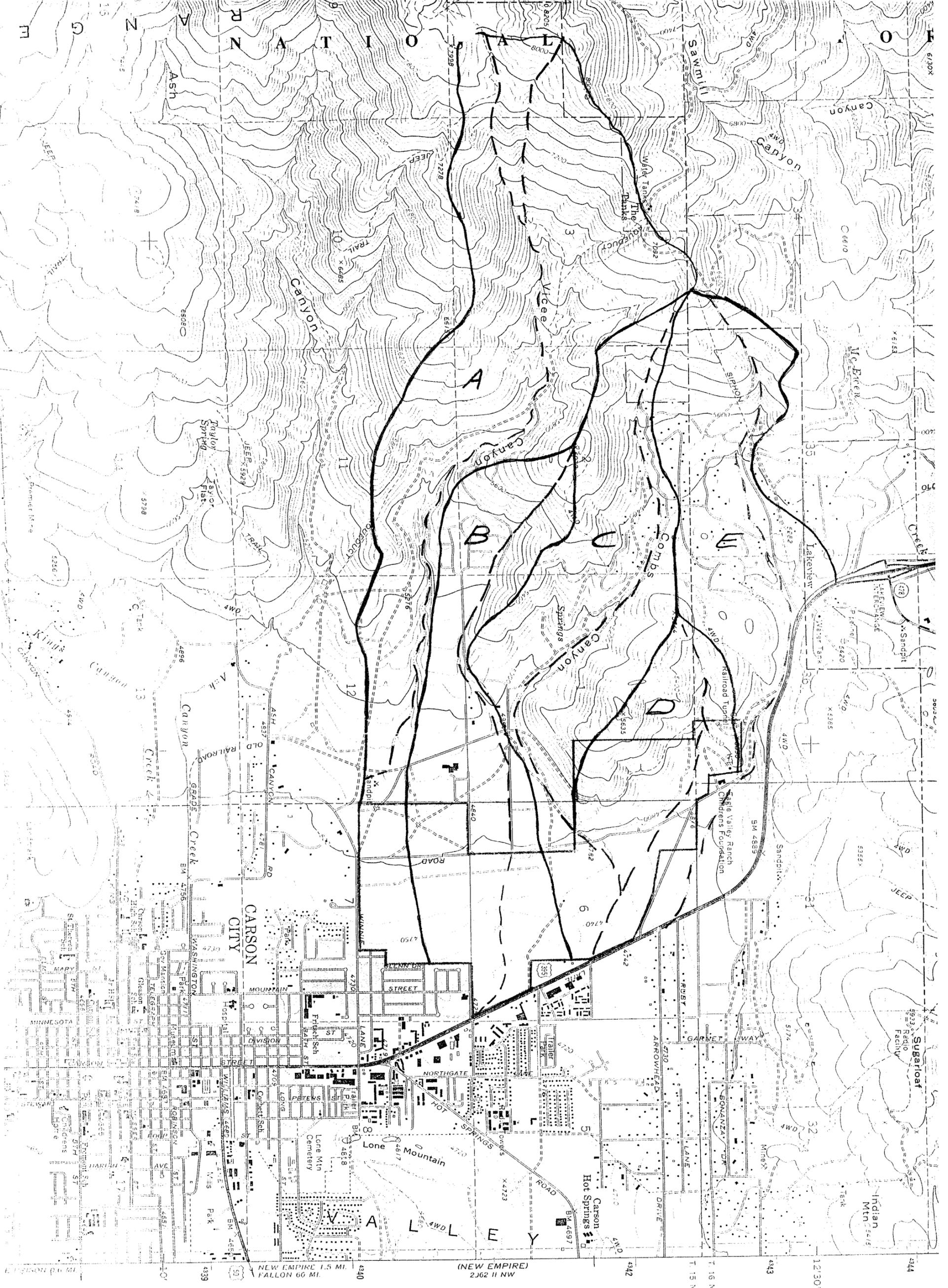
Dedicated Detention Area Storage

| Area | | 5 yr/24 hr | 25 YR/24 HR | 100 YR/ 24 HR |
|------|---|--------------------|---------------------|-------------------------|
| 1 | Qin (cfs) Qout (cfs) Storage (ac ft) | 3.95 .92 4.2 | 12.8 7 5.9 | 28.83 28.83 -0- |
| 2 | Qin Qout Storage | 10.32 4 9.36 | 32.3 10 24 | 213.87 213.87 -0- |
| 3 | Qin Qout Storage | 11.9 4 10.1 | 29.3 12 27.1 | 256 256 -0- |
| 4 | Qin Qout Storage | 6.2 1 6.9 | 21.12 5 14.35 | 48.4 48.4 -0- |

Hydrography Summary

| | Off Site Flows Drainage | | | | |
|--------------------|----------------------------|---------|----------|---------|---------|
| | | | | BASIN | BASIN |
| | ZONE I | ZONE II | ZONE III | B | C |
| | POST | POST | POST | | |
| 5 yr/24 hr TA | 3.95 | 10.32 | 6.77 | 8.06 | 40.82 |
| tc (min) | 95.14 | 70.01 | 79.44 | 83.30 | 90.96 |
| time to peak (min) | 1035.00 | 1079.00 | 1027.00 | 1092.00 | 1275.00 |
| | | | | | |
| 25 yr/24 hr IA | 13.71 | 31.27 | 21.12 | 23.41 | 93.15 |
| tc (min) | 95.14 | 70.01 | 79.44 | 83.30 | 90.96 |
| time to peak (min) | 555.00 | 552.00 | 546.00 | 559.00 | 870.00 |
| | | | | | |
| 100 yr/24 hr IA | 28.83 | 18.86 | 48.41 | -- | -- |
| tc (min) | 95.14 | 70.01 | 79.44 | -- | -- |
| time to peak (min) | 540.00 | 517.00 | 533.00 | -- | -- |
| | | | | | |
| 100 yr/24 hr II | -- | -- | -- | 213.87 | 256.08 |
| tc (min) | -- | -- | -- | 83.30 | 113.24 |
| time to peak (min) | -- | -- | -- | 767.00 | 792.00 |

Phase I Calculations



HISTORIC DRAINAGE

HYDROGRAPH REPORT

RECORD NUMBER : 22
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW WEST SIDE

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 1.33 (cfs)
 Volume..... = 0.08 (acft)
 Time Interval..... = 7 (min)
 Time to Peak..... = 46.15 (min)
 Time of Base..... = 92.30 (min)
 Multiplication factor..... = 1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient..... = 0.40000
 Receding limb factor..... = 1.00000

[RESERVOIR STORAGE]

Maximum Outflow..... = 0.00000 (cfs)
 Maximum Storage..... = 0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area..... = 4.32 (ac)
 Curve Number..... = 73
 Runoff coefficient..... = 0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02100
 Flow Length (L)..... = 1440.00 (ft)
 Time of Concentration..... = 46.15 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SYNTHETIC
 Total Precipitation..... = 0.59 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 0.77 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 22
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW WEST SIDE

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 7 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 1 | 7 | 0.09 | 0.09 | 0.20 | 0.20 |
| 2 | 14 | 0.09 | 0.18 | 0.20 | 0.40 |
| 3 | 21 | 0.09 | 0.27 | 0.20 | 0.60 |
| 4 | 28 | 0.09 | 0.36 | 0.20 | 0.80 |
| 5 | 35 | 0.09 | 0.45 | 0.20 | 1.01 |
| 6 | 42 | 0.09 | 0.54 | 0.20 | 1.21 |
| 7 | 49 | 0.05 | 0.59 | 0.04 | 1.24 |
| 8 | 56 | 0.00 | 0.59 | -0.20 | 1.04 |
| 9 | 63 | 0.00 | 0.59 | -0.20 | 0.84 |
| 10 | 70 | 0.00 | 0.59 | -0.20 | 0.64 |
| 11 | 77 | 0.00 | 0.59 | -0.20 | 0.44 |
| 12 | 84 | 0.00 | 0.59 | -0.20 | 0.24 |
| 13 | 91 | 0.00 | 0.59 | -0.20 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 22
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW WEST SIDE

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 1.33 (cfs)
 Volume..... = 0.08 (acft)
 Time Interval..... = 7 (min)
 Time to Peak..... = 46.15 (min)
 Time of Base..... = 92.30 (min)
 Multiplication factor..... = 1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient..... = 0.40000
 Receding limb factor..... = 1.00000

[RESERVOIR STORAGE]

Maximum Outflow..... = 0.00000 (cfs)
 Maximum Storage..... = 0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area..... = 4.32 (ac)
 Curve Number..... = 73
 Runoff coefficient..... = 0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02100
 Flow Length (L)..... = 1440.00 (ft)
 Time of Concentration..... = 46.15 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SYNTHETIC
 Total Precipitation..... = 0.59 (in)
 Return Period..... = 100 (yr)
 Storm Duration..... = 0.77 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 22
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW WEST SIDE

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 7 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 1 | 7 | 0.09 | 0.09 | 0.20 | 0.20 |
| 2 | 14 | 0.09 | 0.18 | 0.20 | 0.40 |
| 3 | 21 | 0.09 | 0.27 | 0.20 | 0.60 |
| 4 | 28 | 0.09 | 0.36 | 0.20 | 0.80 |
| 5 | 35 | 0.09 | 0.45 | 0.20 | 1.01 |
| 6 | 42 | 0.09 | 0.54 | 0.20 | 1.21 |
| 7 | 49 | 0.05 | 0.59 | 0.04 | 1.24 |
| 8 | 56 | 0.00 | 0.59 | -0.20 | 1.04 |
| 9 | 63 | 0.00 | 0.59 | -0.20 | 0.84 |
| 10 | 70 | 0.00 | 0.59 | -0.20 | 0.64 |
| 11 | 77 | 0.00 | 0.59 | -0.20 | 0.44 |
| 12 | 84 | 0.00 | 0.59 | -0.20 | 0.24 |
| 13 | 91 | 0.00 | 0.59 | -0.20 | 0.04 |

2/15/94

Page 1

HYDROGRAPH REPORT

RECORD NUMBER : 19
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW EAST SIDE

[HYDROGRAPH INFORMATION]

| | | |
|----------------------------|---|-------------|
| Peak Discharge..... | = | 0.48 (cfs) |
| Volume..... | = | 0.02 (acft) |
| Time Interval..... | = | 5 (min) |
| Time to Peak..... | = | 33.90 (min) |
| Time of Base..... | = | 67.80 (min) |
| Multiplication factor..... | = | 1.00 |

[RATIONAL HYDROGRAPH INFORMATION]

| | | |
|---------------------------|---|---------|
| Runoff Coeficient..... | = | 0.40000 |
| Receding limb factor..... | = | 1.00000 |

[RESERVOIR STORAGE]

| | | |
|----------------------|---|----------------|
| Maximum Outflow..... | = | 0.00000 (cfs) |
| Maximum Storage..... | = | 0.00000 (acft) |

[BASIN DESCRIPTION]

| | | |
|-------------------------|---|-----------|
| Watershed Area..... | = | 1.30 (ac) |
| Curve Number..... | = | 73 |
| Runoff coefficient..... | = | 0.40 |

[TIME CONCENTRATION -- SCS LAG]

| | | |
|----------------------------|---|-------------|
| Channel Slope (S)..... | = | 0.01000 |
| Flow Length (L)..... | = | 540.00 (ft) |
| Time of Concentration..... | = | 33.90 (min) |

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|-----------|
| Distribution Type..... | = | SYNTHETIC |
| Total Precipitation..... | = | 0.53 (in) |
| Return Period..... | = | 5 (yr) |
| Storm Duration..... | = | 0.57 (hr) |

HYDROGRAPH REPORT

RECORD NUMBER : 19
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW EAST SIDE

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 5 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 1 | 5 | 0.08 | 0.08 | 0.07 | 0.07 |
| 2 | 10 | 0.08 | 0.15 | 0.07 | 0.14 |
| 3 | 15 | 0.08 | 0.23 | 0.07 | 0.21 |
| 4 | 20 | 0.08 | 0.31 | 0.07 | 0.29 |
| 5 | 25 | 0.08 | 0.39 | 0.07 | 0.36 |
| 6 | 30 | 0.08 | 0.46 | 0.07 | 0.43 |
| 7 | 35 | 0.06 | 0.53 | 0.04 | 0.47 |
| 8 | 40 | 0.00 | 0.53 | -0.07 | 0.40 |
| 9 | 45 | 0.00 | 0.53 | -0.07 | 0.33 |
| 10 | 50 | 0.00 | 0.53 | -0.07 | 0.25 |
| 11 | 55 | 0.00 | 0.53 | -0.07 | 0.18 |
| 12 | 60 | 0.00 | 0.53 | -0.07 | 0.11 |
| 3 | 65 | 0.00 | 0.53 | -0.07 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 19
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW EAST SIDE

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 0.93 (cfs)
 Volume..... = 0.04 (acft)
 Time Interval..... = 5 (min)
 Time to Peak..... = 33.90 (min)
 Time of Base..... = 67.80 (min)
 Multiplication factor..... = 1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient..... = 0.40000
 Receding limb factor..... = 1.00000

[RESERVOIR STORAGE]

Maximum Outflow..... = 0.00000 (cfs)
 Maximum Storage..... = 0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area..... = 1.30 (ac)
 Curve Number..... = 73
 Runoff coefficient..... = 0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01000
 Flow Length (L)..... = 540.00 (ft)
 Time of Concentration..... = 33.90 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SYNTHETIC
 Total Precipitation..... = 1.01 (in)
 Return Period..... = 100 (yr)
 Storm Duration..... = 0.57 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 19
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW EAST SIDE

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 5 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 1 | 5 | 0.15 | 0.15 | 0.14 | 0.14 |
| 2 | 10 | 0.15 | 0.30 | 0.14 | 0.27 |
| 3 | 15 | 0.15 | 0.45 | 0.14 | 0.41 |
| 4 | 20 | 0.15 | 0.60 | 0.14 | 0.55 |
| 5 | 25 | 0.15 | 0.75 | 0.14 | 0.69 |
| 6 | 30 | 0.15 | 0.90 | 0.14 | 0.82 |
| 7 | 35 | 0.12 | 1.01 | 0.08 | 0.90 |
| 8 | 40 | 0.00 | 1.01 | -0.14 | 0.76 |
| 9 | 45 | 0.00 | 1.01 | -0.14 | 0.63 |
| 10 | 50 | 0.00 | 1.01 | -0.14 | 0.49 |
| 11 | 55 | 0.00 | 1.01 | -0.14 | 0.35 |
| 12 | 60 | 0.00 | 1.01 | -0.14 | 0.21 |
| 3 | 65 | 0.00 | 1.01 | -0.14 | 0.08 |

2/15/94

Page 1

HYDROGRAPH REPORT

RECORD NUMBER : 18
 TYPE : MOD. RATIONAL
 DESCRIPTION : STOTM DRAIN AT KIMBERLY AND SHADOW BROOK CT

[HYDROGRAPH INFORMATION]

| | | |
|----------------------------|---|--------------|
| Peak Discharge..... | = | 3.90 (cfs) |
| Volume..... | = | 0.28 (acft) |
| Time Interval..... | = | 9 (min) |
| Time to Peak..... | = | 52.77 (min) |
| Time of Base..... | = | 105.54 (min) |
| Multiplication factor..... | = | 1.00 |

[RATIONAL HYDROGRAPH INFORMATION]

| | | |
|---------------------------|---|---------|
| Runoff Coeficient..... | = | 0.40000 |
| Receding limb factor..... | = | 1.00000 |

[RESERVOIR STORAGE]

| | | |
|----------------------|---|----------------|
| Maximum Outflow..... | = | 0.00000 (cfs) |
| Maximum Storage..... | = | 0.00000 (acft) |

[BASIN DESCRIPTION]

| | | |
|-------------------------|---|------------|
| Watershed Area..... | = | 13.80 (ac) |
| Curve Number..... | = | 73 |
| Runoff coefficient..... | = | 0.40 |

[TIME CONCENTRATION -- SCS LAG]

| | | |
|----------------------------|---|--------------|
| Channel Slope (S)..... | = | 0.02000 |
| Flow Length (L)..... | = | 1724.00 (ft) |
| Time of Concentration..... | = | 52.77 (min) |

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|-----------|
| Distribution Type..... | = | SYNTHETIC |
| Total Precipitation..... | = | 0.62 (in) |
| Return Period..... | = | 5 (yr) |
| Storm Duration..... | = | 0.88 (hr) |

HYDROGRAPH REPORT

RECORD NUMBER : 18
 TYPE : MOD. RATIONAL
 DESCRIPTION : STOTM DRAIN AT KIMBERLY AND SHADOW BROOK CT

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 9 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 1 | 9 | 0.11 | 0.11 | 0.67 | 0.67 |
| 2 | 18 | 0.11 | 0.21 | 0.67 | 1.33 |
| 3 | 27 | 0.11 | 0.32 | 0.67 | 2.00 |
| 4 | 36 | 0.11 | 0.42 | 0.67 | 2.66 |
| 5 | 45 | 0.11 | 0.53 | 0.67 | 3.33 |
| 6 | 54 | 0.09 | 0.62 | 0.48 | 3.81 |
| 7 | 63 | 0.00 | 0.62 | -0.67 | 3.14 |
| 8 | 72 | 0.00 | 0.62 | -0.67 | 2.48 |
| 9 | 81 | 0.00 | 0.62 | -0.67 | 1.81 |
| 10 | 90 | 0.00 | 0.62 | -0.67 | 1.15 |
| 11 | 99 | 0.00 | 0.62 | -0.67 | 0.48 |

2/15/94

Page 1

HYDROGRAPH REPORT

RECORD NUMBER : 18
 TYPE : MOD. RATIONAL
 DESCRIPTION : STOTM DRAIN AT KIMBERLY AND SHADOW BROOK CT

[HYDROGRAPH INFORMATION]

| | | |
|----------------------------|---|--------------|
| Peak Discharge..... | = | 7.51 (cfs) |
| Volume..... | = | 0.55 (acft) |
| Time Interval..... | = | 9 (min) |
| Time to Peak..... | = | 52.77 (min) |
| Time of Base..... | = | 105.54 (min) |
| Multiplication factor..... | = | 1.00 |

[RATIONAL HYDROGRAPH INFORMATION]

| | | |
|---------------------------|---|---------|
| Runoff Coeficient..... | = | 0.40000 |
| Receding limb factor..... | = | 1.00000 |

[RESERVOIR STORAGE]

| | | |
|----------------------|---|----------------|
| Maximum Outflow..... | = | 0.00000 (cfs) |
| Maximum Storage..... | = | 0.00000 (acft) |

[BASIN DESCRIPTION]

| | | |
|-------------------------|---|------------|
| Watershed Area..... | = | 13.80 (ac) |
| Curve Number..... | = | 73 |
| Runoff coefficient..... | = | 0.40 |

[TIME CONCENTRATION -- SCS LAG]

| | | |
|----------------------------|---|--------------|
| Channel Slope (S)..... | = | 0.02000 |
| Flow Length (L)..... | = | 1724.00 (ft) |
| Time of Concentration..... | = | 52.77 (min) |

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|-----------|
| Distribution Type..... | = | SYNTHETIC |
| Total Precipitation..... | = | 1.20 (in) |
| Return Period..... | = | 100 (yr) |
| Storm Duration..... | = | 0.88 (hr) |

HYDROGRAPH REPORT

RECORD NUMBER : 18
 TYPE : MOD. RATIONAL
 DESCRIPTION : STOTM DRAIN AT KIMBERLY AND SHADOW BROOK CT

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 9 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 1 | 9 | 0.20 | 0.20 | 1.28 | 1.28 |
| 2 | 18 | 0.20 | 0.41 | 1.28 | 2.56 |
| 3 | 27 | 0.20 | 0.61 | 1.28 | 3.84 |
| 4 | 36 | 0.20 | 0.82 | 1.28 | 5.12 |
| 5 | 45 | 0.20 | 1.02 | 1.28 | 6.41 |
| 6 | 54 | 0.18 | 1.20 | 0.93 | 7.34 |
| 7 | 63 | 0.00 | 1.20 | -1.28 | 6.06 |
| 8 | 72 | 0.00 | 1.20 | -1.28 | 4.77 |
| 9 | 81 | 0.00 | 1.20 | -1.28 | 3.49 |
| 10 | 90 | 0.00 | 1.20 | -1.28 | 2.21 |
| 11 | 99 | 0.00 | 1.20 | -1.28 | 0.93 |

INLET GRATE CAPACITY
AT KIMBERLY & SHADOW BROOK CT.

$$S_L = 3.12\% \quad S_T = 8\%$$

$$D = 2.4'' = .2' \quad K = 37$$

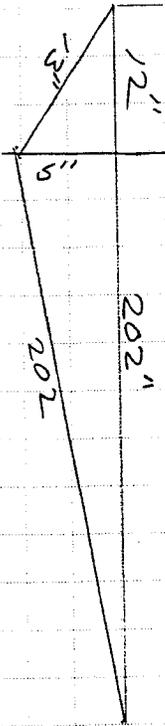
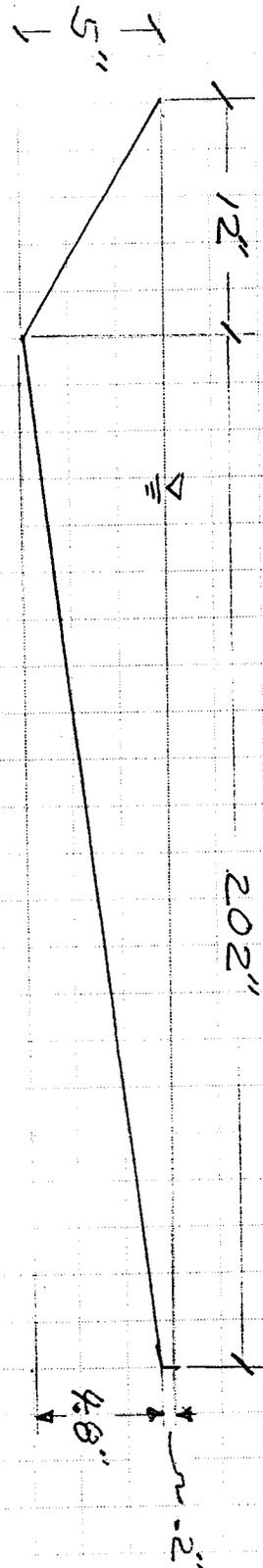
$$Q_{SY/TL} = 3.89 \text{ cfs}$$

INLET GRATE CAPACITY:
NEENAH R-3246-A

$$Q = K D^{5/8} = (37)(.2)^{5/8} = 2.3 \text{ cfs}$$

$$Q_{\text{BYPASS}} = 3.89 - 2.3 = .59 \text{ cfs}$$

TYPE II CURB & GUTTER FULL STREET



$$A = \frac{5 \times 202}{2} + \frac{5 \times 12}{2} = 536 \text{ in}^2 = 3.7 \text{ FT}^2$$

$$P = 13 + 202 = 225 \text{ in} = 18.75 \text{ FT}$$

$$R = A/P = 3.7 / 18.75 = .19$$

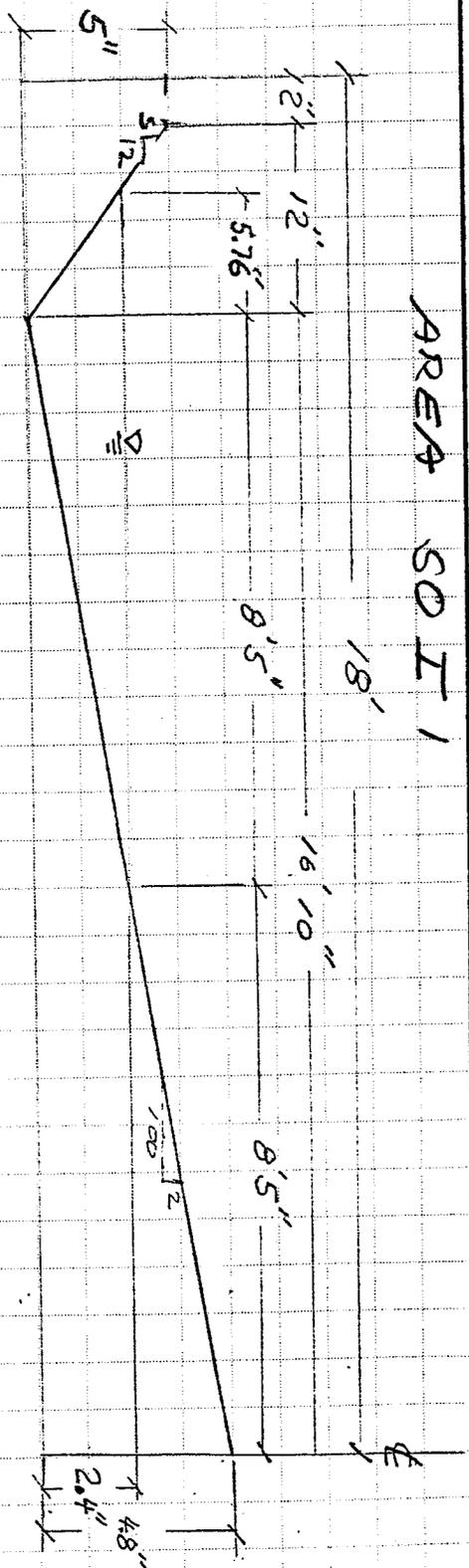
$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$5 = \frac{.0313}{n} \times 536 \times (.19)^{2/3} \times (.013)^{1/2}$$

$$= 25.64 = 25$$

THE L CONFORMATION

AREA SO I I



1 LAUE OPEN
 KIMBERLY & SHADOW BROOK
 5YR TC = DURATION

$$A = \frac{6.24 \times 101}{2} + \frac{5.76 \times 2.4}{2} = 128.11 \text{ m}^2 = .89 \text{ FT}^2$$

$$P = 6.24 + 101 = 107.24 \text{ FT}$$

$$R = A/P = .89 / 107.24 = .0099$$

$$n = .013 \quad S = .01$$

$$Q = \frac{1.4866}{.013} (.89)^{.48} (.0099)^{.78} (.013)^{1.48} = 3.92 \text{ CFS}$$

KIMBERLY & SHADOW BROOK CT.

| SLOPE | LENGTH | L x S |
|-------|------------|-------------|
| .004 | 407 | 1.628 |
| .03 | 505 | 15.15 |
| .02 | 612 | 12.24 |
| .313 | <u>200</u> | <u>6.26</u> |
| | Σ 1724 | 35.28 |

$$WT \text{ SLOPE} = \frac{35.28}{1724} = .020$$

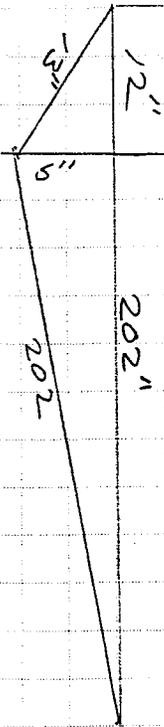
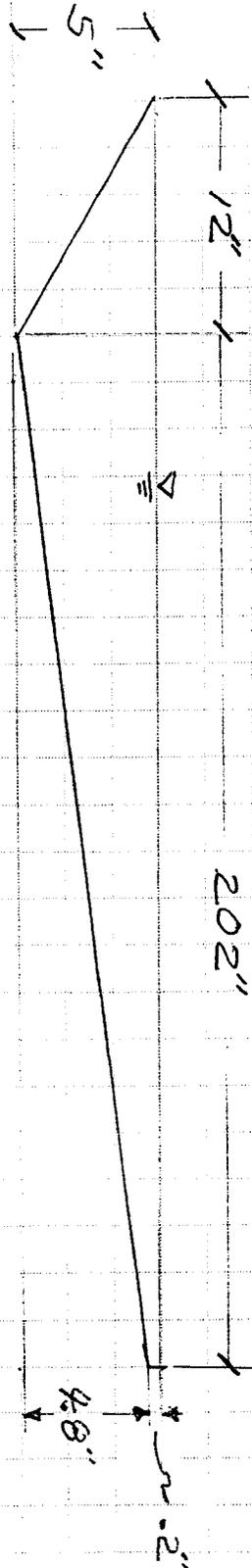
$$AREA = 13.8 \text{ acres}$$

$$Q_{max}^{5yr} = 3.89 \text{ cfs} \quad Q_{max}^{100yr} = 7.51$$

$$Q_{max}^{5yr} \text{ SECTION} = 3.92 \text{ cfs}$$

$$Q_{max}^{100yr} \text{ SECTION} = 25.64 \text{ cfs}$$

TYPE II CURB & GUTTER (FULL STREET) 706



$$A = \frac{5 \times 202}{2} + \frac{5 \times 12}{2} = 536 \text{ in}^2 = 3.7 \text{ ft}^2$$

$$P = 13 + 202 = 225 \text{ in} = 18.75 \text{ ft}$$

$$R = A/P = 3.7 / 18.75 = .19$$

$$Q = \frac{1.486}{n} A R^{.485} S^{.142} \quad S = .004 \quad n = .013$$

$$= \underline{\underline{9.16}}$$

INLET GRATE CAPACITY EAST SIDE
KIMBERLY & GOLD MEADOW CT

$$SL = .004 \quad S_e = 8\%$$

$$D = .2' \quad K = 12$$

INLET GRATE CAPACITY

$$Q = KD^{5/3} = (12)(.2)^{5/3} = .82$$

$$Q = Q_{max} - Q_{inlet} = 1.17 - .82 = .35 \text{ cfs OK}$$

(EAST SIDE)
 KIMBERLY & GOLD MEADOW CT

| SLOPE | LP | S x L |
|-------|------------|------------|
| .0313 | 47 | 1.47 |
| .004 | 313 | 1.25 |
| .015 | <u>180</u> | <u>2.7</u> |
| | Σ 540 | Σ 5.42 |

WT SLOPE = $\frac{5.42}{540} = .01$

AREA = 1.3 ACRES

$n = .013$ $s = .01$ $LP = 540$ $Q_{BYPASS} = .59 cfs$

$Q_{max}^{5yr} = .48 cfs$ $Q_{max}^{100yr} = .93 cfs$

$Q_{max}^{5yr} SECTION = 1.40 cfs$

$Q_{max}^{100yr} SECTION = 9.16$
 □

HYDRAULICS AND HYDROLOGY

| Drain Entrance Location | Kimberly and Shadow Brook Court | Kimberly and Gold Meadow Court | Kimberly and Gold Meadow Court |
|---------------------------------|---------------------------------|--------------------------------|--------------------------------|
| | | East | West |
| Area | 13.8 acres | 1.3 | 4.32 |
| Wt. Slope | .020 FT/FT | .010 | .021 |
| Length of Path | 1724 FT | 540 | 1444 |
| CN | 73 | 73 | 73 |
| C | .4 | .4 | .4 |
| Q max (5 year, tc=duration) | 3.89 cfs | .48 | 1.32 |
| Q max (100 year, tc=duration) | 7.51 cfs | .93 | 2.56 |
| Q max street section (5 year) | 3.92 cfs | 1.40 | 1.40 |
| Q max street section (100 year) | 25.64 cfs | 9.16 | 9.16 |
| Q inlet | 2.3 cfs | .82 | .82 |
| Q bypass | .59 cfs | 0 | .50 |
| Q carryover | 0 cfs | .35 | 0 |
| | | | |

(WEST SIDE)
INLET GRATE CAPACITY
KIMBERLY & GOLD MEADOW CT

$$S_L = .004 \quad S_E = 8\%$$

$$D = .2' \quad K = 12$$

INLET GRATE CAPACITY

$$Q = KD^{5/3} = (12)(.2)^{5/3} = .82 \text{ cfs}$$

$$Q = Q_{\max} - Q_{\text{inlet}} = 1.32 - .82 = .50 \text{ cfs OK}$$

HYDROGRAPH REPORT

RECORD NUMBER : 24
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 3.01 (cfs)
 Volume..... = 3.36 (acft)
 Time Interval..... = 19 (min)
 Time to Peak..... = 1140.00 (min)
 Time of Base..... = 1748.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 18
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 97.37 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 19 (min)
 Time to Peak..... = 76.42 (min)
 Time of Base..... = 382.12 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 68.78 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 164.00 (ac)
 Curve Number..... = 68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01900
 Flow Length (L)..... = 4830.00 (ft)
 Time of Concentration..... = 114.64 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 18
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 PRE DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 19 | 14.00 |
| 38 | 45.33 |
| 57 | 84.75 |
| 76 | 97.32 |
| 95 | 87.62 |
| 114 | 67.02 |
| 133 | 42.04 |
| 152 | 27.80 |
| 171 | 19.06 |
| 190 | 12.64 |
| 209 | 8.45 |
| 228 | 5.53 |
| 247 | 3.72 |
| 266 | 2.51 |
| 285 | 1.67 |
| 304 | 1.11 |
| 323 | 0.81 |
| 342 | 0.52 |
| 361 | 0.27 |
| 380 | 0.03 |

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 513 | 0.05 |
| 532 | 0.18 |
| 551 | 0.41 |
| 570 | 0.72 |
| 589 | 1.04 |
| 608 | 1.32 |
| 627 | 1.56 |
| 646 | 1.75 |
| 665 | 1.92 |
| 684 | 2.06 |
| 703 | 2.17 |
| 722 | 2.27 |
| 741 | 2.34 |
| 760 | 2.39 |
| 779 | 2.43 |
| 798 | 2.47 |
| 817 | 2.51 |
| 836 | 2.56 |
| 855 | 2.62 |
| 874 | 2.66 |
| 893 | 2.71 |
| 912 | 2.75 |

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 931 | 2.79 |
| 950 | 2.83 |
| 969 | 2.87 |
| 988 | 2.90 |
| 1007 | 2.92 |
| 1026 | 2.95 |
| 1045 | 2.97 |
| 1064 | 2.98 |
| 1083 | 3.00 |
| 1102 | 3.00 |
| 1121 | 3.01 |
| 1140 | 3.01 |
| 1159 | 3.01 |
| 1178 | 3.01 |
| 1197 | 3.00 |
| 1216 | 2.99 |
| 1235 | 2.98 |
| 1254 | 2.96 |
| 1273 | 2.95 |
| 1292 | 2.93 |
| 1311 | 2.90 |
| 1330 | 2.88 |

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1349 | 2.85 |
| 1368 | 2.82 |
| 1387 | 2.79 |
| 1406 | 2.76 |
| 1425 | 2.65 |
| 1444 | 2.40 |
| 1463 | 1.95 |
| 1482 | 1.44 |
| 1501 | 0.99 |
| 1520 | 0.65 |
| 1539 | 0.43 |
| 1558 | 0.29 |
| 1577 | 0.19 |
| 1596 | 0.13 |
| 1615 | 0.08 |
| 1634 | 0.05 |
| 1653 | 0.04 |
| 1672 | 0.02 |
| 1691 | 0.01 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 25
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 3.95 (cfs)
 Volume..... = 4.95 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 1035.00 (min)
 Time of Base..... = 1710.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 19
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 117.11 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 63.43 (min)
 Time of Base..... = 317.13 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 57.08 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|--------------------------|--------|-----|
| HOUSING | 92.00 | 75 |
| GOLF COURSE & OPEN SPACE | 50.20 | 61 |
| CONDOS | 21.50 | 85 |
| Overall Approximation | 163.70 | 72 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01900
 Flow Length (L)..... = 4380.00 (ft)
 Time of Concentration..... = 95.14 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 19
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 POST DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 15 | 15.56 |
| 30 | 49.98 |
| 45 | 97.25 |
| 60 | 116.48 |
| 75 | 110.14 |
| 90 | 89.13 |
| 105 | 59.09 |
| 120 | 39.21 |
| 135 | 27.30 |
| 150 | 18.45 |
| 165 | 12.51 |
| 180 | 8.53 |
| 195 | 5.79 |
| 210 | 3.97 |
| 225 | 2.71 |
| 240 | 1.81 |
| 255 | 1.26 |
| 270 | 0.93 |
| 285 | 0.59 |
| 300 | 0.32 |
| 315 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 480 | 0.08 |
| 495 | 0.36 |
| 510 | 0.89 |
| 525 | 1.56 |
| 540 | 2.22 |
| 555 | 2.77 |
| 570 | 3.14 |
| 585 | 3.35 |
| 600 | 3.48 |
| 615 | 3.56 |
| 630 | 3.61 |
| 645 | 3.65 |
| 660 | 3.69 |
| 675 | 3.73 |
| 690 | 3.75 |
| 705 | 3.77 |
| 720 | 3.78 |
| 735 | 3.78 |
| 750 | 3.77 |
| 765 | 3.75 |
| 780 | 3.73 |
| 795 | 3.71 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 810 | 3.71 |
| 825 | 3.73 |
| 840 | 3.75 |
| 855 | 3.78 |
| 870 | 3.80 |
| 885 | 3.82 |
| 900 | 3.84 |
| 915 | 3.86 |
| 930 | 3.88 |
| 945 | 3.90 |
| 960 | 3.92 |
| 975 | 3.93 |
| 990 | 3.94 |
| 1005 | 3.94 |
| 1020 | 3.95 |
| 1035 | 3.95 |
| 1050 | 3.95 |
| 1065 | 3.95 |
| 1080 | 3.94 |
| 1095 | 3.94 |
| 1110 | 3.93 |
| 1125 | 3.92 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1140 | 3.91 |
| 1155 | 3.89 |
| 1170 | 3.87 |
| 1185 | 3.86 |
| 1200 | 3.84 |
| 1215 | 3.81 |
| 1230 | 3.79 |
| 1245 | 3.76 |
| 1260 | 3.74 |
| 1275 | 3.71 |
| 1290 | 3.68 |
| 1305 | 3.65 |
| 1320 | 3.62 |
| 1335 | 3.58 |
| 1350 | 3.55 |
| 1365 | 3.51 |
| 1380 | 3.47 |
| 1395 | 3.43 |
| 1410 | 3.39 |
| 1425 | 3.35 |
| 1440 | 3.24 |
| 1455 | 2.96 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1470 | 2.46 |
| 1485 | 1.88 |
| 1500 | 1.33 |
| 1515 | 0.90 |
| 1530 | 0.61 |
| 1545 | 0.41 |
| 1560 | 0.28 |
| 1575 | 0.19 |
| 1590 | 0.13 |
| 1605 | 0.09 |
| 1620 | 0.06 |
| 1635 | 0.04 |
| 1650 | 0.02 |
| 1665 | 0.02 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 24
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

| | | |
|----------------------------|---|---------------|
| Peak Discharge..... | = | 7.69 (cfs) |
| Volume..... | = | 9.05 (acft) |
| Time Interval..... | = | 19 (min) |
| Time to Peak..... | = | 608.00 (min) |
| Time of Base..... | = | 1748.00 (min) |
| Multiplication factor..... | = | 1.00 |

[UNIT HYDROGRAPH INFORMATION]

| | | |
|---------------------------|---|----------------|
| Unit hydrograph #..... | = | 18 |
| Unit hydrograph type..... | = | CURVILINEAR UH |
| Peak Discharge..... | = | 97.37 (cfs) |
| Shape Factor..... | = | 484.00 |
| Time Interval..... | = | 19 (min) |
| Time to Peak..... | = | 76.42 (min) |
| Time of Base..... | = | 382.12 (min) |
| Rainfall Excess..... | = | 1.00 (in) |
| Basin Lag Time..... | = | 68.78 (min) |

[BASIN DESCRIPTION]

| | | |
|---------------------|---|-------------|
| Watershed Area..... | = | 164.00 (ac) |
| Curve Number..... | = | 68 |

[TIME CONCENTRATION -- SCS LAG]

| | | |
|----------------------------|---|--------------|
| Channel Slope (S)..... | = | 0.01900 |
| Flow Length (L)..... | = | 4830.00 (ft) |
| Time of Concentration..... | = | 114.64 (min) |

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|------------|
| Distribution Type..... | = | SCS IA |
| Total Precipitation..... | = | 3.10 (in) |
| Return Period..... | = | 25 (yr) |
| Storm Duration..... | = | 24.00 (hr) |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 18
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 PRE DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 19 | 14.00 |
| 38 | 45.33 |
| 57 | 84.75 |
| 76 | 97.32 |
| 95 | 87.62 |
| 114 | 67.02 |
| 133 | 42.04 |
| 152 | 27.80 |
| 171 | 19.06 |
| 190 | 12.64 |
| 209 | 8.45 |
| 228 | 5.53 |
| 247 | 3.72 |
| 266 | 2.51 |
| 285 | 1.67 |
| 304 | 1.11 |
| 323 | 0.81 |
| 342 | 0.52 |
| 361 | 0.27 |
| 380 | 0.03 |

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 456 | 0.02 |
| 475 | 0.33 |
| 494 | 1.29 |
| 513 | 2.99 |
| 532 | 4.88 |
| 551 | 6.38 |
| 570 | 7.31 |
| 589 | 7.66 |
| 608 | 7.69 |
| 627 | 7.65 |
| 646 | 7.57 |
| 665 | 7.48 |
| 684 | 7.41 |
| 703 | 7.34 |
| 722 | 7.27 |
| 741 | 7.19 |
| 760 | 7.08 |
| 779 | 6.97 |
| 798 | 6.88 |
| 817 | 6.83 |
| 836 | 6.83 |
| 855 | 6.83 |

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 874 | 6.83 |
| 893 | 6.84 |
| 912 | 6.85 |
| 931 | 6.86 |
| 950 | 6.87 |
| 969 | 6.88 |
| 988 | 6.88 |
| 1007 | 6.87 |
| 1026 | 6.87 |
| 1045 | 6.85 |
| 1064 | 6.83 |
| 1083 | 6.81 |
| 1102 | 6.78 |
| 1121 | 6.74 |
| 1140 | 6.70 |
| 1159 | 6.66 |
| 1178 | 6.61 |
| 1197 | 6.56 |
| 1216 | 6.50 |
| 1235 | 6.44 |
| 1254 | 6.37 |
| 1273 | 6.31 |

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1292 | 6.24 |
| 1311 | 6.16 |
| 1330 | 6.08 |
| 1349 | 6.00 |
| 1368 | 5.92 |
| 1387 | 5.83 |
| 1406 | 5.74 |
| 1425 | 5.51 |
| 1444 | 4.96 |
| 1463 | 4.03 |
| 1482 | 2.98 |
| 1501 | 2.05 |
| 1520 | 1.34 |
| 1539 | 0.89 |
| 1558 | 0.60 |
| 1577 | 0.39 |
| 1596 | 0.26 |
| 1615 | 0.17 |
| 1634 | 0.11 |
| 1653 | 0.07 |
| 1672 | 0.05 |
| 1691 | 0.03 |

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1710 | 0.02 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 25
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 13.71 (cfs)
 Volume..... = 12.33 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 555.00 (min)
 Time of Base..... = 1710.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 19
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 117.11 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 63.43 (min)
 Time of Base..... = 317.13 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 57.08 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|--------------------------|--------|-----|
| HOUSING | 92.00 | 75 |
| GOLF COURSE & OPEN SPACE | 50.20 | 61 |
| CONDOS | 21.50 | 85 |
| Overall Approximation | 163.70 | 72 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01900
 Flow Length (L)..... = 4380.00 (ft)
 Time of Concentration..... = 95.14 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.17 (in)
 Return Period..... = 25 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 19
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 POST DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 15 | 15.56 |
| 30 | 49.98 |
| 45 | 97.25 |
| 60 | 116.48 |
| 75 | 110.14 |
| 90 | 89.13 |
| 105 | 59.09 |
| 120 | 39.21 |
| 135 | 27.30 |
| 150 | 18.45 |
| 165 | 12.51 |
| 180 | 8.53 |
| 195 | 5.79 |
| 210 | 3.97 |
| 225 | 2.71 |
| 240 | 1.81 |
| 255 | 1.26 |
| 270 | 0.93 |
| 285 | 0.59 |
| 300 | 0.32 |
| 315 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 420 | 0.02 |
| 435 | 0.12 |
| 450 | 0.37 |
| 465 | 1.12 |
| 480 | 2.88 |
| 495 | 5.81 |
| 510 | 9.17 |
| 525 | 11.78 |
| 540 | 13.26 |
| 555 | 13.71 |
| 570 | 13.42 |
| 585 | 12.89 |
| 600 | 12.33 |
| 615 | 11.77 |
| 630 | 11.30 |
| 645 | 10.93 |
| 660 | 10.63 |
| 675 | 10.39 |
| 690 | 10.17 |
| 705 | 9.98 |
| 720 | 9.80 |
| 735 | 9.63 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 750 | 9.45 |
| 765 | 9.27 |
| 780 | 9.10 |
| 795 | 8.94 |
| 810 | 8.84 |
| 825 | 8.81 |
| 840 | 8.79 |
| 855 | 8.78 |
| 870 | 8.75 |
| 885 | 8.73 |
| 900 | 8.71 |
| 915 | 8.71 |
| 930 | 8.70 |
| 945 | 8.68 |
| 960 | 8.66 |
| 975 | 8.64 |
| 990 | 8.62 |
| 1005 | 8.59 |
| 1020 | 8.56 |
| 1035 | 8.52 |
| 1050 | 8.48 |
| 1065 | 8.44 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1080 | 8.39 |
| 1095 | 8.34 |
| 1110 | 8.29 |
| 1125 | 8.24 |
| 1140 | 8.18 |
| 1155 | 8.12 |
| 1170 | 8.06 |
| 1185 | 7.99 |
| 1200 | 7.93 |
| 1215 | 7.86 |
| 1230 | 7.78 |
| 1245 | 7.71 |
| 1260 | 7.63 |
| 1275 | 7.55 |
| 1290 | 7.47 |
| 1305 | 7.39 |
| 1320 | 7.31 |
| 1335 | 7.22 |
| 1350 | 7.13 |
| 1365 | 7.04 |
| 1380 | 6.95 |
| 1395 | 6.86 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1410 | 6.77 |
| 1425 | 6.67 |
| 1440 | 6.43 |
| 1455 | 5.87 |
| 1470 | 4.88 |
| 1485 | 3.72 |
| 1500 | 2.64 |
| 1515 | 1.78 |
| 1530 | 1.20 |
| 1545 | 0.82 |
| 1560 | 0.55 |
| 1575 | 0.37 |
| 1590 | 0.25 |
| 1605 | 0.17 |
| 1620 | 0.11 |
| 1635 | 0.07 |
| 1650 | 0.05 |
| 1665 | 0.03 |
| 1680 | 0.02 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 25
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 28.83 (cfs)
 Volume..... = 21.42 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 540.00 (min)
 Time of Base..... = 1710.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 19
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 117.11 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 63.43 (min)
 Time of Base..... = 317.13 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 57.08 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|--------------------------|--------|-----|
| HOUSING | 92.00 | 75 |
| GOLF COURSE & OPEN SPACE | 50.20 | 61 |
| CONDOS | 21.50 | 85 |
| Overall Approximation | 163.70 | 72 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01900
 Flow Length (L)..... = 4380.00 (ft)
 Time of Concentration..... = 95.14 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 4.17 (in)
 Return Period..... = 100 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 19
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 POST DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 15 | 15.56 |
| 30 | 49.98 |
| 45 | 97.25 |
| 60 | 116.48 |
| 75 | 110.14 |
| 90 | 89.13 |
| 105 | 59.09 |
| 120 | 39.21 |
| 135 | 27.30 |
| 150 | 18.45 |
| 165 | 12.51 |
| 180 | 8.53 |
| 195 | 5.79 |
| 210 | 3.97 |
| 225 | 2.71 |
| 240 | 1.81 |
| 255 | 1.26 |
| 270 | 0.93 |
| 285 | 0.59 |
| 300 | 0.32 |
| 315 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 360 | 0.03 |
| 375 | 0.15 |
| 390 | 0.43 |
| 405 | 0.92 |
| 420 | 1.63 |
| 435 | 2.55 |
| 450 | 3.74 |
| 465 | 5.88 |
| 480 | 9.97 |
| 495 | 16.16 |
| 510 | 22.61 |
| 525 | 26.99 |
| 540 | 28.83 |
| 555 | 28.52 |
| 570 | 26.95 |
| 585 | 25.17 |
| 600 | 23.49 |
| 615 | 21.98 |
| 630 | 20.73 |
| 645 | 19.74 |
| 660 | 18.95 |
| 675 | 18.30 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 690 | 17.75 |
| 705 | 17.26 |
| 720 | 16.83 |
| 735 | 16.42 |
| 750 | 16.01 |
| 765 | 15.62 |
| 780 | 15.26 |
| 795 | 14.92 |
| 810 | 14.70 |
| 825 | 14.58 |
| 840 | 14.49 |
| 855 | 14.42 |
| 870 | 14.34 |
| 885 | 14.26 |
| 900 | 14.19 |
| 915 | 14.13 |
| 930 | 14.08 |
| 945 | 14.02 |
| 960 | 13.95 |
| 975 | 13.88 |
| 990 | 13.81 |
| 1005 | 13.73 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1020 | 13.65 |
| 1035 | 13.56 |
| 1050 | 13.47 |
| 1065 | 13.38 |
| 1080 | 13.28 |
| 1095 | 13.18 |
| 1110 | 13.07 |
| 1125 | 12.96 |
| 1140 | 12.85 |
| 1155 | 12.73 |
| 1170 | 12.62 |
| 1185 | 12.49 |
| 1200 | 12.37 |
| 1215 | 12.24 |
| 1230 | 12.11 |
| 1245 | 11.98 |
| 1260 | 11.85 |
| 1275 | 11.71 |
| 1290 | 11.57 |
| 1305 | 11.43 |
| 1320 | 11.29 |
| 1335 | 11.14 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1350 | 10.99 |
| 1365 | 10.84 |
| 1380 | 10.69 |
| 1395 | 10.54 |
| 1410 | 10.38 |
| 1425 | 10.22 |
| 1440 | 9.85 |
| 1455 | 8.98 |
| 1470 | 7.46 |
| 1485 | 5.69 |
| 1500 | 4.04 |
| 1515 | 2.72 |
| 1530 | 1.84 |
| 1545 | 1.25 |
| 1560 | 0.85 |
| 1575 | 0.57 |
| 1590 | 0.38 |
| 1605 | 0.26 |
| 1620 | 0.17 |
| 1635 | 0.11 |
| 1650 | 0.07 |
| 1665 | 0.05 |

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 1680 | 0.03 |
| 1695 | 0.01 |

3/4/94

Page 1

HYDROGRAPH REPORT

RECORD NUMBER : 26
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

| | | |
|----------------------------|---|---------------|
| Peak Discharge..... | = | 1.63 (cfs) |
| Volume..... | = | 1.83 (acft) |
| Time Interval..... | = | 13 (min) |
| Time to Peak..... | = | 1118.00 (min) |
| Time of Base..... | = | 1638.00 (min) |
| Multiplication factor..... | = | 1.00 |

[UNIT HYDROGRAPH INFORMATION]

| | | |
|---------------------------|---|----------------|
| Unit hydrograph #..... | = | 20 |
| Unit hydrograph type..... | = | CURVILINEAR UH |
| Peak Discharge..... | = | 75.10 (cfs) |
| Shape Factor..... | = | 484.00 |
| Time Interval..... | = | 13 (min) |
| Time to Peak..... | = | 53.47 (min) |
| Time of Base..... | = | 267.37 (min) |
| Rainfall Excess..... | = | 1.00 (in) |
| Basin Lag Time..... | = | 48.13 (min) |

[BASIN DESCRIPTION]

| | | |
|---------------------|---|------------|
| Watershed Area..... | = | 88.50 (ac) |
| Curve Number..... | = | 68 |

[TIME CONCENTRATION -- SCS LAG]

| | | |
|----------------------------|---|--------------|
| Channel Slope (S)..... | = | 0.02700 |
| Flow Length (L)..... | = | 3850.00 (ft) |
| Time of Concentration..... | = | 80.21 (min) |

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|------------|
| Distribution Type..... | = | SCS IA |
| Total Precipitation..... | = | 2.17 (in) |
| Return Period..... | = | 5 (yr) |
| Storm Duration..... | = | 24.00 (hr) |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 20
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 13 | 10.42 |
| 26 | 33.64 |
| 39 | 64.00 |
| 52 | 74.89 |
| 65 | 69.02 |
| 78 | 54.17 |
| 91 | 34.45 |
| 104 | 23.10 |
| 117 | 15.87 |
| 130 | 10.57 |
| 143 | 7.20 |
| 156 | 4.81 |
| 169 | 3.23 |
| 182 | 2.17 |
| 195 | 1.47 |
| 208 | 0.99 |
| 221 | 0.71 |
| 234 | 0.49 |
| 247 | 0.29 |
| 260 | 0.10 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 507 | 0.03 |
| 520 | 0.09 |
| 533 | 0.20 |
| 546 | 0.35 |
| 559 | 0.51 |
| 572 | 0.65 |
| 585 | 0.76 |
| 598 | 0.85 |
| 611 | 0.93 |
| 624 | 1.00 |
| 637 | 1.06 |
| 650 | 1.11 |
| 663 | 1.16 |
| 676 | 1.20 |
| 689 | 1.23 |
| 702 | 1.26 |
| 715 | 1.29 |
| 728 | 1.31 |
| 741 | 1.32 |
| 754 | 1.33 |
| 767 | 1.33 |
| 780 | 1.34 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 793 | 1.35 |
| 806 | 1.37 |
| 819 | 1.40 |
| 832 | 1.42 |
| 845 | 1.44 |
| 858 | 1.45 |
| 871 | 1.47 |
| 884 | 1.48 |
| 897 | 1.50 |
| 910 | 1.51 |
| 923 | 1.53 |
| 936 | 1.54 |
| 949 | 1.55 |
| 962 | 1.57 |
| 975 | 1.58 |
| 988 | 1.58 |
| 1001 | 1.59 |
| 1014 | 1.60 |
| 1027 | 1.61 |
| 1040 | 1.61 |
| 1053 | 1.62 |
| 1066 | 1.62 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1079 | 1.62 |
| 1092 | 1.63 |
| 1105 | 1.63 |
| 1118 | 1.63 |
| 1131 | 1.63 |
| 1144 | 1.63 |
| 1157 | 1.62 |
| 1170 | 1.62 |
| 1183 | 1.62 |
| 1196 | 1.61 |
| 1209 | 1.61 |
| 1222 | 1.60 |
| 1235 | 1.60 |
| 1248 | 1.59 |
| 1261 | 1.58 |
| 1274 | 1.57 |
| 1287 | 1.57 |
| 1300 | 1.56 |
| 1313 | 1.55 |
| 1326 | 1.54 |
| 1339 | 1.53 |
| 1352 | 1.51 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1417 | 5.21 |
| 1430 | 5.03 |
| 1443 | 4.56 |
| 1456 | 3.73 |
| 1469 | 2.78 |
| 1482 | 1.93 |
| 1495 | 1.27 |
| 1508 | 0.85 |
| 1521 | 0.57 |
| 1534 | 0.38 |
| 1547 | 0.25 |
| 1560 | 0.17 |
| 1573 | 0.11 |
| 1586 | 0.07 |
| 1599 | 0.05 |
| 1612 | 0.03 |
| 1625 | 0.02 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 28
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 13.29 (cfs)
 Volume..... = 14.78 (acft)
 Time Interval..... = 14 (min)
 Time to Peak..... = 574.00 (min)
 Time of Base..... = 1680.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 22
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 204.55 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 14 (min)
 Time to Peak..... = 59.01 (min)
 Time of Base..... = 295.04 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 53.11 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 266.00 (ac)
 Curve Number..... = 68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.05000
 Flow Length (L)..... = 6400.00 (ft)
 Time of Concentration..... = 88.51 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 22
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 14 | 27.31 |
| 28 | 87.80 |
| 42 | 170.38 |
| 56 | 203.50 |
| 70 | 191.91 |
| 84 | 154.73 |
| 98 | 102.11 |
| 112 | 67.74 |
| 126 | 47.17 |
| 140 | 31.75 |
| 154 | 21.58 |
| 168 | 14.69 |
| 182 | 9.96 |
| 196 | 6.81 |
| 210 | 4.63 |
| 224 | 3.09 |
| 238 | 2.17 |
| 252 | 1.59 |
| 266 | 1.01 |
| 280 | 0.52 |
| 294 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 28
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 14 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 462 | 0.14 |
| 476 | 0.90 |
| 490 | 2.79 |
| 504 | 5.72 |
| 518 | 8.76 |
| 532 | 11.14 |
| 546 | 12.60 |
| 560 | 13.21 |
| 574 | 13.29 |
| 588 | 13.15 |
| 602 | 12.91 |
| 616 | 12.67 |
| 630 | 12.47 |
| 644 | 12.29 |
| 658 | 12.15 |
| 672 | 12.04 |
| 686 | 11.94 |
| 700 | 11.85 |
| 714 | 11.77 |
| 728 | 11.67 |
| 742 | 11.52 |
| 756 | 11.36 |

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

Table with 2 columns: TIME (min) and OUTFLOW (cfs). Data points range from 770 to 1064 minutes.

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1078 | 11.02 |
| 1092 | 10.98 |
| 1106 | 10.94 |
| 1120 | 10.89 |
| 1134 | 10.84 |
| 1148 | 10.78 |
| 1162 | 10.72 |
| 1176 | 10.66 |
| 1190 | 10.59 |
| 1204 | 10.52 |
| 1218 | 10.44 |
| 1232 | 10.37 |
| 1246 | 10.29 |
| 1260 | 10.20 |
| 1274 | 10.12 |
| 1288 | 10.03 |
| 1302 | 9.94 |
| 1316 | 9.84 |
| 1330 | 9.74 |
| 1344 | 9.64 |
| 1358 | 9.54 |
| 1372 | 9.43 |

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1386 | 9.33 |
| 1400 | 9.22 |
| 1414 | 9.10 |
| 1428 | 8.79 |
| 1442 | 8.03 |
| 1456 | 6.67 |
| 1470 | 5.08 |
| 1484 | 3.60 |
| 1498 | 2.42 |
| 1512 | 1.63 |
| 1526 | 1.11 |
| 1540 | 0.75 |
| 1554 | 0.51 |
| 1568 | 0.34 |
| 1582 | 0.23 |
| 1596 | 0.15 |
| 1610 | 0.10 |
| 1624 | 0.06 |
| 1638 | 0.04 |
| 1652 | 0.02 |
| 1666 | 0.01 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

| | | |
|----------------------------|---|---------------|
| Peak Discharge..... | = | 21.12 (cfs) |
| Volume..... | = | 18.24 (acft) |
| Time Interval..... | = | 13 (min) |
| Time to Peak..... | = | 546.00 (min) |
| Time of Base..... | = | 1664.00 (min) |
| Multiplication factor..... | = | 1.00 |

[UNIT HYDROGRAPH INFORMATION]

| | | |
|---------------------------|---|----------------|
| Unit hydrograph #..... | = | 23 |
| Unit hydrograph type..... | = | CURVILINEAR UH |
| Peak Discharge..... | = | 219.26 (cfs) |
| Shape Factor..... | = | 484.00 |
| Time Interval..... | = | 13 (min) |
| Time to Peak..... | = | 52.96 (min) |
| Time of Base..... | = | 264.79 (min) |
| Rainfall Excess..... | = | 1.00 (in) |
| Basin Lag Time..... | = | 47.66 (min) |

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|--------|-----|
| GOLF COURSE AND OPEN SPACE | 60.60 | 61 |
| HOUSING | 65.00 | 75 |
| CONDOS | 19.40 | 85 |
| COMMERCIAL | 28.00 | 94 |
| UNDEVELOPED | 79.60 | 68 |
| MAINTENANCE | 3.30 | 70 |
| Overall Approximation | 255.90 | 72 |

[TIME CONCENTRATION -- SCS LAG]

| | | |
|----------------------------|---|--------------|
| Channel Slope (S)..... | = | 0.05000 |
| Flow Length (L)..... | = | 6400.00 (ft) |
| Time of Concentration..... | = | 79.44 (min) |

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|------------|
| Distribution Type..... | = | SCS IA |
| Total Precipitation..... | = | 3.10 (in) |
| Return Period..... | = | 100 (yr) |
| Storm Duration..... | = | 24.00 (hr) |

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 13 | 30.90 |
| 26 | 99.88 |
| 39 | 188.58 |
| 52 | 218.86 |
| 65 | 199.71 |
| 78 | 155.04 |
| 91 | 98.04 |
| 104 | 65.36 |
| 117 | 44.77 |
| 130 | 29.83 |
| 143 | 20.16 |
| 156 | 13.37 |
| 169 | 8.91 |
| 182 | 6.04 |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 23
 TYPE : CURVILINEAR UH
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 195 | 4.06 |
| 208 | 2.73 |
| 221 | 1.96 |
| 234 | 1.31 |
| 247 | 0.74 |
| 260 | 0.20 |

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 416 | 0.01 |
| 429 | 0.09 |
| 442 | 0.32 |
| 455 | 0.96 |
| 468 | 2.58 |
| 481 | 5.93 |
| 494 | 10.87 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 507 | 15.90 |
| 520 | 19.38 |
| 533 | 20.98 |
| 546 | 21.12 |
| 559 | 20.46 |
| 572 | 19.61 |
| 585 | 18.69 |
| 598 | 17.79 |
| 611 | 17.06 |
| 624 | 16.48 |
| 637 | 16.03 |
| 650 | 15.66 |
| 663 | 15.34 |
| 676 | 15.09 |
| 689 | 14.85 |
| 702 | 14.64 |
| 715 | 14.43 |
| 728 | 14.22 |
| 741 | 13.97 |
| 754 | 13.72 |
| 767 | 13.48 |
| 780 | 13.25 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 793 | 13.13 |
| 806 | 13.10 |
| 819 | 13.13 |
| 832 | 13.15 |
| 845 | 13.14 |
| 858 | 13.09 |
| 871 | 13.05 |
| 884 | 13.03 |
| 897 | 13.02 |
| 910 | 13.02 |
| 923 | 13.01 |
| 936 | 12.99 |
| 949 | 12.97 |
| 962 | 12.95 |
| 975 | 12.92 |
| 988 | 12.88 |
| 1001 | 12.85 |
| 1014 | 12.80 |
| 1027 | 12.76 |
| 1040 | 12.71 |
| 1053 | 12.65 |
| 1066 | 12.60 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1079 | 12.54 |
| 1092 | 12.47 |
| 1105 | 12.40 |
| 1118 | 12.33 |
| 1131 | 12.26 |
| 1144 | 12.18 |
| 1157 | 12.10 |
| 1170 | 12.02 |
| 1183 | 11.94 |
| 1196 | 11.85 |
| 1209 | 11.76 |
| 1222 | 11.66 |
| 1235 | 11.57 |
| 1248 | 11.47 |
| 1261 | 11.37 |
| 1274 | 11.26 |
| 1287 | 11.16 |
| 1300 | 11.05 |
| 1313 | 10.94 |
| 1326 | 10.83 |
| 1339 | 10.71 |
| 1352 | 10.60 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1365 | 10.48 |
| 1378 | 10.36 |
| 1391 | 10.24 |
| 1404 | 10.12 |
| 1417 | 9.99 |
| 1430 | 9.62 |
| 1443 | 8.72 |
| 1456 | 7.13 |
| 1469 | 5.32 |
| 1482 | 3.69 |
| 1495 | 2.42 |
| 1508 | 1.62 |
| 1521 | 1.09 |
| 1534 | 0.73 |
| 1547 | 0.48 |
| 1560 | 0.32 |
| 1573 | 0.21 |
| 1586 | 0.14 |
| 1599 | 0.09 |
| 1612 | 0.06 |
| 1625 | 0.03 |
| 1638 | 0.02 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 48.41 (cfs)
 Volume..... = 33.27 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 533.00 (min)
 Time of Base..... = 1664.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 23
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 219.26 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 13 (min)
 Time to Peak..... = 52.96 (min)
 Time of Base..... = 264.79 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 47.66 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|--------|-----|
| GOLF COURSE AND OPEN SPACE | 60.60 | 61 |
| HOUSING | 65.00 | 75 |
| CONDOS | 19.40 | 85 |
| COMMERCIAL | 28.00 | 94 |
| UNDEVELOPED | 79.60 | 68 |
| MAINTENANCE | 3.30 | 70 |
| Overall Approximation | 255.90 | 72 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.05000
 Flow Length (L)..... = 6400.00 (ft)
 Time of Concentration..... = 79.44 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|------------|
| Distribution Type..... | = | SCS IA |
| Total Precipitation..... | = | 4.17 (in) |
| Return Period..... | = | 100 (yr) |
| Storm Duration..... | = | 24.00 (hr) |

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 13 | 30.90 |
| 26 | 99.88 |
| 39 | 188.58 |
| 52 | 218.86 |
| 65 | 199.71 |
| 78 | 155.04 |
| 91 | 98.04 |
| 104 | 65.36 |
| 117 | 44.77 |
| 130 | 29.83 |
| 143 | 20.16 |
| 156 | 13.37 |
| 169 | 8.91 |
| 182 | 6.04 |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 23
 TYPE : CURVILINEAR UH
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 195 | 4.06 |
| 208 | 2.73 |
| 221 | 1.96 |
| 234 | 1.31 |
| 247 | 0.74 |
| 260 | 0.20 |

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 351 | 0.02 |
| 364 | 0.11 |
| 377 | 0.39 |
| 390 | 0.96 |
| 403 | 1.84 |
| 416 | 2.97 |
| 429 | 4.33 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 442 | 5.96 |
| 455 | 8.36 |
| 468 | 12.88 |
| 481 | 20.94 |
| 494 | 31.71 |
| 507 | 41.56 |
| 520 | 47.18 |
| 533 | 48.41 |
| 546 | 46.63 |
| 559 | 43.59 |
| 572 | 40.58 |
| 585 | 37.75 |
| 598 | 35.19 |
| 611 | 33.12 |
| 624 | 31.51 |
| 637 | 30.23 |
| 650 | 29.19 |
| 663 | 28.32 |
| 676 | 27.59 |
| 689 | 26.95 |
| 702 | 26.36 |
| 715 | 25.81 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 728 | 25.29 |
| 741 | 24.73 |
| 754 | 24.17 |
| 767 | 23.64 |
| 780 | 23.14 |
| 793 | 22.84 |
| 806 | 22.70 |
| 819 | 22.66 |
| 832 | 22.64 |
| 845 | 22.53 |
| 858 | 22.39 |
| 871 | 22.25 |
| 884 | 22.15 |
| 897 | 22.08 |
| 910 | 22.01 |
| 923 | 21.94 |
| 936 | 21.86 |
| 949 | 21.77 |
| 962 | 21.68 |
| 975 | 21.58 |
| 988 | 21.48 |
| 1001 | 21.37 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1014 | 21.25 |
| 1027 | 21.13 |
| 1040 | 21.01 |
| 1053 | 20.88 |
| 1066 | 20.75 |
| 1079 | 20.61 |
| 1092 | 20.47 |
| 1105 | 20.32 |
| 1118 | 20.17 |
| 1131 | 20.02 |
| 1144 | 19.86 |
| 1157 | 19.70 |
| 1170 | 19.54 |
| 1183 | 19.37 |
| 1196 | 19.20 |
| 1209 | 19.03 |
| 1222 | 18.85 |
| 1235 | 18.67 |
| 1248 | 18.49 |
| 1261 | 18.31 |
| 1274 | 18.12 |
| 1287 | 17.93 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1300 | 17.73 |
| 1313 | 17.54 |
| 1326 | 17.34 |
| 1339 | 17.14 |
| 1352 | 16.94 |
| 1365 | 16.73 |
| 1378 | 16.52 |
| 1391 | 16.31 |
| 1404 | 16.10 |
| 1417 | 15.89 |
| 1430 | 15.29 |
| 1443 | 13.84 |
| 1456 | 11.31 |
| 1469 | 8.44 |
| 1482 | 5.85 |
| 1495 | 3.85 |
| 1508 | 2.58 |
| 1521 | 1.73 |
| 1534 | 1.15 |
| 1547 | 0.77 |
| 1560 | 0.51 |
| 1573 | 0.33 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1586 | 0.22 |
| 1599 | 0.14 |
| 1612 | 0.09 |
| 1625 | 0.05 |
| 1638 | 0.03 |
| 1651 | 0.01 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 5 YR/ 24 HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 8.06 (cfs)
 Volume..... = 9.34 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 1092.00 (min)
 Time of Base..... = 1664.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 3
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 332.57 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 13 (min)
 Time to Peak..... = 55.53 (min)
 Time of Base..... = 277.65 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 49.98 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|--------|-----|
| GLENBROOK WOODED & PASTURE | 157.00 | 78 |
| HAYBOURNE PASTURE | 41.00 | 67 |
| SURPRISE PASTURE | 166.00 | 67 |
| TOIYABE WOODED | 6.00 | 65 |
| TOLL PASTURE | 37.00 | 48 |
| Overall Approximation | 407.00 | 69 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12000
 Flow Length (L)..... = 10600.00 (ft)
 Time of Concentration..... = 83.30 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA B UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME INTV | TIME (min) | FLOW (cfs) |
|-----------|------------|------------|
| 1 | 13 | 43.47 |
| 2 | 26 | 139.39 |
| 3 | 39 | 273.55 |
| 4 | 52 | 330.45 |
| 5 | 65 | 315.17 |
| 6 | 78 | 257.86 |
| 7 | 91 | 173.35 |
| 8 | 104 | 115.16 |
| 9 | 117 | 80.14 |
| 10 | 130 | 54.77 |
| 11 | 143 | 37.24 |
| 12 | 156 | 25.27 |
| 13 | 169 | 17.21 |
| 14 | 182 | 11.89 |
| 15 | 195 | 8.16 |
| 16 | 208 | 5.53 |
| 17 | 221 | 3.79 |
| 18 | 234 | 2.80 |
| 19 | 247 | 1.87 |
| 20 | 260 | 1.06 |
| 21 | 273 | 0.28 |

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|-----------|------------|---------------------------|--------------------------|---------------------------|----------------------|
| 37 | 481 | 0.11 | 0.93 | 0.01 | 0.01 |
| 38 | 494 | 0.06 | 0.99 | 0.09 | 0.09 |
| 39 | 507 | 0.04 | 1.03 | 0.27 | 0.36 |
| 40 | 520 | 0.04 | 1.07 | 0.54 | 0.91 |
| 41 | 533 | 0.04 | 1.11 | 0.76 | 1.67 |
| 42 | 546 | 0.03 | 1.14 | 0.87 | 2.54 |
| 43 | 559 | 0.03 | 1.17 | 0.84 | 3.37 |
| 44 | 572 | 0.03 | 1.20 | 0.68 | 4.05 |
| 45 | 585 | 0.03 | 1.22 | 0.52 | 4.58 |
| 46 | 598 | 0.02 | 1.25 | 0.40 | 4.98 |
| 47 | 611 | 0.02 | 1.27 | 0.33 | 5.31 |
| 48 | 624 | 0.02 | 1.29 | 0.29 | 5.60 |
| 49 | 637 | 0.02 | 1.32 | 0.25 | 5.84 |

| | | | | | |
|----|-----|------|------|------|------|
| 50 | 650 | 0.02 | 1.34 | 0.21 | 6.05 |
| 51 | 663 | 0.02 | 1.36 | 0.18 | 6.24 |
| 52 | 676 | 0.02 | 1.38 | 0.16 | 6.40 |
| 53 | 689 | 0.02 | 1.40 | 0.14 | 6.54 |
| 54 | 702 | 0.02 | 1.42 | 0.12 | 6.66 |
| 55 | 715 | 0.02 | 1.44 | 0.10 | 6.75 |
| 56 | 728 | 0.02 | 1.45 | 0.08 | 6.83 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 5 YR/ 24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 57 | 741 | 0.02 | 1.47 | 0.04 | 6.88 |
| 58 | 754 | 0.02 | 1.49 | 0.02 | 6.89 |
| 59 | 767 | 0.02 | 1.50 | 0.01 | 6.90 |
| 60 | 780 | 0.02 | 1.52 | 0.00 | 6.89 |
| 61 | 793 | 0.02 | 1.54 | 0.04 | 6.93 |
| 62 | 806 | 0.02 | 1.56 | 0.08 | 7.01 |
| 63 | 819 | 0.02 | 1.57 | 0.10 | 7.11 |
| 64 | 832 | 0.02 | 1.59 | 0.10 | 7.22 |
| 65 | 845 | 0.02 | 1.60 | 0.08 | 7.30 |
| 66 | 858 | 0.02 | 1.62 | 0.06 | 7.36 |
| 67 | 871 | 0.02 | 1.63 | 0.06 | 7.42 |
| 68 | 884 | 0.02 | 1.65 | 0.06 | 7.48 |
| 69 | 897 | 0.02 | 1.67 | 0.07 | 7.55 |
| 70 | 910 | 0.02 | 1.68 | 0.07 | 7.62 |
| 71 | 923 | 0.02 | 1.70 | 0.06 | 7.68 |
| 72 | 936 | 0.01 | 1.71 | 0.06 | 7.74 |
| 73 | 949 | 0.01 | 1.73 | 0.05 | 7.79 |
| 74 | 962 | 0.01 | 1.74 | 0.05 | 7.84 |
| 75 | 975 | 0.01 | 1.75 | 0.04 | 7.88 |
| 76 | 988 | 0.01 | 1.77 | 0.04 | 7.92 |
| 77 | 1001 | 0.01 | 1.78 | 0.03 | 7.95 |
| 78 | 1014 | 0.01 | 1.80 | 0.03 | 7.98 |
| 79 | 1027 | 0.01 | 1.81 | 0.02 | 8.00 |
| 80 | 1040 | 0.01 | 1.82 | 0.02 | 8.02 |
| 81 | 1053 | 0.01 | 1.84 | 0.02 | 8.04 |
| 82 | 1066 | 0.01 | 1.85 | 0.01 | 8.05 |
| 83 | 1079 | 0.01 | 1.86 | 0.01 | 8.05 |
| 84 | 1092 | 0.01 | 1.88 | 0.00 | 8.06 |
| 85 | 1105 | 0.01 | 1.89 | 0.00 | 8.06 |
| 86 | 1118 | 0.01 | 1.90 | 0.00 | 8.05 |
| 87 | 1131 | 0.01 | 1.92 | -0.01 | 8.05 |
| 88 | 1144 | 0.01 | 1.93 | -0.01 | 8.03 |
| 89 | 1157 | 0.01 | 1.94 | -0.01 | 8.02 |
| 90 | 1170 | 0.01 | 1.95 | -0.02 | 8.00 |
| 91 | 1183 | 0.01 | 1.96 | -0.02 | 7.98 |
| 92 | 1196 | 0.01 | 1.98 | -0.02 | 7.96 |
| 93 | 1209 | 0.01 | 1.99 | -0.03 | 7.93 |
| 94 | 1222 | 0.01 | 2.00 | -0.03 | 7.90 |
| 95 | 1235 | 0.01 | 2.01 | -0.03 | 7.86 |
| 96 | 1248 | 0.01 | 2.02 | -0.04 | 7.83 |
| 97 | 1261 | 0.01 | 2.03 | -0.04 | 7.79 |
| 98 | 1274 | 0.01 | 2.04 | -0.04 | 7.74 |
| 99 | 1287 | 0.01 | 2.06 | -0.05 | 7.70 |

| | | | | | |
|-----|------|------|------|-------|------|
| 100 | 1300 | 0.01 | 2.07 | -0.05 | 7.65 |
| 101 | 1313 | 0.01 | 2.08 | -0.05 | 7.60 |
| 102 | 1326 | 0.01 | 2.09 | -0.05 | 7.54 |
| 3 | 1339 | 0.01 | 2.10 | -0.06 | 7.49 |
| 1J4 | 1352 | 0.01 | 2.11 | -0.06 | 7.43 |
| 105 | 1365 | 0.01 | 2.12 | -0.06 | 7.37 |
| 106 | 1378 | 0.01 | 2.13 | -0.06 | 7.31 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 5 YR/ 24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 107 | 1391 | 0.01 | 2.14 | -0.07 | 7.24 |
| 108 | 1404 | 0.01 | 2.14 | -0.07 | 7.17 |
| 109 | 1417 | 0.01 | 2.15 | -0.07 | 7.10 |
| 110 | 1430 | 0.01 | 2.16 | -0.22 | 6.88 |
| 111 | 1443 | 0.01 | 2.17 | -0.56 | 6.32 |
| 112 | 1456 | 0.00 | 2.17 | -1.03 | 5.28 |
| 113 | 1469 | 0.00 | 2.17 | -1.22 | 4.06 |
| 114 | 1482 | 0.00 | 2.17 | -1.16 | 2.91 |
| 115 | 1495 | 0.00 | 2.17 | -0.94 | 1.97 |
| 116 | 1508 | 0.00 | 2.17 | -0.63 | 1.33 |
| 117 | 1521 | 0.00 | 2.17 | -0.42 | 0.91 |
| 118 | 1534 | 0.00 | 2.17 | -0.29 | 0.62 |
| 9 | 1547 | 0.00 | 2.17 | -0.20 | 0.42 |
| 120 | 1560 | 0.00 | 2.17 | -0.14 | 0.28 |
| 121 | 1573 | 0.00 | 2.17 | -0.09 | 0.19 |
| 122 | 1586 | 0.00 | 2.17 | -0.06 | 0.13 |
| 123 | 1599 | 0.00 | 2.17 | -0.04 | 0.09 |
| 124 | 1612 | 0.00 | 2.17 | -0.03 | 0.06 |
| 125 | 1625 | 0.00 | 2.17 | -0.02 | 0.04 |
| 126 | 1638 | 0.00 | 2.17 | -0.01 | 0.02 |
| 127 | 1651 | 0.00 | 2.17 | -0.01 | 0.01 |
| 128 | 1664 | 0.00 | 2.17 | -0.01 | 0.00 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 25 YR/ 24 HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 23.41 (cfs)
 Volume..... = 24.22 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 559.00 (min)
 Time of Base..... = 1677.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 3
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 332.57 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 13 (min)
 Time to Peak..... = 55.53 (min)
 Time of Base..... = 277.65 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 49.98 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|--------|-----|
| GLENBROOK WOODED & PASTURE | 157.00 | 78 |
| HAYBOURNE PASTURE | 41.00 | 67 |
| SURPRISE PASTURE | 166.00 | 67 |
| TOIYABE WOODED | 6.00 | 65 |
| TOLL PASTURE | 37.00 | 48 |
| Overall Approximation | 407.00 | 69 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12000
 Flow Length (L)..... = 10600.00 (ft)
 Time of Concentration..... = 83.30 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 25 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA B UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME INTV | TIME (min) | FLOW (cfs) |
|-----------|---------------|---------------|
| 1 | 13 | 43.47 |
| 2 | 26 | 139.39 |
| 3 | 39 | 273.55 |
| 4 | 52 | 330.45 |
| 5 | 65 | 315.17 |
| 6 | 78 | 257.86 |
| 7 | 91 | 173.35 |
| 8 | 104 | 115.16 |
| 9 | 117 | 80.14 |
| 10 | 130 | 54.77 |
| 11 | 143 | 37.24 |
| 12 | 156 | 25.27 |
| 13 | 169 | 17.21 |
| 14 | 182 | 11.89 |
| 15 | 195 | 8.16 |
| 16 | 208 | 5.53 |
| 17 | 221 | 3.79 |
| 18 | 234 | 2.80 |
| 19 | 247 | 1.87 |
| 20 | 260 | 1.06 |
| 21 | 273 | 0.28 |

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|-----------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 34 | 442 | 0.06 | 0.92 | 0.00 | 0.00 |
| 35 | 455 | 0.09 | 1.02 | 0.14 | 0.14 |
| 36 | 468 | 0.16 | 1.17 | 0.85 | 0.99 |
| 37 | 481 | 0.15 | 1.33 | 2.55 | 3.54 |
| 38 | 494 | 0.09 | 1.41 | 4.60 | 8.14 |
| 39 | 507 | 0.06 | 1.48 | 5.58 | 13.72 |
| 40 | 520 | 0.06 | 1.53 | 4.74 | 18.46 |
| | 533 | 0.05 | 1.59 | 3.14 | 21.60 |
| | 546 | 0.05 | 1.63 | 1.52 | 23.11 |
| 43 | 559 | 0.04 | 1.67 | 0.30 | 23.41 |
| 44 | 572 | 0.04 | 1.71 | -0.26 | 23.15 |
| 45 | 585 | 0.04 | 1.75 | -0.52 | 22.63 |
| 46 | 598 | 0.04 | 1.78 | -0.65 | 21.99 |

| | | | | | |
|----|-----|------|------|-------|-------|
| 47 | 611 | 0.03 | 1.82 | -0.59 | 21.40 |
| 48 | 624 | 0.03 | 1.85 | -0.47 | 20.93 |
| 50 | 637 | 0.03 | 1.88 | -0.37 | 20.56 |
| 51 | 650 | 0.03 | 1.91 | -0.31 | 20.25 |
| 52 | 663 | 0.03 | 1.94 | -0.26 | 20.00 |
| 53 | 676 | 0.03 | 1.97 | -0.21 | 19.78 |
| | 689 | 0.03 | 2.00 | -0.20 | 19.58 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 25 YR/ 24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 54 | 702 | 0.03 | 2.03 | -0.18 | 19.40 |
| 55 | 715 | 0.03 | 2.05 | -0.19 | 19.22 |
| 56 | 728 | 0.03 | 2.08 | -0.19 | 19.02 |
| 57 | 741 | 0.03 | 2.10 | -0.25 | 18.77 |
| 58 | 754 | 0.02 | 2.12 | -0.28 | 18.50 |
| 59 | 767 | 0.02 | 2.15 | -0.27 | 18.23 |
| 60 | 780 | 0.02 | 2.17 | -0.26 | 17.97 |
| 61 | 793 | 0.02 | 2.20 | -0.14 | 17.83 |
| 62 | 806 | 0.02 | 2.22 | -0.02 | 17.82 |
| 63 | 819 | 0.02 | 2.24 | 0.06 | 17.87 |
| 64 | 832 | 0.02 | 2.27 | 0.07 | 17.94 |
| 65 | 845 | 0.02 | 2.29 | 0.02 | 17.97 |
| 66 | 858 | 0.02 | 2.31 | -0.01 | 17.95 |
| 67 | 871 | 0.02 | 2.34 | -0.02 | 17.93 |
| 68 | 884 | 0.02 | 2.36 | 0.00 | 17.93 |
| 69 | 897 | 0.02 | 2.38 | 0.02 | 17.95 |
| 70 | 910 | 0.02 | 2.40 | 0.02 | 17.97 |
| 71 | 923 | 0.02 | 2.42 | 0.02 | 17.99 |
| 72 | 936 | 0.02 | 2.44 | 0.01 | 18.00 |
| 73 | 949 | 0.02 | 2.47 | 0.00 | 18.00 |
| 74 | 962 | 0.02 | 2.49 | -0.01 | 18.00 |
| 75 | 975 | 0.02 | 2.51 | -0.01 | 17.99 |
| 76 | 988 | 0.02 | 2.53 | -0.02 | 17.97 |
| 77 | 1001 | 0.02 | 2.55 | -0.03 | 17.94 |
| 78 | 1014 | 0.02 | 2.57 | -0.03 | 17.91 |
| 79 | 1027 | 0.02 | 2.59 | -0.04 | 17.87 |
| 80 | 1040 | 0.02 | 2.61 | -0.05 | 17.82 |
| 81 | 1053 | 0.02 | 2.63 | -0.05 | 17.77 |
| 82 | 1066 | 0.02 | 2.65 | -0.06 | 17.72 |
| 83 | 1079 | 0.02 | 2.66 | -0.06 | 17.65 |
| 84 | 1092 | 0.02 | 2.68 | -0.07 | 17.58 |
| 85 | 1105 | 0.02 | 2.70 | -0.07 | 17.51 |
| 86 | 1118 | 0.02 | 2.72 | -0.08 | 17.43 |
| 87 | 1131 | 0.02 | 2.74 | -0.09 | 17.34 |
| 88 | 1144 | 0.02 | 2.76 | -0.09 | 17.25 |
| 89 | 1157 | 0.02 | 2.77 | -0.10 | 17.16 |
| 90 | 1170 | 0.02 | 2.79 | -0.10 | 17.06 |
| 91 | 1183 | 0.02 | 2.81 | -0.10 | 16.95 |
| 92 | 1196 | 0.02 | 2.82 | -0.11 | 16.84 |
| 93 | 1209 | 0.02 | 2.84 | -0.11 | 16.73 |
| 94 | 1222 | 0.02 | 2.86 | -0.12 | 16.61 |
| 95 | 1235 | 0.02 | 2.87 | -0.12 | 16.49 |
| 96 | 1248 | 0.02 | 2.89 | -0.13 | 16.36 |

| | | | | | |
|-----|------|------|------|-------|-------|
| 97 | 1261 | 0.02 | 2.91 | -0.13 | 16.23 |
| 98 | 1274 | 0.02 | 2.92 | -0.13 | 16.10 |
| 99 | 1287 | 0.02 | 2.94 | -0.14 | 15.96 |
| 0 | 1300 | 0.02 | 2.95 | -0.14 | 15.82 |
| 101 | 1313 | 0.01 | 2.97 | -0.15 | 15.67 |
| 102 | 1326 | 0.01 | 2.98 | -0.15 | 15.53 |
| 103 | 1339 | 0.01 | 3.00 | -0.15 | 15.37 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 25 YR/ 24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 104 | 1352 | 0.01 | 3.01 | -0.16 | 15.22 |
| 105 | 1365 | 0.01 | 3.02 | -0.16 | 15.06 |
| 106 | 1378 | 0.01 | 3.04 | -0.16 | 14.90 |
| 107 | 1391 | 0.01 | 3.05 | -0.16 | 14.73 |
| 108 | 1404 | 0.01 | 3.06 | -0.17 | 14.57 |
| 109 | 1417 | 0.01 | 3.08 | -0.17 | 14.39 |
| 110 | 1430 | 0.01 | 3.09 | -0.48 | 13.91 |
| 111 | 1443 | 0.01 | 3.10 | -1.16 | 12.76 |
| 112 | 1456 | 0.00 | 3.10 | -2.09 | 10.66 |
| 113 | 1469 | 0.00 | 3.10 | -2.47 | 8.19 |
| 114 | 1482 | 0.00 | 3.10 | -2.33 | 5.86 |
| 115 | 1495 | 0.00 | 3.10 | -1.90 | 3.96 |
| 116 | 1508 | 0.00 | 3.10 | -1.28 | 2.69 |
| 117 | 1521 | 0.00 | 3.10 | -0.85 | 1.84 |
| 118 | 1534 | 0.00 | 3.10 | -0.59 | 1.25 |
| 119 | 1547 | 0.00 | 3.10 | -0.40 | 0.85 |
| 120 | 1560 | 0.00 | 3.10 | -0.27 | 0.57 |
| 121 | 1573 | 0.00 | 3.10 | -0.19 | 0.39 |
| 122 | 1586 | 0.00 | 3.10 | -0.13 | 0.26 |
| 123 | 1599 | 0.00 | 3.10 | -0.09 | 0.17 |
| 124 | 1612 | 0.00 | 3.10 | -0.06 | 0.11 |
| 125 | 1625 | 0.00 | 3.10 | -0.04 | 0.07 |
| 126 | 1638 | 0.00 | 3.10 | -0.03 | 0.04 |
| 127 | 1651 | 0.00 | 3.10 | -0.02 | 0.02 |
| 128 | 1664 | 0.00 | 3.10 | -0.01 | 0.01 |
| 129 | 1677 | 0.00 | 3.10 | -0.01 | 0.00 |

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 25 YR/24 HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 93.15 (cfs)
 Volume..... = 125.86 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 870.00 (min)
 Time of Base..... = 2310.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 1
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 524.53 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 60.64 (min)
 Time of Base..... = 303.20 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 54.58 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 701.00 (ac)
 Curve Number..... = 69

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12450
 Flow Length (L)..... = 14900.00 (ft)
 Time of Concentration..... = 90.96 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 25 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | FLOW (cfs) |
|-----------|---------------|---------------|
| 1 | 15 | 12.97 |
| 2 | 30 | 39.57 |
| 3 | 45 | 74.81 |
| 4 | 60 | 118.43 |
| 5 | 75 | 172.90 |
| 6 | 90 | 242.10 |
| 7 | 105 | 323.44 |
| 8 | 120 | 396.23 |
| 9 | 135 | 454.40 |
| 10 | 150 | 495.54 |
| 11 | 165 | 519.65 |
| 12 | 180 | 523.98 |
| 13 | 195 | 520.76 |
| 14 | 210 | 502.18 |
| 15 | 225 | 474.30 |
| 16 | 240 | 443.02 |
| 17 | 255 | 408.24 |
| 18 | 270 | 364.99 |
| 19 | 285 | 314.75 |
| 20 | 300 | 268.00 |
| 21 | 315 | 229.71 |
| 22 | 330 | 200.17 |
| 23 | 345 | 174.22 |
| 24 | 360 | 152.41 |
| 25 | 375 | 135.13 |
| 26 | 390 | 119.34 |
| 27 | 405 | 104.45 |
| 28 | 420 | 91.47 |
| 29 | 435 | 78.50 |
| 30 | 450 | 69.39 |
| 31 | 465 | 60.74 |
| 32 | 480 | 53.10 |
| 33 | 495 | 46.61 |
| 34 | 510 | 40.19 |
| 35 | 525 | 35.43 |
| 36 | 540 | 30.68 |
| 37 | 555 | 26.85 |
| 38 | 570 | 23.61 |
| 39 | 585 | 20.53 |
| 40 | 600 | 18.15 |
| 41 | 615 | 15.77 |
| 42 | 630 | 13.89 |
| 43 | 645 | 12.16 |
| 44 | 660 | 10.58 |

| | | |
|----|-----|------|
| 45 | 675 | 9.28 |
| 46 | 690 | 7.98 |
| 47 | 705 | 7.08 |
| 48 | 720 | 6.21 |
| 49 | 735 | 5.52 |
| 50 | 750 | 5.00 |
| 51 | 765 | 4.48 |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | FLOW (cfs) |
|-----------|---------------|---------------|
| 52 | 780 | 3.96 |
| 53 | 795 | 3.44 |
| 54 | 810 | 2.92 |
| 55 | 825 | 2.44 |
| 56 | 840 | 2.01 |
| 57 | 855 | 1.57 |
| 58 | 870 | 1.14 |
| 59 | 885 | 0.71 |
| 60 | 900 | 0.28 |

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|-----------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 30 | 450 | 0.07 | 0.96 | 0.01 | 0.01 |
| 31 | 465 | 0.18 | 1.14 | 0.17 | 0.18 |
| 32 | 480 | 0.18 | 1.32 | 0.63 | 0.81 |
| 33 | 495 | 0.10 | 1.42 | 1.29 | 2.11 |
| 34 | 510 | 0.07 | 1.49 | 2.04 | 4.14 |
| 35 | 525 | 0.07 | 1.56 | 2.92 | 7.07 |
| 36 | 540 | 0.06 | 1.61 | 4.03 | 11.09 |
| 37 | 555 | 0.05 | 1.66 | 5.31 | 16.41 |
| 38 | 570 | 0.04 | 1.70 | 6.50 | 22.90 |
| 39 | 585 | 0.04 | 1.75 | 7.27 | 30.17 |
| 40 | 600 | 0.04 | 1.79 | 7.66 | 37.83 |
| 41 | 615 | 0.04 | 1.83 | 7.72 | 45.55 |
| 42 | 630 | 0.04 | 1.86 | 7.44 | 52.99 |
| 43 | 645 | 0.04 | 1.90 | 6.96 | 59.95 |
| 44 | 660 | 0.03 | 1.93 | 6.39 | 66.34 |
| 45 | 675 | 0.03 | 1.97 | 5.66 | 71.99 |
| 46 | 690 | 0.03 | 2.00 | 4.92 | 76.91 |
| 47 | 705 | 0.03 | 2.03 | 4.25 | 81.16 |
| 48 | 720 | 0.03 | 2.06 | 3.51 | 84.67 |
| 49 | 735 | 0.03 | 2.09 | 2.66 | 87.33 |
| 50 | 750 | 0.03 | 2.12 | 1.86 | 89.20 |
| 51 | 765 | 0.03 | 2.15 | 1.28 | 90.48 |
| 52 | 780 | 0.03 | 2.17 | 0.91 | 91.38 |
| 53 | 795 | 0.03 | 2.20 | 0.65 | 92.03 |
| 54 | 810 | 0.03 | 2.23 | 0.44 | 92.47 |

| | | | | | |
|----|-----|------|------|-------|-------|
| 55 | 825 | 0.03 | 2.26 | 0.31 | 92.78 |
| 56 | 840 | 0.03 | 2.28 | 0.22 | 93.01 |
| 57 | 855 | 0.03 | 2.31 | 0.12 | 93.12 |
| 8 | 870 | 0.03 | 2.33 | 0.03 | 93.15 |
| 59 | 885 | 0.03 | 2.36 | -0.02 | 93.14 |
| 60 | 900 | 0.03 | 2.38 | -0.06 | 93.08 |
| 61 | 915 | 0.03 | 2.41 | -0.05 | 93.03 |

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 25 YR/24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 62 | 930 | 0.02 | 2.43 | -0.05 | 92.98 |
| 63 | 945 | 0.02 | 2.46 | -0.05 | 92.93 |
| 64 | 960 | 0.02 | 2.48 | -0.04 | 92.89 |
| 65 | 975 | 0.02 | 2.51 | -0.03 | 92.86 |
| 66 | 990 | 0.02 | 2.53 | -0.01 | 92.85 |
| 67 | 1005 | 0.02 | 2.55 | -0.01 | 92.84 |
| 68 | 1020 | 0.02 | 2.58 | 0.00 | 92.84 |
| 69 | 1035 | 0.02 | 2.60 | 0.00 | 92.84 |
| 70 | 1050 | 0.02 | 2.62 | -0.01 | 92.83 |
| 71 | 1065 | 0.02 | 2.64 | -0.03 | 92.80 |
| 72 | 1080 | 0.02 | 2.67 | -0.06 | 92.74 |
| 73 | 1095 | 0.02 | 2.69 | -0.08 | 92.65 |
| 74 | 1110 | 0.02 | 2.71 | -0.11 | 92.55 |
| 75 | 1125 | 0.02 | 2.73 | -0.14 | 92.41 |
| 76 | 1140 | 0.02 | 2.75 | -0.17 | 92.24 |
| 77 | 1155 | 0.02 | 2.77 | -0.20 | 92.04 |
| 78 | 1170 | 0.02 | 2.79 | -0.23 | 91.81 |
| 79 | 1185 | 0.02 | 2.81 | -0.26 | 91.55 |
| 80 | 1200 | 0.02 | 2.83 | -0.29 | 91.26 |
| 81 | 1215 | 0.02 | 2.85 | -0.32 | 90.93 |
| 82 | 1230 | 0.02 | 2.87 | -0.36 | 90.58 |
| 83 | 1245 | 0.02 | 2.89 | -0.39 | 90.19 |
| 84 | 1260 | 0.02 | 2.90 | -0.43 | 89.76 |
| 85 | 1275 | 0.02 | 2.92 | -0.46 | 89.30 |
| 86 | 1290 | 0.02 | 2.94 | -0.50 | 88.80 |
| 87 | 1305 | 0.02 | 2.96 | -0.53 | 88.27 |
| 88 | 1320 | 0.02 | 2.97 | -0.56 | 87.70 |
| 89 | 1335 | 0.02 | 2.99 | -0.60 | 87.11 |
| 90 | 1350 | 0.02 | 3.01 | -0.63 | 86.47 |
| 91 | 1365 | 0.02 | 3.02 | -0.66 | 85.81 |
| 92 | 1380 | 0.02 | 3.04 | -0.69 | 85.12 |
| 93 | 1395 | 0.02 | 3.05 | -0.71 | 84.40 |
| 94 | 1410 | 0.02 | 3.07 | -0.74 | 83.67 |
| 95 | 1425 | 0.02 | 3.09 | -0.76 | 82.90 |
| 96 | 1440 | 0.01 | 3.10 | -0.89 | 82.01 |
| 97 | 1455 | 0.01 | 3.11 | -1.13 | 80.88 |
| 98 | 1470 | -0.01 | 3.10 | -1.43 | 79.45 |
| 99 | 1485 | 0.00 | 3.10 | -1.80 | 77.65 |
| 100 | 1500 | 0.00 | 3.10 | -2.25 | 75.40 |
| 101 | 1515 | 0.00 | 3.10 | -2.80 | 72.60 |
| 102 | 1530 | 0.00 | 3.10 | -3.45 | 69.15 |
| 103 | 1545 | 0.00 | 3.10 | -4.01 | 65.13 |
| 104 | 1560 | 0.00 | 3.10 | -4.45 | 60.68 |

| | | | | | |
|-----|------|------|------|-------|-------|
| 105 | 1575 | 0.00 | 3.10 | -4.74 | 55.94 |
| 106 | 1590 | 0.00 | 3.10 | -4.89 | 51.06 |
| 107 | 1605 | 0.00 | 3.10 | -4.87 | 46.19 |
| 3 | 1620 | 0.00 | 3.10 | -4.78 | 41.41 |
| 109 | 1635 | 0.00 | 3.10 | -4.58 | 36.83 |
| 110 | 1650 | 0.00 | 3.10 | -4.30 | 32.53 |
| 111 | 1665 | 0.00 | 3.10 | -3.99 | 28.54 |

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 25 YR/24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|-----------|------------|---------------------------|--------------------------|---------------------------|----------------------|
| 112 | 1680 | 0.00 | 3.10 | -3.66 | 24.88 |
| 113 | 1695 | 0.00 | 3.10 | -3.26 | 21.62 |
| 114 | 1710 | 0.00 | 3.10 | -2.82 | 18.80 |
| 115 | 1725 | 0.00 | 3.10 | -2.40 | 16.39 |
| 116 | 1740 | 0.00 | 3.10 | -2.06 | 14.33 |
| 117 | 1755 | 0.00 | 3.10 | -1.80 | 12.53 |
| 118 | 1770 | 0.00 | 3.10 | -1.57 | 10.96 |
| 119 | 1785 | 0.00 | 3.10 | -1.37 | 9.59 |
| 120 | 1800 | 0.00 | 3.10 | -1.21 | 8.38 |
| 121 | 1815 | 0.00 | 3.10 | -1.07 | 7.31 |
| 122 | 1830 | 0.00 | 3.10 | -0.94 | 6.37 |
| 123 | 1845 | 0.00 | 3.10 | -0.82 | 5.55 |
| 124 | 1860 | 0.00 | 3.10 | -0.71 | 4.85 |
| 125 | 1875 | 0.00 | 3.10 | -0.62 | 4.22 |
| 126 | 1890 | 0.00 | 3.10 | -0.55 | 3.68 |
| 127 | 1905 | 0.00 | 3.10 | -0.48 | 3.20 |
| 128 | 1920 | 0.00 | 3.10 | -0.42 | 2.78 |
| 129 | 1935 | 0.00 | 3.10 | -0.36 | 2.42 |
| 130 | 1950 | 0.00 | 3.10 | -0.32 | 2.10 |
| 131 | 1965 | 0.00 | 3.10 | -0.28 | 1.83 |
| 132 | 1980 | 0.00 | 3.10 | -0.24 | 1.59 |
| 133 | 1995 | 0.00 | 3.10 | -0.21 | 1.38 |
| 134 | 2010 | 0.00 | 3.10 | -0.18 | 1.19 |
| 135 | 2025 | 0.00 | 3.10 | -0.16 | 1.03 |
| 136 | 2040 | 0.00 | 3.10 | -0.14 | 0.89 |
| 137 | 2055 | 0.00 | 3.10 | -0.12 | 0.76 |
| 138 | 2070 | 0.00 | 3.10 | -0.11 | 0.66 |
| 139 | 2085 | 0.00 | 3.10 | -0.09 | 0.56 |
| 140 | 2100 | 0.00 | 3.10 | -0.08 | 0.48 |
| 141 | 2115 | 0.00 | 3.10 | -0.07 | 0.41 |
| 142 | 2130 | 0.00 | 3.10 | -0.06 | 0.34 |
| 143 | 2145 | 0.00 | 3.10 | -0.06 | 0.29 |
| 144 | 2160 | 0.00 | 3.10 | -0.05 | 0.24 |
| 145 | 2175 | 0.00 | 3.10 | -0.04 | 0.20 |
| 146 | 2190 | 0.00 | 3.10 | -0.04 | 0.16 |
| 147 | 2205 | 0.00 | 3.10 | -0.03 | 0.12 |
| 148 | 2220 | 0.00 | 3.10 | -0.03 | 0.09 |
| 149 | 2235 | 0.00 | 3.10 | -0.02 | 0.07 |
| 150 | 2250 | 0.00 | 3.10 | -0.02 | 0.05 |
| 151 | 2265 | 0.00 | 3.10 | -0.02 | 0.03 |
| 152 | 2280 | 0.00 | 3.10 | -0.01 | 0.02 |
| 153 | 2295 | 0.00 | 3.10 | -0.01 | 0.01 |
| 154 | 2310 | 0.00 | 3.10 | -0.01 | 0.00 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 213.87 (cfs)
 Volume..... = 46.52 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 767.00 (min)
 Time of Base..... = 1677.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 3
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 332.57 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 13 (min)
 Time to Peak..... = 55.53 (min)
 Time of Base..... = 277.65 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 49.98 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|--------|-----|
| GLENBROOK WOODED & PASTURE | 157.00 | 78 |
| HAYBOURNE PASTURE | 41.00 | 67 |
| SURPRISE PASTURE | 166.00 | 67 |
| TOIYABE WOODED | 6.00 | 65 |
| TOLL PASTURE | 37.00 | 48 |
| Overall Approximation | 407.00 | 69 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12000
 Flow Length (L)..... = 10600.00 (ft)
 Time of Concentration..... = 83.30 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|------------|
| Distribution Type..... | = | SCS II |
| Total Precipitation..... | = | 4.17 (in) |
| Return Period..... | = | 100 (yr) |
| Storm Duration..... | = | 24.00 (hr) |

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 13 | 43.47 |
| 26 | 139.39 |
| 39 | 273.55 |
| 52 | 330.45 |
| 65 | 315.17 |
| 78 | 257.86 |
| 91 | 173.35 |
| 104 | 115.16 |
| 117 | 80.14 |
| 130 | 54.77 |
| 143 | 37.24 |
| 156 | 25.27 |
| 169 | 17.21 |
| 182 | 11.89 |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : CURVILINEAR UH
DESCRIPTION : AREA B UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 195 | 8.16 |
| 208 | 5.53 |
| 221 | 3.79 |
| 234 | 2.80 |
| 247 | 1.87 |
| 260 | 1.06 |
| 273 | 0.28 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 650 | 0.01 |
| 663 | 0.11 |
| 676 | 0.52 |
| 689 | 1.60 |
| 702 | 5.38 |
| 715 | 26.62 |
| 728 | 75.00 |
| 741 | 144.72 |
| 754 | 196.72 |
| 767 | 213.87 |
| 780 | 201.84 |
| 793 | 169.90 |
| 806 | 137.79 |
| 819 | 113.52 |
| 832 | 94.84 |
| 845 | 80.15 |
| 858 | 68.64 |
| 871 | 59.67 |
| 884 | 52.74 |
| 897 | 47.37 |
| 910 | 43.17 |
| 923 | 39.87 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 936 | 37.24 |
| 949 | 34.93 |
| 962 | 32.78 |
| 975 | 30.76 |
| 988 | 29.01 |
| 1001 | 27.57 |
| 1014 | 26.36 |
| 1027 | 25.35 |
| 1040 | 24.50 |
| 1053 | 23.76 |
| 1066 | 23.10 |
| 1079 | 22.48 |
| 1092 | 21.89 |
| 1105 | 21.32 |
| 1118 | 20.76 |
| 1131 | 20.21 |
| 1144 | 19.66 |
| 1157 | 19.10 |
| 1170 | 18.55 |
| 1183 | 18.00 |
| 1196 | 17.44 |
| 1209 | 16.88 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1222 | 16.34 |
| 1235 | 15.83 |
| 1248 | 15.40 |
| 1261 | 15.04 |
| 1274 | 14.76 |
| 1287 | 14.53 |
| 1300 | 14.35 |
| 1313 | 14.19 |
| 1326 | 14.05 |
| 1339 | 13.93 |
| 1352 | 13.81 |
| 1365 | 13.70 |
| 1378 | 13.59 |
| 1391 | 13.48 |
| 1404 | 13.37 |
| 1417 | 13.27 |
| 1430 | 12.87 |
| 1443 | 11.84 |
| 1456 | 9.91 |
| 1469 | 7.63 |
| 1482 | 5.46 |
| 1495 | 3.69 |

HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1508 | 2.50 |
| 1521 | 1.71 |
| 1534 | 1.16 |
| 1547 | 0.79 |
| 1560 | 0.53 |
| 1573 | 0.36 |
| 1586 | 0.24 |
| 1599 | 0.16 |
| 1612 | 0.10 |
| 1625 | 0.07 |
| 1638 | 0.04 |
| 1651 | 0.02 |
| 1664 | 0.01 |

2/28/94

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 5 YR/24 HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 40.82 (cfs)
 Volume..... = 48.60 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 1275.00 (min)
 Time of Base..... = 2310.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 1
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 524.53 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 60.64 (min)
 Time of Base..... = 303.20 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 54.58 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 701.00 (ac)
 Curve Number..... = 69

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12450
 Flow Length (L)..... = 14900.00 (ft)
 Time of Concentration..... = 90.96 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | FLOW (cfs) |
|-----------|---------------|---------------|
| 1 | 15 | 12.97 |
| 2 | 30 | 39.57 |
| 3 | 45 | 74.81 |
| 4 | 60 | 118.43 |
| 5 | 75 | 172.90 |
| 6 | 90 | 242.10 |
| 7 | 105 | 323.44 |
| 8 | 120 | 396.23 |
| 9 | 135 | 454.40 |
| 10 | 150 | 495.54 |
| 11 | 165 | 519.65 |
| 12 | 180 | 523.98 |
| 13 | 195 | 520.76 |
| 14 | 210 | 502.18 |
| 15 | 225 | 474.30 |
| 16 | 240 | 443.02 |
| 17 | 255 | 408.24 |
| 18 | 270 | 364.99 |
| 19 | 285 | 314.75 |
| 20 | 300 | 268.00 |
| 21 | 315 | 229.71 |
| 22 | 330 | 200.17 |
| 23 | 345 | 174.22 |
| 24 | 360 | 152.41 |
| 25 | 375 | 135.13 |
| 26 | 390 | 119.34 |
| 27 | 405 | 104.45 |
| 28 | 420 | 91.47 |
| 29 | 435 | 78.50 |
| 30 | 450 | 69.39 |
| 31 | 465 | 60.74 |
| 32 | 480 | 53.10 |
| 33 | 495 | 46.61 |
| 34 | 510 | 40.19 |
| 35 | 525 | 35.43 |
| 36 | 540 | 30.68 |
| 37 | 555 | 26.85 |
| 38 | 570 | 23.61 |
| 39 | 585 | 20.53 |
| 40 | 600 | 18.15 |
| 41 | 615 | 15.77 |
| 42 | 630 | 13.89 |
| 43 | 645 | 12.16 |
| 44 | 660 | 10.58 |

| | | |
|----|-----|------|
| 45 | 675 | 9.28 |
| 46 | 690 | 7.98 |
| 47 | 705 | 7.08 |
| 48 | 720 | 6.21 |
| 49 | 735 | 5.52 |
| 50 | 750 | 5.00 |
| 51 | 765 | 4.48 |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | FLOW (cfs) |
|-----------|---------------|---------------|
| 52 | 780 | 3.96 |
| 53 | 795 | 3.44 |
| 54 | 810 | 2.92 |
| 55 | 825 | 2.44 |
| 56 | 840 | 2.01 |
| 57 | 855 | 1.57 |
| 58 | 870 | 1.14 |
| 59 | 885 | 0.71 |
| 60 | 900 | 0.28 |

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|-----------|---------------|------------------------------|-----------------------------|------------------------------|-------------------------|
| 32 | 480 | 0.13 | 0.92 | 0.00 | 0.00 |
| 33 | 495 | 0.07 | 0.99 | 0.03 | 0.03 |
| 34 | 510 | 0.05 | 1.04 | 0.08 | 0.11 |
| 35 | 525 | 0.05 | 1.09 | 0.18 | 0.29 |
| 36 | 540 | 0.04 | 1.13 | 0.31 | 0.60 |
| 37 | 555 | 0.03 | 1.16 | 0.47 | 1.07 |
| 38 | 570 | 0.03 | 1.19 | 0.67 | 1.74 |
| 39 | 585 | 0.03 | 1.22 | 0.92 | 2.66 |
| 40 | 600 | 0.03 | 1.25 | 1.18 | 3.85 |
| 41 | 615 | 0.03 | 1.28 | 1.43 | 5.27 |
| 42 | 630 | 0.03 | 1.30 | 1.63 | 6.90 |
| 43 | 645 | 0.03 | 1.33 | 1.78 | 8.68 |
| 44 | 660 | 0.02 | 1.35 | 1.88 | 10.57 |
| 45 | 675 | 0.02 | 1.38 | 1.95 | 12.51 |
| 46 | 690 | 0.02 | 1.40 | 1.96 | 14.48 |
| 47 | 705 | 0.02 | 1.42 | 1.94 | 16.42 |
| 48 | 720 | 0.02 | 1.44 | 1.90 | 18.32 |
| 49 | 735 | 0.02 | 1.46 | 1.82 | 20.14 |
| 50 | 750 | 0.02 | 1.48 | 1.72 | 21.86 |
| 51 | 765 | 0.02 | 1.50 | 1.59 | 23.45 |
| 52 | 780 | 0.02 | 1.52 | 1.44 | 24.88 |
| 53 | 795 | 0.02 | 1.54 | 1.30 | 26.18 |
| 54 | 810 | 0.02 | 1.56 | 1.17 | 27.35 |
| 55 | 825 | 0.02 | 1.58 | 1.06 | 28.41 |
| 56 | 840 | 0.02 | 1.60 | 0.97 | 29.38 |

| | | | | | |
|----|-----|------|------|------|-------|
| 57 | 855 | 0.02 | 1.62 | 0.88 | 30.26 |
| 58 | 870 | 0.02 | 1.63 | 0.82 | 31.08 |
| 59 | 885 | 0.02 | 1.65 | 0.77 | 31.84 |
| 60 | 900 | 0.02 | 1.67 | 0.72 | 32.56 |
| 61 | 915 | 0.02 | 1.69 | 0.67 | 33.23 |
| 62 | 930 | 0.02 | 1.70 | 0.63 | 33.86 |
| 63 | 945 | 0.02 | 1.72 | 0.60 | 34.46 |

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 5 YR/24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 64 | 960 | 0.02 | 1.74 | 0.57 | 35.03 |
| 65 | 975 | 0.02 | 1.75 | 0.55 | 35.58 |
| 66 | 990 | 0.02 | 1.77 | 0.52 | 36.10 |
| 67 | 1005 | 0.02 | 1.79 | 0.50 | 36.60 |
| 68 | 1020 | 0.02 | 1.80 | 0.47 | 37.07 |
| 69 | 1035 | 0.02 | 1.82 | 0.45 | 37.52 |
| 70 | 1050 | 0.02 | 1.84 | 0.42 | 37.94 |
| 71 | 1065 | 0.02 | 1.85 | 0.39 | 38.33 |
| 72 | 1080 | 0.02 | 1.87 | 0.36 | 38.69 |
| 73 | 1095 | 0.02 | 1.88 | 0.33 | 39.03 |
| 74 | 1110 | 0.01 | 1.90 | 0.31 | 39.33 |
| 75 | 1125 | 0.01 | 1.91 | 0.27 | 39.61 |
| 6 | 1140 | 0.01 | 1.92 | 0.25 | 39.85 |
| 77 | 1155 | 0.01 | 1.94 | 0.22 | 40.07 |
| 78 | 1170 | 0.01 | 1.95 | 0.19 | 40.26 |
| 79 | 1185 | 0.01 | 1.97 | 0.16 | 40.42 |
| 80 | 1200 | 0.01 | 1.98 | 0.13 | 40.55 |
| 81 | 1215 | 0.01 | 1.99 | 0.11 | 40.66 |
| 82 | 1230 | 0.01 | 2.01 | 0.08 | 40.74 |
| 83 | 1245 | 0.01 | 2.02 | 0.05 | 40.79 |
| 84 | 1260 | 0.01 | 2.03 | 0.03 | 40.82 |
| 85 | 1275 | 0.01 | 2.05 | 0.00 | 40.82 |
| 86 | 1290 | 0.01 | 2.06 | -0.02 | 40.80 |
| 87 | 1305 | 0.01 | 2.07 | -0.05 | 40.75 |
| 88 | 1320 | 0.01 | 2.08 | -0.07 | 40.68 |
| 89 | 1335 | 0.01 | 2.09 | -0.09 | 40.59 |
| 90 | 1350 | 0.01 | 2.11 | -0.12 | 40.47 |
| 91 | 1365 | 0.01 | 2.12 | -0.14 | 40.33 |
| 92 | 1380 | 0.01 | 2.13 | -0.16 | 40.17 |
| 93 | 1395 | 0.01 | 2.14 | -0.18 | 39.99 |
| 94 | 1410 | 0.01 | 2.15 | -0.20 | 39.78 |
| 95 | 1425 | 0.01 | 2.16 | -0.22 | 39.56 |
| 96 | 1440 | 0.01 | 2.17 | -0.30 | 39.26 |
| 97 | 1455 | 0.01 | 2.18 | -0.42 | 38.84 |
| 98 | 1470 | -0.01 | 2.17 | -0.58 | 38.26 |
| 99 | 1485 | 0.00 | 2.17 | -0.77 | 37.49 |
| 100 | 1500 | 0.00 | 2.17 | -1.00 | 36.49 |
| 101 | 1515 | 0.00 | 2.17 | -1.28 | 35.21 |
| 102 | 1530 | 0.00 | 2.17 | -1.61 | 33.60 |
| 103 | 1545 | 0.00 | 2.17 | -1.90 | 31.69 |
| 104 | 1560 | 0.00 | 2.17 | -2.13 | 29.56 |
| 105 | 1575 | 0.00 | 2.17 | -2.28 | 27.28 |
| 106 | 1590 | 0.00 | 2.17 | -2.36 | 24.92 |

| | | | | | |
|-----|------|------|------|-------|-------|
| 107 | 1605 | 0.00 | 2.17 | -2.36 | 22.56 |
| 108 | 1620 | 0.00 | 2.17 | -2.33 | 20.24 |
| 109 | 1635 | 0.00 | 2.17 | -2.23 | 18.01 |
|) | 1650 | 0.00 | 2.17 | -2.10 | 15.91 |
| 111 | 1665 | 0.00 | 2.17 | -1.95 | 13.96 |
| 112 | 1680 | 0.00 | 2.17 | -1.79 | 12.17 |
| 113 | 1695 | 0.00 | 2.17 | -1.60 | 10.57 |

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 5 YR/24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

| TIME INTV | TIME (min) | INCREMENTAL RAINFALL (in) | CUMULATIVE RAINFALL (in) | INCREMENTAL OUTFLOW (cfs) | DESIGN OUTFLOW (cfs) |
|--------------|---------------|---------------------------------|--------------------------------|---------------------------------|-------------------------|
| 114 | 1710 | 0.00 | 2.17 | -1.38 | 9.20 |
| 115 | 1725 | 0.00 | 2.17 | -1.18 | 8.02 |
| 116 | 1740 | 0.00 | 2.17 | -1.01 | 7.01 |
| 117 | 1755 | 0.00 | 2.17 | -0.88 | 6.13 |
| 118 | 1770 | 0.00 | 2.17 | -0.77 | 5.37 |
| 119 | 1785 | 0.00 | 2.17 | -0.67 | 4.70 |
| 120 | 1800 | 0.00 | 2.17 | -0.59 | 4.10 |
| 121 | 1815 | 0.00 | 2.17 | -0.52 | 3.58 |
| 122 | 1830 | 0.00 | 2.17 | -0.46 | 3.12 |
| 123 | 1845 | 0.00 | 2.17 | -0.40 | 2.72 |
| 124 | 1860 | 0.00 | 2.17 | -0.35 | 2.37 |
| 25 | 1875 | 0.00 | 2.17 | -0.30 | 2.07 |
| 126 | 1890 | 0.00 | 2.17 | -0.27 | 1.80 |
| 127 | 1905 | 0.00 | 2.17 | -0.23 | 1.57 |
| 128 | 1920 | 0.00 | 2.17 | -0.20 | 1.36 |
| 129 | 1935 | 0.00 | 2.17 | -0.18 | 1.19 |
| 130 | 1950 | 0.00 | 2.17 | -0.16 | 1.03 |
| 131 | 1965 | 0.00 | 2.17 | -0.13 | 0.90 |
| 132 | 1980 | 0.00 | 2.17 | -0.12 | 0.78 |
| 133 | 1995 | 0.00 | 2.17 | -0.10 | 0.68 |
| 134 | 2010 | 0.00 | 2.17 | -0.09 | 0.59 |
| 135 | 2025 | 0.00 | 2.17 | -0.08 | 0.51 |
| 136 | 2040 | 0.00 | 2.17 | -0.07 | 0.44 |
| 137 | 2055 | 0.00 | 2.17 | -0.06 | 0.38 |
| 138 | 2070 | 0.00 | 2.17 | -0.05 | 0.32 |
| 139 | 2085 | 0.00 | 2.17 | -0.05 | 0.28 |
| 140 | 2100 | 0.00 | 2.17 | -0.04 | 0.24 |
| 141 | 2115 | 0.00 | 2.17 | -0.03 | 0.20 |
| 142 | 2130 | 0.00 | 2.17 | -0.03 | 0.17 |
| 143 | 2145 | 0.00 | 2.17 | -0.03 | 0.14 |
| 144 | 2160 | 0.00 | 2.17 | -0.02 | 0.12 |
| 145 | 2175 | 0.00 | 2.17 | -0.02 | 0.10 |
| 146 | 2190 | 0.00 | 2.17 | -0.02 | 0.08 |
| 147 | 2205 | 0.00 | 2.17 | -0.02 | 0.06 |
| 148 | 2220 | 0.00 | 2.17 | -0.02 | 0.05 |
| 149 | 2235 | 0.00 | 2.17 | -0.01 | 0.03 |
| 150 | 2250 | 0.00 | 2.17 | -0.01 | 0.02 |
| 151 | 2265 | 0.00 | 2.17 | -0.01 | 0.02 |
| 152 | 2280 | 0.00 | 2.17 | -0.01 | 0.01 |
| 153 | 2295 | 0.00 | 2.17 | 0.00 | 0.00 |
| 154 | 2310 | 0.00 | 2.17 | 0.00 | 0.00 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 256.08 (cfs)
 Volume..... = 72.38 (acft)
 Time Interval..... = 18 (min)
 Time to Peak..... = 792.00 (min)
 Time of Base..... = 1764.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 1
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 419.55 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 18 (min)
 Time to Peak..... = 75.49 (min)
 Time of Base..... = 377.45 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 67.94 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|-----------------------|--------|-----|
| CORBETT | 187.00 | 68 |
| SUPRISE | 25.00 | 51 |
| SUPRISE | 66.00 | 60 |
| GLENBROOK | 315.00 | 70 |
| KOONTZ | 76.00 | 70 |
| SUB | 19.00 | 51 |
| TOLL | 10.00 | 30 |
| Overall Approximation | 698.00 | 67 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12450
 Flow Length (L)..... = 14900.00 (ft)
 Time of Concentration..... = 113.24 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|------------|
| Distribution Type..... | = | SCS II |
| Total Precipitation..... | = | 4.17 (in) |
| Return Period..... | = | 100 (yr) |
| Storm Duration..... | = | 24.00 (hr) |

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 18 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 18 | 56.47 |
| 36 | 181.67 |
| 54 | 351.10 |
| 72 | 417.61 |
| 90 | 392.14 |
| 108 | 314.39 |
| 126 | 205.96 |
| 144 | 136.87 |
| 162 | 95.12 |
| 180 | 63.63 |
| 198 | 43.45 |
| 216 | 29.48 |
| 234 | 19.94 |
| 252 | 13.59 |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 18 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 270 | 9.20 |
| 288 | 6.17 |
| 306 | 4.35 |
| 324 | 3.15 |
| 342 | 1.97 |
| 360 | 0.97 |

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 18 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 684 | 0.26 |
| 702 | 3.09 |
| 720 | 33.00 |
| 738 | 99.27 |
| 756 | 190.33 |
| 774 | 244.93 |
| 792 | 256.07 |

HYDROGRAPH REPORT

RECORD NUMBER : 2
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 18 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 810 | 234.87 |
| 828 | 192.09 |
| 846 | 157.47 |
| 864 | 131.81 |
| 882 | 110.62 |
| 900 | 94.62 |
| 918 | 82.26 |
| 936 | 72.72 |
| 954 | 65.29 |
| 972 | 59.22 |
| 990 | 54.11 |
| 1008 | 49.92 |
| 1026 | 46.45 |
| 1044 | 43.47 |
| 1062 | 40.93 |
| 1080 | 38.72 |
| 1098 | 37.07 |
| 1116 | 35.61 |
| 1134 | 34.24 |
| 1152 | 32.94 |
| 1170 | 31.66 |
| 1188 | 30.40 |

HYDROGRAPH REPORT

RECORD NUMBER : 2
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 18 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1206 | 29.15 |
| 1224 | 27.92 |
| 1242 | 26.76 |
| 1260 | 25.73 |
| 1278 | 24.89 |
| 1296 | 24.22 |
| 1314 | 23.70 |
| 1332 | 23.28 |
| 1350 | 22.92 |
| 1368 | 22.61 |
| 1386 | 22.32 |
| 1404 | 22.06 |
| 1422 | 21.80 |
| 1440 | 21.06 |
| 1458 | 19.24 |
| 1476 | 15.96 |
| 1494 | 12.13 |
| 1512 | 8.57 |
| 1530 | 5.73 |
| 1548 | 3.87 |
| 1566 | 2.63 |
| 1584 | 1.77 |

HYDROGRAPH REPORT

RECORD NUMBER : 2
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 18 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1602 | 1.19 |
| 1620 | 0.80 |
| 1638 | 0.53 |
| 1656 | 0.35 |
| 1674 | 0.23 |
| 1692 | 0.15 |
| 1710 | 0.09 |
| 1728 | 0.05 |
| 1746 | 0.03 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1365 | 1.50 |
| 1378 | 1.49 |
| 1391 | 1.48 |
| 1404 | 1.46 |
| 1417 | 1.45 |
| 1430 | 1.40 |
| 1443 | 1.28 |
| 1456 | 1.05 |
| 1469 | 0.79 |
| 1482 | 0.55 |
| 1495 | 0.36 |
| 1508 | 0.24 |
| 1521 | 0.16 |
| 1534 | 0.11 |
| 1547 | 0.07 |
| 1560 | 0.05 |
| 1573 | 0.03 |
| 1586 | 0.02 |
| 1599 | 0.01 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 27
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 2.32 (cfs)
 Volume..... = 2.93 (acft)
 Time Interval..... = 11 (min)
 Time to Peak..... = 572.00 (min)
 Time of Base..... = 1628.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 21
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 86.03 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 11 (min)
 Time to Peak..... = 46.68 (min)
 Time of Base..... = 233.38 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 42.01 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|-------|-----|
| GOLF COURSE AND OPEN SPACE | 35.50 | 61 |
| HOUSING | 26.50 | 75 |
| CONDOS | 19.00 | 85 |
| COMMERCIAL | 7.50 | 94 |
| Overall Approximation | 88.50 | 73 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02700
 Flow Length (L)..... = 3850.00 (ft)
 Time of Concentration..... = 70.01 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 21
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 11 | 11.37 |
| 22 | 36.49 |
| 33 | 71.21 |
| 44 | 85.54 |
| 55 | 81.13 |
| 66 | 65.90 |
| 77 | 43.90 |
| 88 | 29.15 |
| 99 | 20.29 |
| 110 | 13.76 |
| 121 | 9.34 |
| 132 | 6.36 |
| 143 | 4.32 |
| 154 | 2.97 |
| 165 | 2.03 |
| 176 | 1.37 |
| 187 | 0.94 |
| 198 | 0.70 |
| 209 | 0.45 |
| 220 | 0.25 |
| 231 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 473 | 0.05 |
| 484 | 0.23 |
| 495 | 0.60 |
| 506 | 1.07 |
| 517 | 1.52 |
| 528 | 1.87 |
| 539 | 2.09 |
| 550 | 2.22 |
| 561 | 2.30 |
| 572 | 2.32 |
| 583 | 2.31 |
| 594 | 2.29 |
| 605 | 2.28 |
| 616 | 2.27 |
| 627 | 2.27 |
| 638 | 2.27 |
| 649 | 2.26 |
| 660 | 2.26 |
| 671 | 2.26 |
| 682 | 2.26 |
| 693 | 2.26 |
| 704 | 2.27 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 715 | 2.26 |
| 726 | 2.25 |
| 737 | 2.22 |
| 748 | 2.21 |
| 759 | 2.19 |
| 770 | 2.17 |
| 781 | 2.16 |
| 792 | 2.15 |
| 803 | 2.16 |
| 814 | 2.18 |
| 825 | 2.20 |
| 836 | 2.21 |
| 847 | 2.22 |
| 858 | 2.22 |
| 869 | 2.22 |
| 880 | 2.23 |
| 891 | 2.24 |
| 902 | 2.25 |
| 913 | 2.25 |
| 924 | 2.26 |
| 935 | 2.27 |
| 946 | 2.27 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 957 | 2.27 |
| 968 | 2.27 |
| 979 | 2.28 |
| 990 | 2.28 |
| 1001 | 2.28 |
| 1012 | 2.28 |
| 1023 | 2.28 |
| 1034 | 2.28 |
| 1045 | 2.27 |
| 1056 | 2.27 |
| 1067 | 2.27 |
| 1078 | 2.26 |
| 1089 | 2.26 |
| 1100 | 2.25 |
| 1111 | 2.25 |
| 1122 | 2.24 |
| 1133 | 2.23 |
| 1144 | 2.22 |
| 1155 | 2.22 |
| 1166 | 2.21 |
| 1177 | 2.20 |
| 1188 | 2.19 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1199 | 2.18 |
| 1210 | 2.17 |
| 1221 | 2.16 |
| 1232 | 2.14 |
| 1243 | 2.13 |
| 1254 | 2.12 |
| 1265 | 2.11 |
| 1276 | 2.09 |
| 1287 | 2.08 |
| 1298 | 2.06 |
| 1309 | 2.05 |
| 1320 | 2.03 |
| 1331 | 2.02 |
| 1342 | 2.00 |
| 1353 | 1.99 |
| 1364 | 1.97 |
| 1375 | 1.95 |
| 1386 | 1.94 |
| 1397 | 1.92 |
| 1408 | 1.90 |
| 1419 | 1.88 |
| 1430 | 1.86 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1441 | 1.80 |
| 1452 | 1.65 |
| 1463 | 1.38 |
| 1474 | 1.06 |
| 1485 | 0.75 |
| 1496 | 0.51 |
| 1507 | 0.34 |
| 1518 | 0.23 |
| 1529 | 0.16 |
| 1540 | 0.11 |
| 1551 | 0.07 |
| 1562 | 0.05 |
| 1573 | 0.03 |
| 1584 | 0.02 |
| 1595 | 0.01 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 4.51 (cfs)
 Volume..... = 4.92 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 559.00 (min)
 Time of Base..... = 1651.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 20
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 75.10 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 13 (min)
 Time to Peak..... = 53.47 (min)
 Time of Base..... = 267.37 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 48.13 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 88.50 (ac)
 Curve Number..... = 68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02700
 Flow Length (L)..... = 3850.00 (ft)
 Time of Concentration..... = 80.21 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 20
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 13 | 10.42 |
| 26 | 33.64 |
| 39 | 64.00 |
| 52 | 74.89 |
| 65 | 69.02 |
| 78 | 54.17 |
| 91 | 34.45 |
| 104 | 23.10 |
| 117 | 15.87 |
| 130 | 10.57 |
| 143 | 7.20 |
| 156 | 4.81 |
| 169 | 3.23 |
| 182 | 2.17 |
| 195 | 1.47 |
| 208 | 0.99 |
| 221 | 0.71 |
| 234 | 0.49 |
| 247 | 0.29 |
| 260 | 0.10 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 455 | 0.01 |
| 468 | 0.14 |
| 481 | 0.59 |
| 494 | 1.46 |
| 507 | 2.55 |
| 520 | 3.49 |
| 533 | 4.12 |
| 546 | 4.43 |
| 559 | 4.51 |
| 572 | 4.49 |
| 585 | 4.42 |
| 598 | 4.31 |
| 611 | 4.22 |
| 624 | 4.15 |
| 637 | 4.09 |
| 650 | 4.05 |
| 663 | 4.01 |
| 676 | 3.98 |
| 689 | 3.95 |
| 702 | 3.92 |
| 715 | 3.89 |
| 728 | 3.85 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 741 | 3.81 |
| 754 | 3.76 |
| 767 | 3.71 |
| 780 | 3.66 |
| 793 | 3.64 |
| 806 | 3.64 |
| 819 | 3.66 |
| 832 | 3.68 |
| 845 | 3.69 |
| 858 | 3.68 |
| 871 | 3.68 |
| 884 | 3.69 |
| 897 | 3.69 |
| 910 | 3.70 |
| 923 | 3.71 |
| 936 | 3.71 |
| 949 | 3.71 |
| 962 | 3.71 |
| 975 | 3.71 |
| 988 | 3.71 |
| 1001 | 3.71 |
| 1014 | 3.70 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1027 | 3.69 |
| 1040 | 3.69 |
| 1053 | 3.68 |
| 1066 | 3.67 |
| 1079 | 3.65 |
| 1092 | 3.64 |
| 1105 | 3.63 |
| 1118 | 3.61 |
| 1131 | 3.60 |
| 1144 | 3.58 |
| 1157 | 3.56 |
| 1170 | 3.54 |
| 1183 | 3.52 |
| 1196 | 3.50 |
| 1209 | 3.47 |
| 1222 | 3.45 |
| 1235 | 3.43 |
| 1248 | 3.40 |
| 1261 | 3.37 |
| 1274 | 3.35 |
| 1287 | 3.32 |
| 1300 | 3.29 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1313 | 3.26 |
| 1326 | 3.23 |
| 1339 | 3.20 |
| 1352 | 3.17 |
| 1365 | 3.14 |
| 1378 | 3.10 |
| 1391 | 3.07 |
| 1404 | 3.03 |
| 1417 | 3.00 |
| 1430 | 2.89 |
| 1443 | 2.63 |
| 1456 | 2.16 |
| 1469 | 1.62 |
| 1482 | 1.13 |
| 1495 | 0.75 |
| 1508 | 0.50 |
| 1521 | 0.34 |
| 1534 | 0.23 |
| 1547 | 0.15 |
| 1560 | 0.10 |
| 1573 | 0.07 |
| 1586 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1599 | 0.03 |
| 1612 | 0.02 |
| 1625 | 0.01 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 8.56 (cfs)
 Volume..... = 6.75 (acft)
 Time Interval..... = 11 (min)
 Time to Peak..... = 528.00 (min)
 Time of Base..... = 1639.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 21
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 86.03 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 11 (min)
 Time to Peak..... = 46.68 (min)
 Time of Base..... = 233.38 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 42.01 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|-------|-----|
| GOLF COURSE AND OPEN SPACE | 35.50 | 61 |
| HOUSING | 26.50 | 75 |
| CONDOS | 19.00 | 85 |
| COMMERCIAL | 7.50 | 94 |
| Overall Approximation | 88.50 | 73 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02700
 Flow Length (L)..... = 3850.00 (ft)
 Time of Concentration..... = 70.01 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 25 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 21
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 11 | 11.37 |
| 22 | 36.49 |
| 33 | 71.21 |
| 44 | 85.54 |
| 55 | 81.13 |
| 66 | 65.90 |
| 77 | 43.90 |
| 88 | 29.15 |
| 99 | 20.29 |
| 110 | 13.76 |
| 121 | 9.34 |
| 132 | 6.36 |
| 143 | 4.32 |
| 154 | 2.97 |
| 165 | 2.03 |
| 176 | 1.37 |
| 187 | 0.94 |
| 198 | 0.70 |
| 209 | 0.45 |
| 220 | 0.25 |
| 231 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 418 | 0.04 |
| 429 | 0.11 |
| 440 | 0.26 |
| 451 | 0.51 |
| 462 | 1.01 |
| 473 | 1.99 |
| 484 | 3.60 |
| 495 | 5.54 |
| 506 | 7.23 |
| 517 | 8.25 |
| 528 | 8.56 |
| 539 | 8.42 |
| 550 | 8.09 |
| 561 | 7.72 |
| 572 | 7.33 |
| 583 | 6.95 |
| 594 | 6.60 |
| 605 | 6.33 |
| 616 | 6.12 |
| 627 | 5.96 |
| 638 | 5.82 |
| 649 | 5.70 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 660 | 5.60 |
| 671 | 5.51 |
| 682 | 5.44 |
| 693 | 5.37 |
| 704 | 5.32 |
| 715 | 5.26 |
| 726 | 5.18 |
| 737 | 5.08 |
| 748 | 5.00 |
| 759 | 4.92 |
| 770 | 4.85 |
| 781 | 4.79 |
| 792 | 4.74 |
| 803 | 4.74 |
| 814 | 4.75 |
| 825 | 4.77 |
| 836 | 4.77 |
| 847 | 4.75 |
| 858 | 4.74 |
| 869 | 4.72 |
| 880 | 4.72 |
| 891 | 4.72 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 902 | 4.71 |
| 913 | 4.71 |
| 924 | 4.70 |
| 935 | 4.70 |
| 946 | 4.69 |
| 957 | 4.68 |
| 968 | 4.67 |
| 979 | 4.66 |
| 990 | 4.64 |
| 1001 | 4.63 |
| 1012 | 4.62 |
| 1023 | 4.60 |
| 1034 | 4.58 |
| 1045 | 4.56 |
| 1056 | 4.55 |
| 1067 | 4.53 |
| 1078 | 4.51 |
| 1089 | 4.48 |
| 1100 | 4.46 |
| 1111 | 4.44 |
| 1122 | 4.42 |
| 1133 | 4.39 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1144 | 4.37 |
| 1155 | 4.34 |
| 1166 | 4.31 |
| 1177 | 4.29 |
| 1188 | 4.26 |
| 1199 | 4.23 |
| 1210 | 4.20 |
| 1221 | 4.17 |
| 1232 | 4.14 |
| 1243 | 4.11 |
| 1254 | 4.08 |
| 1265 | 4.05 |
| 1276 | 4.01 |
| 1287 | 3.98 |
| 1298 | 3.95 |
| 1309 | 3.91 |
| 1320 | 3.88 |
| 1331 | 3.84 |
| 1342 | 3.81 |
| 1353 | 3.77 |
| 1364 | 3.73 |
| 1375 | 3.70 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1386 | 3.66 |
| 1397 | 3.62 |
| 1408 | 3.58 |
| 1419 | 3.54 |
| 1430 | 3.50 |
| 1441 | 3.39 |
| 1452 | 3.10 |
| 1463 | 2.59 |
| 1474 | 1.98 |
| 1485 | 1.41 |
| 1496 | 0.95 |
| 1507 | 0.64 |
| 1518 | 0.44 |
| 1529 | 0.30 |
| 1540 | 0.20 |
| 1551 | 0.14 |
| 1562 | 0.09 |
| 1573 | 0.06 |
| 1584 | 0.04 |
| 1595 | 0.03 |
| 1606 | 0.02 |
| 1617 | 0.01 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 18.86 (cfs)
 Volume..... = 12.14 (acft)
 Time Interval..... = 11 (min)
 Time to Peak..... = 517.00 (min)
 Time of Base..... = 1639.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 21
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 86.03 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 11 (min)
 Time to Peak..... = 46.68 (min)
 Time of Base..... = 233.38 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 42.01 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|-------|-----|
| GOLF COURSE AND OPEN SPACE | 35.50 | 61 |
| HOUSING | 26.50 | 75 |
| CONDOS | 19.00 | 85 |
| COMMERCIAL | 7.50 | 94 |
| Overall Approximation | 88.50 | 73 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02700
 Flow Length (L)..... = 3850.00 (ft)
 Time of Concentration..... = 70.01 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 4.17 (in)
 Return Period..... = 100 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 21
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 11 | 11.37 |
| 22 | 36.49 |
| 33 | 71.21 |
| 44 | 85.54 |
| 55 | 81.13 |
| 66 | 65.90 |
| 77 | 43.90 |
| 88 | 29.15 |
| 99 | 20.29 |
| 110 | 13.76 |
| 121 | 9.34 |
| 132 | 6.36 |
| 143 | 4.32 |
| 154 | 2.97 |
| 165 | 2.03 |
| 176 | 1.37 |
| 187 | 0.94 |
| 198 | 0.70 |
| 209 | 0.45 |
| 220 | 0.25 |
| 231 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 352 | 0.04 |
| 363 | 0.13 |
| 374 | 0.29 |
| 385 | 0.54 |
| 396 | 0.87 |
| 407 | 1.26 |
| 418 | 1.69 |
| 429 | 2.16 |
| 440 | 2.71 |
| 451 | 3.40 |
| 462 | 4.63 |
| 473 | 6.88 |
| 484 | 10.40 |
| 495 | 14.32 |
| 506 | 17.40 |
| 517 | 18.86 |
| 528 | 18.81 |
| 539 | 17.89 |
| 550 | 16.70 |
| 561 | 15.56 |
| 572 | 14.49 |
| 583 | 13.49 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 594 | 12.62 |
| 605 | 11.94 |
| 616 | 11.42 |
| 627 | 11.00 |
| 638 | 10.65 |
| 649 | 10.34 |
| 660 | 10.08 |
| 671 | 9.87 |
| 682 | 9.67 |
| 693 | 9.51 |
| 704 | 9.36 |
| 715 | 9.22 |
| 726 | 9.04 |
| 737 | 8.83 |
| 748 | 8.66 |
| 759 | 8.49 |
| 770 | 8.36 |
| 781 | 8.21 |
| 792 | 8.12 |
| 803 | 8.08 |
| 814 | 8.08 |
| 825 | 8.09 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 836 | 8.07 |
| 847 | 8.03 |
| 858 | 7.98 |
| 869 | 7.94 |
| 880 | 7.91 |
| 891 | 7.89 |
| 902 | 7.87 |
| 913 | 7.85 |
| 924 | 7.82 |
| 935 | 7.80 |
| 946 | 7.77 |
| 957 | 7.74 |
| 968 | 7.70 |
| 979 | 7.67 |
| 990 | 7.64 |
| 1001 | 7.60 |
| 1012 | 7.56 |
| 1023 | 7.53 |
| 1034 | 7.49 |
| 1045 | 7.45 |
| 1056 | 7.40 |
| 1067 | 7.36 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1078 | 7.32 |
| 1089 | 7.27 |
| 1100 | 7.23 |
| 1111 | 7.18 |
| 1122 | 7.13 |
| 1133 | 7.09 |
| 1144 | 7.04 |
| 1155 | 6.99 |
| 1166 | 6.94 |
| 1177 | 6.88 |
| 1188 | 6.83 |
| 1199 | 6.78 |
| 1210 | 6.72 |
| 1221 | 6.67 |
| 1232 | 6.61 |
| 1243 | 6.56 |
| 1254 | 6.50 |
| 1265 | 6.44 |
| 1276 | 6.39 |
| 1287 | 6.33 |
| 1298 | 6.27 |
| 1309 | 6.21 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1320 | 6.15 |
| 1331 | 6.09 |
| 1342 | 6.03 |
| 1353 | 5.96 |
| 1364 | 5.90 |
| 1375 | 5.84 |
| 1386 | 5.77 |
| 1397 | 5.71 |
| 1408 | 5.64 |
| 1419 | 5.58 |
| 1430 | 5.51 |
| 1441 | 5.33 |
| 1452 | 4.88 |
| 1463 | 4.07 |
| 1474 | 3.11 |
| 1485 | 2.22 |
| 1496 | 1.49 |
| 1507 | 1.01 |
| 1518 | 0.69 |
| 1529 | 0.47 |
| 1540 | 0.31 |
| 1551 | 0.21 |

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1562 | 0.14 |
| 1573 | 0.10 |
| 1584 | 0.06 |
| 1595 | 0.04 |
| 1606 | 0.03 |
| 1617 | 0.02 |

HYDROGRAPH REPORT

RECORD NUMBER : 31
 TYPE : COMBINE
 DESCRIPTION : COMBINED FLOWS DRAINAGE BASIN 2, ZONE 2 5YR/24HR

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 10.32 (cfs)
 Volume..... = 12.26 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 1079.00 (min)
 Time of Base..... = 1664.00 (min)

[COMBINE HYDROGRAPH RECORD #]

HYDROGRAPH # 30 TYPE : MANUAL
 DESCRIPTION : IMPORTED AREA B OFF SITE 5 YR/ 24 HR IA
 Peak Discharge..... = 8.06 (cfs)
 Time to Peak..... = 1092.00 (min)
 Time Interval..... = 13 (min)
 HYDROGRAPH # 27 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA
 Peak Discharge..... = 18.86 (cfs)
 Time to Peak..... = 517.00 (min)
 Time Interval..... = 11 (min)

[Combine Hydrograph Flow Values]
 (The time interval is 13 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 468 | 0.03 |
| 481 | 0.19 |
| 494 | 0.66 |
| 507 | 1.47 |
| 520 | 2.52 |
| 533 | 3.64 |
| 546 | 4.71 |
| 559 | 5.65 |
| 572 | 6.38 |

HYDROGRAPH REPORT

RECORD NUMBER : 31
TYPE : COMBINE
DESCRIPTION : COMBINED FLOWS DRAINAGE BASIN 2, ZONE 2 5YR/24HR

[Combine Hydrograph Flow Values]
(The time interval is 13 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 585 | 6.89 |
| 598 | 7.27 |
| 611 | 7.59 |
| 624 | 7.87 |
| 637 | 8.11 |
| 650 | 8.32 |
| 663 | 8.50 |
| 676 | 8.66 |
| 689 | 8.80 |
| 702 | 8.92 |
| 715 | 9.02 |
| 728 | 9.08 |
| 741 | 9.09 |
| 754 | 9.09 |
| 767 | 9.07 |
| 780 | 9.05 |
| 793 | 9.08 |
| 806 | 9.18 |
| 819 | 9.30 |
| 832 | 9.42 |
| 845 | 9.51 |
| 858 | 9.58 |
| 871 | 9.64 |
| 884 | 9.71 |
| 897 | 9.79 |
| 910 | 9.87 |
| 923 | 9.94 |
| 936 | 10.00 |
| 949 | 10.06 |
| 962 | 10.11 |
| 975 | 10.15 |
| 988 | 10.19 |
| 1001 | 10.23 |
| 1014 | 10.25 |
| 1027 | 10.28 |

HYDROGRAPH REPORT

RECORD NUMBER : 31
TYPE : COMBINE
DESCRIPTION : COMBINED FLOWS DRAINAGE BASIN 2, ZONE 2 5YR/24HR

[Combine Hydrograph Flow Values]
(The time interval is 13 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 1040 | 10.30 |
| 1053 | 10.31 |
| 1066 | 10.31 |
| 1079 | 10.32 |
| 1092 | 10.31 |
| 1105 | 10.31 |
| 1118 | 10.29 |
| 1131 | 10.28 |
| 1144 | 10.26 |
| 1157 | 10.23 |
| 1170 | 10.20 |
| 1183 | 10.17 |
| 1196 | 10.14 |
| 1209 | 10.09 |
| 1222 | 10.05 |
| 1235 | 10.00 |
| 1248 | 9.95 |
| 1261 | 9.90 |
| 1274 | 9.84 |
| 1287 | 9.78 |
| 1300 | 9.71 |
| 1313 | 9.64 |
| 1326 | 9.57 |
| 1339 | 9.50 |
| 1352 | 9.42 |
| 1365 | 9.34 |
| 1378 | 9.26 |
| 1391 | 9.17 |
| 1404 | 9.08 |
| 1417 | 8.99 |
| 1430 | 8.74 |
| 1443 | 8.09 |
| 1456 | 6.84 |
| 1469 | 5.27 |
| 1482 | 3.74 |

HYDROGRAPH REPORT

RECORD NUMBER : 31
TYPE : COMBINE
DESCRIPTION : COMBINED FLOWS DRAINAGE BASIN 2, ZONE 2 5YR/24HR

[Combine Hydrograph Flow Values]
(The time interval is 13 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 1495 | 2.49 |
| 1508 | 1.67 |
| 1521 | 1.13 |
| 1534 | 0.75 |
| 1547 | 0.50 |
| 1560 | 0.34 |
| 1573 | 0.22 |
| 1586 | 0.15 |
| 1599 | 0.10 |
| 1612 | 0.06 |
| 1625 | 0.04 |
| 1638 | 0.02 |
| 1651 | 0.01 |
| 1664 | 0.00 |

HYDROGRAPH REPORT

RECORD NUMBER : 33
 TYPE : COMBINE
 DESCRIPTION : COMBINED DRAINAGE B ZONE 2 25YR/24

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 31.27 (cfs)
 Volume..... = 30.97 (acft)
 Time Interval..... = 12 (min)
 Time to Peak..... = 552.00 (min)
 Time of Base..... = 1680.00 (min)

[COMBINE HYDROGRAPH RECORD #]

HYDROGRAPH # 32 TYPE : MANUAL
 DESCRIPTION : IMPORTED AREA B OFF SITE 25YR/ 24 HR IA
 Peak Discharge..... = 23.41 (cfs)
 Time to Peak..... = 559.00 (min)
 Time Interval..... = 13 (min)
 HYDROGRAPH # 27 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA
 Peak Discharge..... = 18.86 (cfs)
 Time to Peak..... = 517.00 (min)
 Time Interval..... = 11 (min)

[Combine Hydrograph Flow Values]
 (The time interval is 12 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 408 | 0.01 |
| 420 | 0.05 |
| 432 | 0.16 |
| 444 | 0.38 |
| 456 | 0.94 |
| 468 | 2.54 |
| 480 | 6.36 |
| 492 | 12.45 |
| 504 | 19.35 |

HYDROGRAPH REPORT

RECORD NUMBER : 33
TYPE : COMBINE
DESCRIPTION : COMBINED DRAINAGE B ZONE 2 25YR/24

[Combine Hydrograph Flow Values]
(The time interval is 12 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 516 | 25.15 |
| 528 | 28.95 |
| 540 | 30.80 |
| 552 | 31.27 |
| 564 | 30.92 |
| 576 | 30.18 |
| 588 | 29.27 |
| 600 | 28.35 |
| 612 | 27.56 |
| 624 | 26.94 |
| 636 | 26.44 |
| 648 | 26.01 |
| 660 | 25.65 |
| 672 | 25.36 |
| 684 | 25.09 |
| 696 | 24.84 |
| 708 | 24.61 |
| 720 | 24.36 |
| 732 | 24.07 |
| 744 | 23.73 |
| 756 | 23.39 |
| 768 | 23.08 |
| 780 | 22.76 |
| 792 | 22.59 |
| 804 | 22.55 |
| 816 | 22.61 |
| 828 | 22.69 |
| 840 | 22.72 |
| 852 | 22.71 |
| 864 | 22.68 |
| 876 | 22.65 |
| 888 | 22.66 |
| 900 | 22.67 |
| 912 | 22.69 |
| 924 | 22.70 |

HYDROGRAPH REPORT

RECORD NUMBER : 33
TYPE : COMBINE
DESCRIPTION : COMBINED DRAINAGE B ZONE 2 25YR/24

[Combine Hydrograph Flow Values]
(The time interval is 12 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 936 | 22.70 |
| 948 | 22.69 |
| 960 | 22.68 |
| 972 | 22.65 |
| 984 | 22.62 |
| 996 | 22.59 |
| 1008 | 22.54 |
| 1020 | 22.49 |
| 1032 | 22.44 |
| 1044 | 22.37 |
| 1056 | 22.30 |
| 1068 | 22.23 |
| 1080 | 22.15 |
| 1092 | 22.06 |
| 1104 | 21.97 |
| 1116 | 21.87 |
| 1128 | 21.76 |
| 1140 | 21.65 |
| 1152 | 21.54 |
| 1164 | 21.42 |
| 1176 | 21.30 |
| 1188 | 21.17 |
| 1200 | 21.03 |
| 1212 | 20.90 |
| 1224 | 20.75 |
| 1236 | 20.61 |
| 1248 | 20.46 |
| 1260 | 20.30 |
| 1272 | 20.14 |
| 1284 | 19.98 |
| 1296 | 19.82 |
| 1308 | 19.65 |
| 1320 | 19.47 |
| 1332 | 19.29 |
| 1344 | 19.11 |

HYDROGRAPH REPORT

RECORD NUMBER : 33
TYPE : COMBINE
DESCRIPTION : COMBINED DRAINAGE B ZONE 2 25YR/24

[Combine Hydrograph Flow Values]
(The time interval is 12 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 1356 | 18.93 |
| 1368 | 18.74 |
| 1380 | 18.55 |
| 1392 | 18.36 |
| 1404 | 18.16 |
| 1416 | 17.96 |
| 1428 | 17.50 |
| 1440 | 16.42 |
| 1452 | 14.41 |
| 1464 | 11.68 |
| 1476 | 8.81 |
| 1488 | 6.27 |
| 1500 | 4.31 |
| 1512 | 2.98 |
| 1524 | 2.06 |
| 1536 | 1.42 |
| 1548 | 0.98 |
| 1560 | 0.67 |
| 1572 | 0.46 |
| 1584 | 0.32 |
| 1596 | 0.22 |
| 1608 | 0.15 |
| 1620 | 0.10 |
| 1632 | 0.06 |
| 1644 | 0.03 |
| 1656 | 0.02 |
| 1668 | 0.01 |
| 1680 | 0.00 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 28
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

| | | |
|----------------------------|---|---------------|
| Peak Discharge..... | = | 4.90 (cfs) |
| Volume..... | = | 5.50 (acft) |
| Time Interval..... | = | 14 (min) |
| Time to Peak..... | = | 1120.00 (min) |
| Time of Base..... | = | 1680.00 (min) |
| Multiplication factor..... | = | 1.00 |

[UNIT HYDROGRAPH INFORMATION]

| | | |
|---------------------------|---|----------------|
| Unit hydrograph #..... | = | 22 |
| Unit hydrograph type..... | = | CURVILINEAR UH |
| Peak Discharge..... | = | 204.55 (cfs) |
| Shape Factor..... | = | 484.00 |
| Time Interval..... | = | 14 (min) |
| Time to Peak..... | = | 59.01 (min) |
| Time of Base..... | = | 295.04 (min) |
| Rainfall Excess..... | = | 1.00 (in) |
| Basin Lag Time..... | = | 53.11 (min) |

[BASIN DESCRIPTION]

| | | |
|---------------------|---|-------------|
| Watershed Area..... | = | 266.00 (ac) |
| Curve Number..... | = | 68 |

[TIME CONCENTRATION -- SCS LAG]

| | | |
|----------------------------|---|--------------|
| Channel Slope (S)..... | = | 0.05000 |
| Flow Length (L)..... | = | 6400.00 (ft) |
| Time of Concentration..... | = | 88.51 (min) |

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|------------|
| Distribution Type..... | = | SCS IA |
| Total Precipitation..... | = | 2.17 (in) |
| Return Period..... | = | 5 (yr) |
| Storm Duration..... | = | 24.00 (hr) |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 22
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 14 | 27.31 |
| 28 | 87.80 |
| 42 | 170.38 |
| 56 | 203.50 |
| 70 | 191.91 |
| 84 | 154.73 |
| 98 | 102.11 |
| 112 | 67.74 |
| 126 | 47.17 |
| 140 | 31.75 |
| 154 | 21.58 |
| 168 | 14.69 |
| 182 | 9.96 |
| 196 | 6.81 |
| 210 | 4.63 |
| 224 | 3.09 |
| 238 | 2.17 |
| 252 | 1.59 |
| 266 | 1.01 |
| 280 | 0.52 |
| 294 | 0.04 |

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 504 | 0.05 |
| 518 | 0.19 |
| 532 | 0.48 |
| 546 | 0.89 |
| 560 | 1.36 |
| 574 | 1.80 |
| 588 | 2.18 |
| 602 | 2.49 |
| 616 | 2.75 |
| 630 | 2.98 |
| 644 | 3.17 |
| 658 | 3.34 |
| 672 | 3.49 |
| 686 | 3.61 |
| 700 | 3.73 |
| 714 | 3.82 |
| 728 | 3.90 |
| 742 | 3.95 |
| 756 | 3.98 |
| 770 | 4.01 |
| 784 | 4.02 |
| 798 | 4.07 |

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 812 | 4.13 |
| 826 | 4.21 |
| 840 | 4.28 |
| 854 | 4.33 |
| 868 | 4.38 |
| 882 | 4.43 |
| 896 | 4.48 |
| 910 | 4.53 |
| 924 | 4.58 |
| 938 | 4.63 |
| 952 | 4.67 |
| 966 | 4.71 |
| 980 | 4.74 |
| 994 | 4.77 |
| 1008 | 4.80 |
| 1022 | 4.82 |
| 1036 | 4.84 |
| 1050 | 4.86 |
| 1064 | 4.87 |
| 1078 | 4.88 |
| 1092 | 4.89 |
| 1106 | 4.90 |

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1120 | 4.90 |
| 1134 | 4.90 |
| 1148 | 4.89 |
| 1162 | 4.89 |
| 1176 | 4.88 |
| 1190 | 4.87 |
| 1204 | 4.85 |
| 1218 | 4.84 |
| 1232 | 4.82 |
| 1246 | 4.80 |
| 1260 | 4.78 |
| 1274 | 4.75 |
| 1288 | 4.72 |
| 1302 | 4.70 |
| 1316 | 4.67 |
| 1330 | 4.63 |
| 1344 | 4.60 |
| 1358 | 4.56 |
| 1372 | 4.52 |
| 1386 | 4.48 |
| 1400 | 4.44 |
| 1414 | 4.40 |

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1428 | 4.25 |
| 1442 | 3.89 |
| 1456 | 3.24 |
| 1470 | 2.47 |
| 1484 | 1.75 |
| 1498 | 1.17 |
| 1512 | 0.79 |
| 1526 | 0.54 |
| 1540 | 0.36 |
| 1554 | 0.25 |
| 1568 | 0.17 |
| 1582 | 0.11 |
| 1596 | 0.07 |
| 1610 | 0.05 |
| 1624 | 0.03 |
| 1638 | 0.02 |
| 1652 | 0.01 |

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 6.17 (cfs)
 Volume..... = 7.68 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 1027.00 (min)
 Time of Base..... = 1651.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 23
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 219.26 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 13 (min)
 Time to Peak..... = 52.96 (min)
 Time of Base..... = 264.79 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 47.66 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

| DESCRIPTION | AREA | CN# |
|----------------------------|--------|-----|
| GOLF COURSE AND OPEN SPACE | 60.60 | 61 |
| HOUSING | 65.00 | 75 |
| CONDOS | 19.40 | 85 |
| COMMERCIAL | 28.00 | 94 |
| UNDEVELOPED | 79.60 | 68 |
| MAINTENANCE | 3.30 | 70 |
| Overall Approximation | 255.90 | 72 |

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.05000
 Flow Length (L)..... = 6400.00 (ft)
 Time of Concentration..... = 79.44 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[RAINFALL DESCRIPTION]

| | | |
|--------------------------|---|------------|
| Distribution Type..... | = | SCS IA |
| Total Precipitation..... | = | 2.17 (in) |
| Return Period..... | = | 5 (yr) |
| Storm Duration..... | = | 24.00 (hr) |

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 13 | 30.90 |
| 26 | 99.88 |
| 39 | 188.58 |
| 52 | 218.86 |
| 65 | 199.71 |
| 78 | 155.04 |
| 91 | 98.04 |
| 104 | 65.36 |
| 117 | 44.77 |
| 130 | 29.83 |
| 143 | 20.16 |
| 156 | 13.37 |
| 169 | 8.91 |
| 182 | 6.04 |

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 23
 TYPE : CURVILINEAR UH
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | FLOW (cfs) |
|---------------|---------------|
| 195 | 4.06 |
| 208 | 2.73 |
| 221 | 1.96 |
| 234 | 1.31 |
| 247 | 0.74 |
| 260 | 0.20 |

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

| TIME (min) | OUTFLOW (cfs) |
|---------------|------------------|
| 468 | 0.02 |
| 481 | 0.21 |
| 494 | 0.76 |
| 507 | 1.74 |
| 520 | 2.85 |
| 533 | 3.85 |
| 546 | 4.63 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 559 | 5.13 |
| 572 | 5.42 |
| 585 | 5.57 |
| 598 | 5.64 |
| 611 | 5.69 |
| 624 | 5.74 |
| 637 | 5.78 |
| 650 | 5.82 |
| 663 | 5.85 |
| 676 | 5.88 |
| 689 | 5.90 |
| 702 | 5.91 |
| 715 | 5.92 |
| 728 | 5.92 |
| 741 | 5.89 |
| 754 | 5.84 |
| 767 | 5.79 |
| 780 | 5.75 |
| 793 | 5.75 |
| 806 | 5.78 |
| 819 | 5.84 |
| 832 | 5.89 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 845 | 5.92 |
| 858 | 5.94 |
| 871 | 5.96 |
| 884 | 5.99 |
| 897 | 6.02 |
| 910 | 6.05 |
| 923 | 6.07 |
| 936 | 6.10 |
| 949 | 6.12 |
| 962 | 6.13 |
| 975 | 6.15 |
| 988 | 6.16 |
| 1001 | 6.17 |
| 1014 | 6.17 |
| 1027 | 6.17 |
| 1040 | 6.17 |
| 1053 | 6.17 |
| 1066 | 6.16 |
| 1079 | 6.15 |
| 1092 | 6.14 |
| 1105 | 6.13 |
| 1118 | 6.11 |

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

| TIME | OUTFLOW |
|-------|---------|
| (min) | (cfs) |
| 1131 | 6.09 |
| 1144 | 6.07 |
| 1157 | 6.05 |
| 1170 | 6.03 |
| 1183 | 6.00 |
| 1196 | 5.97 |
| 1209 | 5.94 |
| 1222 | 5.91 |
| 1235 | 5.87 |
| 1248 | 5.84 |
| 1261 | 5.80 |
| 1274 | 5.76 |
| 1287 | 5.72 |
| 1300 | 5.67 |
| 1313 | 5.63 |
| 1326 | 5.58 |
| 1339 | 5.53 |
| 1352 | 5.48 |
| 1365 | 5.43 |
| 1378 | 5.38 |
| 1391 | 5.32 |
| 1404 | 5.27 |

REVISIONS

| NO. | DATE | DESCRIPTION |
|-----|---------|------------------------------|
| 1 | 1-3-95 | RETENTION BASINS W/1 PHASE 2 |
| 2 | 1-27-95 | GOLF COURSE ROUTING PHASE 1 |

| BASIN | A.P.N. |
|---------|----------|
| 1A, 1C | 8-061-29 |
| 1B | 8-061-67 |
| 2, 3, 4 | 8-061-39 |
| A, B | 7-422-13 |

SILVER OAK CONSULTANTS
 PROJECT MANAGER: [Name]
 CIVIL ENGINEER: [Name]
 REGISTERED PROFESSIONAL ENGINEER
 STATE OF CALIFORNIA
 LICENSE NO. [Number]
 (916) 441-1100 Fax (916) 441-1111

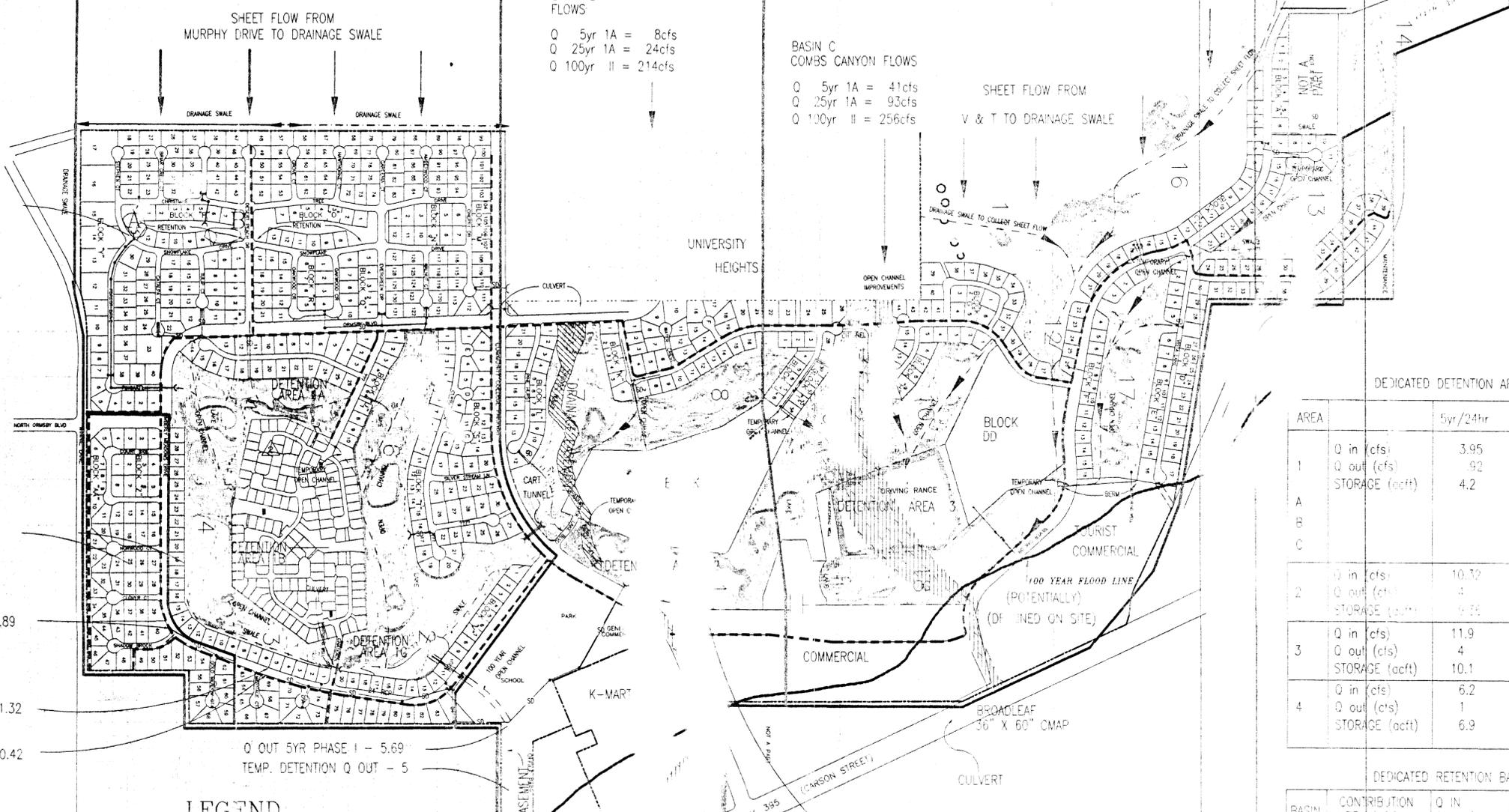
CARSON CITY
 SILVER OAK
 MASTER
 DRAINAGE PLAN

JOB No. 94138
 DATE JAN 2, 1995
 VERT SCALE N/A
 HORIZ SCALE 1" = 400'
 DRAWN BY JRS
 CHECKED BY RM
 SHEET 1 OF 1 SHEETS

| ZONE 1 | | | ZONE 2 | | | ZONE 3 | | |
|----------------------------|--------|-----|----------------------------|-------|-----|----------------------------|--------|-----|
| DESCRIPTION | AREA | CN# | DESCRIPTION | AREA | CN# | DESCRIPTION | AREA | CN# |
| GOLF COURSE AND OPEN SPACE | 50.20 | 61 | GOLF COURSE AND OPEN SPACE | 35.50 | 61 | GOLF COURSE AND OPEN SPACE | 60.60 | 61 |
| HOUSING | 92.00 | 75 | HOUSING | 26.50 | 75 | HOUSING | 65.00 | 75 |
| CONDOS | 21.50 | 85 | CONDOS | 19.00 | 85 | CONDOS | 19.40 | 85 |
| COMMERCIAL | 7.50 | 94 | COMMERCIAL | 7.50 | 94 | COMMERCIAL | 28.00 | 94 |
| UNDEVELOPED | | | UNDEVELOPED | | | UNDEVELOPED | 79.60 | 68 |
| MAINTENANCE | | | MAINTENANCE | | | MAINTENANCE | 3.30 | 70 |
| OVERALL APPROX. | 163.70 | 72 | OVERALL APPROX. | 88.50 | 73 | OVERALL APPROX. | 255.90 | 72 |

BASIN B FLOWS
 Q 5yr 1A = 8cfs
 Q 25yr 1A = 24cfs
 Q 100yr II = 214cfs

BASIN C COMBS CANYON FLOWS
 Q 5yr 1A = 41cfs
 Q 25yr 1A = 93cfs
 Q 100yr II = 256cfs



DEDICATED DETENTION AREA STORAGE AND FLOWS

| AREA | | 5yr/24hr | 25yr/24hr | 100yr/24hr |
|------|----------------|----------|-----------|------------|
| 1 | Q in (cfs) | 3.95 | 12.8 | 28.83 |
| | Q out (cfs) | 92 | 7 | 28.83 |
| | STORAGE (acft) | 4.2 | 0 | 0 |
| A | Q in (cfs) | | 0.6 | |
| | Q out (cfs) | | 1.8 | |
| | STORAGE (acft) | | 3.6 | |
| 2 | Q in (cfs) | 10.32 | 32.3 | 213.87 |
| | Q out (cfs) | 4 | 10 | 213 |
| | STORAGE (acft) | 9.54 | 24 | 0 |
| 3 | Q in (cfs) | 11.9 | 29.3 | 256 |
| | Q out (cfs) | 4 | 12 | 216 |
| | STORAGE (acft) | 10.1 | 27.1 | 83 |
| 4 | Q in (cfs) | 6.2 | 21.12 | 48.4 |
| | Q out (cfs) | 1 | 5 | 102.03 |
| | STORAGE (acft) | 6.9 | 14.35 | 19.59 |

DEDICATED RETENTION BASINS

| BASIN | CONTRIBUTION AREA (AC.) | Q IN (C.F.S.) | VOLUME IN (AC./FT.) | STORAGE (AC./FT.) |
|-------|-------------------------|---------------|---------------------|-------------------|
| A | 8.14 | 2.69 | 0.12 | 0.12 |
| B | 3.47 | 1.4 | 0.05 | 0.05 |

SCALE 1" = 400'

MASTER DRAINAGE PLAN

CONSTRUCTED

CONSTRUCTED

CONSTRUCTED

Q IN 5YR - 3.89
 Q IN 5YR - 1.32
 Q IN 5YR - 0.42

Q OUT 5YR PHASE I - 5.69
 TEMP. DETENTION Q OUT - 5

LEGEND

- ZONE
- PHASE
- SHEET FLOW
- RETENTION BASIN
- OPEN CHANNEL
- DRAINAGE SWALE
- 100 YR FLOOD ROUTE
- CULVERT
- CATCH BASIN
- STORM DRAIN
- STORM DRAIN MANHOLE

PLAN HOLD CORPORATION • IRVINE, CALIFORNIA
 REGISTERED PROFESSIONAL ENGINEER
 LICENSE NO. 10000

2236

REVISIONS

| NO. | DATE | DESCRIPTION |
|-----|---------|--------------------------------|
| 1 | 1-3-96 | RETENTION BASINS, W. 1 PHASE 2 |
| 2 | 1-27-96 | GOLF COURSE BOTTING PHASE 1 |

ZONE 1

| DESCRIPTION | AREA | CN# |
|----------------------------|--------|-----|
| GOLF COURSE AND OPEN SPACE | 50.20 | 61 |
| HOUSING | 92.00 | 75 |
| CONDOS | 21.50 | 85 |
| OVERALL APPROX. | 163.70 | 72 |

ZONE 2

| DESCRIPTION | AREA | CN# |
|----------------------------|-------|-----|
| GOLF COURSE AND OPEN SPACE | 35.50 | 61 |
| HOUSING | 26.50 | 75 |
| CONDOS | 19.00 | 85 |
| COMMERCIAL | 7.50 | 94 |
| OVERALL APPROX. | 88.50 | 73 |

ZONE 3

| DESCRIPTION | AREA | CN# |
|----------------------------|--------|-----|
| GOLF COURSE AND OPEN SPACE | 60.60 | 61 |
| HOUSING | 65.00 | 75 |
| CONDOS | 19.40 | 85 |
| COMMERCIAL | 28.00 | 94 |
| UNDEVELOPED | 79.60 | 68 |
| MAINTENANCE | 3.30 | 70 |
| OVERALL APPROX. | 255.90 | 72 |

BASIN B FLOWS
Q 5yr 1A = 8cfs
Q 25yr 1A = 24cfs
Q 100yr II = 214cfs

BASIN C COMBS CANYON FLOWS
Q 5yr 1A = 41cfs
Q 25yr 1A = 93cfs
Q 100yr II = 256cfs

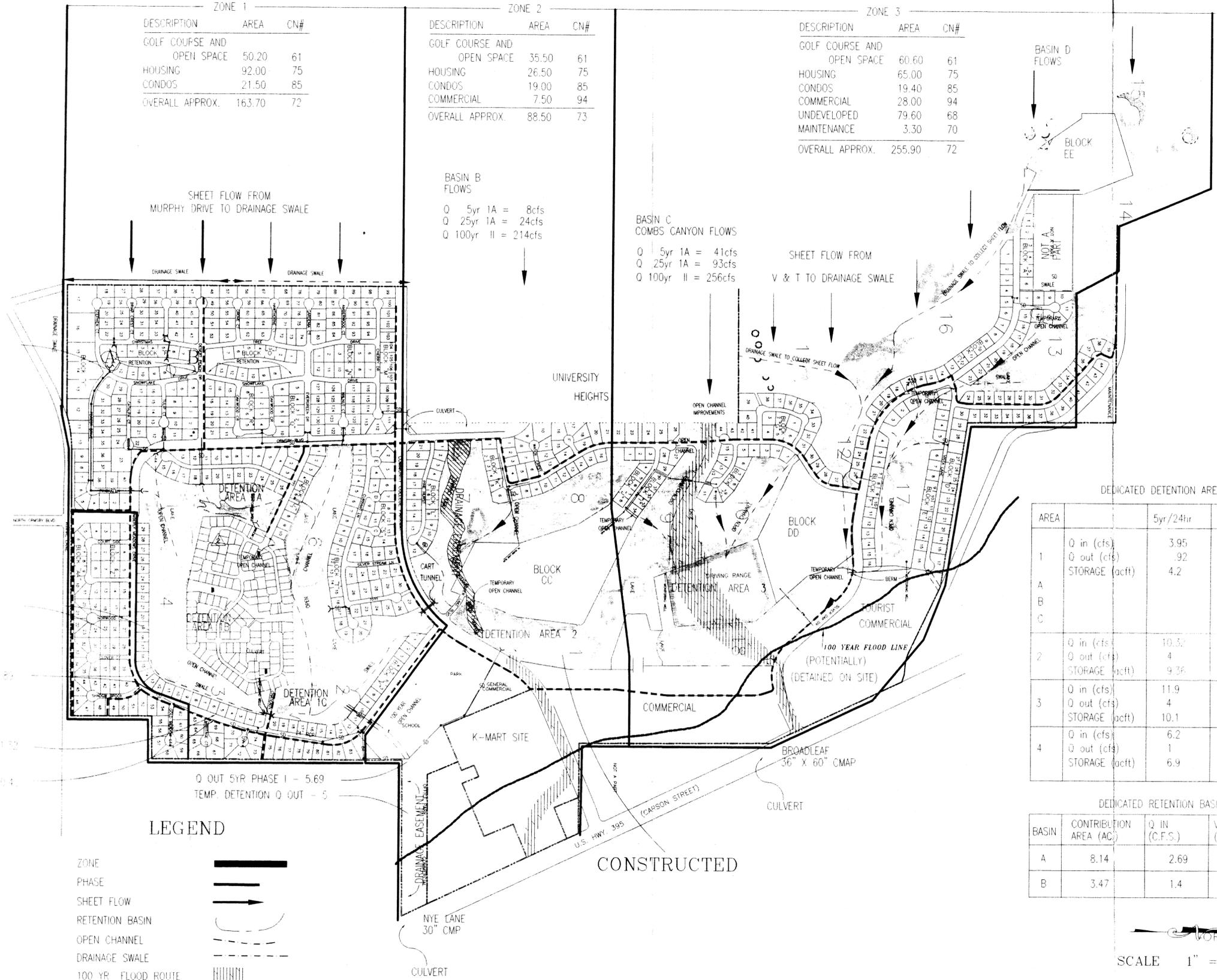
| BASIN | A.P.N. |
|---------|----------|
| 1A, 1C | 8-061-29 |
| 1B | 8-061-67 |
| 2, 3, 4 | 8-061-39 |
| A, B | 7-422-13 |

DEDICATED DETENTION AREA STORAGE AND FLOWS

| AREA | 5yr/24hr | 25yr/24hr | 100yr/24hr |
|------|--|---------------------|-------------------------|
| 1 | Q in (cfs) 3.95 Q out (cfs) .92 STORAGE (acft) 4.2 | 12.8 7 0 | 28.83 28.83 0 |
| A | | 0.6 | |
| B | | 1.8 | |
| C | | 3.6 | |
| 2 | Q in (cfs) 10.50 Q out (cfs) 4 STORAGE (acft) 9.36 | 32.3 10 24 | 215.87 213 0 |
| 3 | Q in (cfs) 11.9 Q out (cfs) 4 STORAGE (acft) 10.1 | 29.3 12 27.1 | 256 216 83 |
| 4 | Q in (cfs) 6.2 Q out (cfs) 1 STORAGE (acft) 6.9 | 21.12 5 14.35 | 48.4 102.03 19.59 |

DEDICATED RETENTION BASINS

| BASIN | CONTRIBUTION AREA (AC) | Q IN (C.F.S.) | VOLUME IN (AC/FT) | STORAGE (AC/FT) |
|-------|------------------------|---------------|-------------------|-----------------|
| A | 8.14 | 2.69 | 0.12 | 0.12 |
| B | 3.47 | 1.4 | 0.05 | 0.05 |



CONSTRUCTED

CONSTRUCTED

CONSTRUCTED

LEGEND

- ZONE
- PHASE
- SHEET FLOW
- RETENTION BASIN
- OPEN CHANNEL
- DRAINAGE SWALE
- 100 YR. FLOOD ROUTE
- CULVERT
- CATCH BASIN
- STORM DRAIN
- STORM DRAIN MANHOLE

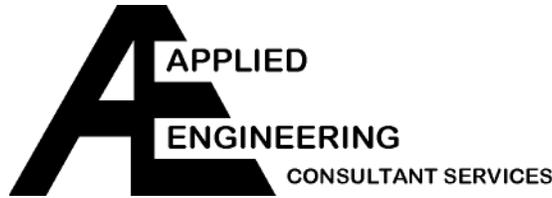
MASTER DRAINAGE PLAN

NORTH
SCALE 1" = 400'

SILVER STATE CONSULTANTS
CONSULTING ENGINEERS AND ARCHITECTS
1000 W. 10TH ST. SUITE 100
DENVER, CO 80202
TEL: 303.733.1100 FAX: 303.733.1101

CARSON CITY
SILVER OAK
MASTER
DRAINAGE PLAN

| | |
|-------------|-------------|
| JOB No. | 94136 |
| DATE | JAN 2, 1996 |
| VERT SCALE | N/A |
| HORIZ SCALE | 1" = 400' |
| DRAWN BY | JRS |
| CHECKED BY | RM |
| SHEET | 1 |
| OF | 1 |
| SHEETS | |
| FILE NO. | 207702 |



4825 Convair Drive, Suite 17; Carson City, Nevada 89706
Telephone (775) 888-9939, Fax (775) 888-9469

November 12, 2015
Project No. 124-44-15

Mr. Mark Turner
Silver Oak Development
3075 College Drive
Carson City, Nevada 89703

Re: Geotechnical Investigation
Proposed Phase 21 Single Family Residential Development
Silver Oak Planned Unit Development
Oak Ridge Drive (APN: 007-462-12)
Carson City, Nevada

Dear Mr. Turner:

This report presents the results of our Geotechnical Investigation performed for the Proposed Phase 21 Single Family Residential Development Project to be located on Oak Ridge Drive (APN: 007-462-12) within the Silver Oak Planned Unit Development in Carson City, Nevada. A project vicinity map for the single family residential development is presented on Plate 1.

Our scope of work was to excavate several test pits within the proposed Phase 21 Residential Development boundaries, evaluate the subsurface soils encountered, and provide site specific recommendations to aid in the design and construction of the proposed residential structures and associated improvements. These recommendations addressed Portland Cement Concrete foundation and slab-on-grade preparation procedures, including overexcavation requirements, if needed, asphaltic concrete pavement structural sections and other relevant site specific items.

We understand the proposed single family residential development will consist of 31 parcels on Oak Ridge Drive (APN: 007-462-12) within Phase 21 of the Silver Oak Planned Unit Development in Carson City, Nevada. The project site is bounded by Oak Ridge Drive and the Silver Oak Park Site adjacent to the southern boundary; the existing closed K-Mart Commercial Parcel adjacent to the northern boundary; by a proposed future school parcel to the west and by existing single family residential lots and the Nye Lane Medical Building Complex to the east. Our firm has previously prepared a geotechnical investigation and earthquake fault review for the Phase 17 Residential Subdivision dated April 4, 2013 in the

vicinity of the proposed Phase 21 Residential Subdivision. Our firm also provided review of previously prepared geotechnical investigations for the K-Mart Shopping Center, prepared by SEA Incorporated, dated August 13, 1993 and the overall Silver Oak Planned Community Site Feasibility Study, prepared by Pezonella and Associates dated January 12, 1994. The Phase 21 Residential Subdivision geotechnical investigation encompasses both the past established geotechnical information and the current geotechnical data / information obtained.

It is also our understanding that the project will consist of an approximate 8.0 acre site. Tentative construction plans include conventional Portland Cement concrete foundations and slab-on-grade with wood framed walls and a wood panelized roofing system. We are anticipating minimal earthwork to attain proper drainage. However, overexcavation of unsuitable soils may be needed pending in-place soil characteristics and subsequent geotechnical recommendations to attain acceptable structural support. Exterior site improvements including flexible asphaltic concrete and Portland cement concrete flatwork are also anticipated.

The project is located in the northern portion of Carson City, which is within the western portion of Eagle Valley. Eagle Valley is a structural basin bounded to the west by the Carson Range (a spur of the Sierra Nevada Mountains), to the north by the Virginia Range and to the east by the Pine Nut Mountains. To the south, an alluvial divide separates Eagle Valley from Carson Valley.

The valley sediments are unconsolidated and partially consolidated materials derived from erosion of the surrounding mountains, which are composed of Tertiary and Quaternary volcanic rocks and Mesozoic granodiorites and metavolcanics. Sediments in the basin are mid-to late- Pleistocene alluvial deposits consisting of silty sands and gravels with some interbeds of sandy silts and clays. The subsurface soils would be considered to be within the Soil Profile Type Sd as shown within Table 16-J of the 2012 International Building Code (I.B.C.). The site lies within Seismic Zone 3 as categorized by the Uniform Building Code and has a corresponding Seismic Zone factor (Z) of 0.30.

The Earthquake Hazards Map – Carson City Quadrangle by Trexler and Bell (1979) published by the Nevada Bureau of Mines and Geology indicated that the Phase 21 residential development site lies within the vicinity of a southwest to northeast trending indeterminate (questionable) Holocene aged faults (less than 10,000 years old). The Nevada Earthquake Safety Council has developed the criteria for the evaluation of the Quaternary age earthquake faults and defines active faulting as those exhibiting displacement within the last 10,000 years. Furthermore two (2) Master Theses were prepared by Kirkham (1976) and Rogers (1975) and inferred that several faults also cross within the southeastern boundaries of the Silver Oak Planned Unit Development. Based upon our review the mapped faulting in the vicinity of the residential development is not considered to be present on the property and that no further mitigation of the fault hazard was recommended.

The Geologic Mapping completed by Trexler (1977) Carson City Folio, Nevada Bureau of Mines and Geology (Map 1Ag) indicates that the proposed single family residential development is underlain by Quaternary Aged (Qal) soils consisting of alluvial - plain sand, silt,

and gravel deposits which are considered to be moderately to poorly bedded, poorly to moderately sorted, angular to subrounded materials placed within broad surfaces of low gradient areas.

The criteria for the evaluation of Quaternary earthquake faults was not previously regulated by the State of Nevada. Most previously accepted geological constraints in Nevada relied on criteria methods established by the State of California. The Alquist-Priolo Act of 1972 (California) defined active faults as those with evidence of displacement within the past 11,000 years (Holocene Aged). The faults with evidence of displacement during the Pleistocene time period (11,000 to 2,000,000 years ago) are generally considered potentially active. The Nevada Earthquake Safety Council (1998) had adopted the criteria regarding Holocene Quaternary age earthquake faults less than 10,000 years. Holocene Active Faults normally require a minimum setback of 50 feet for occupied structures. Occupied structures are defined as having a human occupancy rate of more than 2,000 hours per year. Furthermore no “Critical Facility” is permitted to be placed over a fault trace of a Late Quaternary Active Fault, which are defined as evidence of movements within the past 130,000 years. “Critical Facility” is defined as buildings or structures that are considered critical to the function of a community such as hospitals, fire stations, emergency management operations centers and schools. The single family residence structures are considered to be occupied non-critical structures and the intended construction methodology is considered to be suitable to resist earthquake induced stresses without experiencing catastrophic failure.

Holocene faulting within the vicinity are considered to have the potential for a large magnitude ($M \geq 7$ Type) earthquake and have Slip Rates (SR) less than 5 mm/year. The maximum credible earthquake for the vicinity of the project is 7.5 in magnitude. In accordance with the USGS the ground motion corresponding to a 2% probability of exceeding in 50 years is 0.84g and the ground motion corresponding to a 10% probability of exceeding in 50 years is 0.43g.

We would recommend that the structural seismic design be evaluated in accordance with the 2012 International Building Code (IBC) as adopted by the Carson City Building Department. The following Site Specific IBC Geotechnical Seismic Design Parameters should be utilized for the on-site soil profile classification of an IBC Site Class D soil. A Seismic Source Type B may be assumed for the site.

IBC SEISMIC DESIGN PARAMETERS

| Parameter | Factors | IBC Reference |
|----------------------------|--------------------------------|----------------------|
| Site Class | D | 2012 IBC |
| Spectral Acceleration | $S_s = 2.453$ $S_i = 0.912$ | Section 1613.3.1 |
| Seismic Coefficient, F_a | $F_a = 1.0$ | Table 1613.3.3(1) |
| Seismic Coefficient, F_v | $F_v = 1.5$ | Table 1613.3.3(2) |

| | | |
|--|------------------------|--------------------------------------|
| Spectral Response Acceleration Parameter | Sms=2.453 Sml=1.368 | Equation (16-37) Equation (16-38) |
| Design Special Response Acceleration Parameter | SDs=1.636 SDI=0.912 | Equation (16-39) Equation (16-40) |

Carson City is located in Seismic Zone 3 as categorized by the Uniform Building Code. This represents a moderately to highly active seismic area. Per the Carson City Quadrangle Geologic Map, the proposed site has been identified as having the potential for moderate severity in regards to liquefaction potential (ground failure) during significant seismic events. Liquefaction occurs during strong dynamic accelerations which causes severe movement of any overlying improvement, including foundation settlement or loss of bearing. The most susceptible soils for liquefaction are saturated loose to medium dense cohesionless (clean) sands and silts, within the upper 30- to 50- feet of the surface. Various subsurface sands encountered at the depths explored are considered to be within gradation parameters of potentially susceptible liquefiable soils.

Extensive liquefaction could occur with projected peak horizontal accelerations of 0.7g or higher, which may be generated by 7- to 7.5- magnitude earthquakes. Probabilistic ground accelerations in the range of 0.4g or less may also produce minor settlements of the overlying structures. Potentially costly remedial measures such as deep piles, dynamic compaction, mat foundations, or gravel piers can be utilized. However, these up-front costs and a comparison of potentially long-range repair costs and assumed liability is a financial decision that can only be assessed by the owner. Project mitigation costs are typically not considered practical for similar apartment complex developments within the vicinity of the proposed site. An in-depth analysis of the liquefaction potential of the subsurface soils was not included within our scope of work. However, based on our geotechnical review we believe that the liquefaction potential for the proposed site is minimal due to the known subsurface soil conditions.

The primary Geologic references for this report were obtained from the Geologic Environments Map Series prepared by the Nevada Bureau of Mines and Geology and Bulletin No. 75 "Geology and Mineral Deposits of Lyon, Douglas, and Ormsby Counties, Nevada," By James G. Moore, 1969 and the Nevada Bureau of Mines and Geology Genoa Quadrangle-Earthquake Hazards Map by Robert C. Pearse, 1979.

The Federal Emergency Management Agency (FEMA) Flood Zone Boundary Panel No. 320001 0092F, Map revised February 19, 2014, indicates that the site is located within Flood Hazard Zone "X". This denotes areas which have been determined to be within 0.2% annual chance flood or areas of 1% annual chance flood with an average depth of less than 1 foot. The area is shown as being protected from the 1% annual chance or greater flood by a levee system in conjunction with the Carson City Highway bypass and the Silver Oak Development which indicates that the major precipitation run-off contributors north of the Silver Oak Development are intercepted and routed within the alignment of the bypass or within existing storm drainage structures and detention facilities within the Silver Oak Boundaries.

Site Field Investigations included excavating five (5) test pits utilizing a backhoe within the boundaries of the proposed residential subdivision to depths of 6.5- to 9.5- feet below the existing grade. A site exploration plan indicating the test pit locations is presented on Plate 2. An additional test pit was also excavated north of College Parkway as a possible structural fill source for the intended Phase 21 Subdivision Improvements. Test pit logs of the encountered subsoils are presented on Plates 3 and 7. Representative subsurface soil samples were obtained in each of the test pits. These were then transported to our laboratory where selected soil samples were subjected to testing to determine physical and engineering properties, which included moisture content, grain size distribution and Atterberg Limit Determinations. Laboratory test results are presented on Plates 8 through 13. An explanation of the soil terminology is presented on Plate 14. Subsequently, the soils were classified in accordance with the Uniform Soil Classification System presented on Plate 15.

The Field Investigation indicated that the overlying surface soils within the perimeter subdivision boundaries of the proposed residential subdivision consist of previously placed granular fill materials which are medium dense and dry to moist for depths of approximately 3- to 5- feet in depth feet below the existing surface. Underlying the upper fill soils are the native silty sands and sandy silts which are medium dense and stiff for depths of 2- to 3- feet, which are in turn underlain by medium dense moist granular silty and clayey sands. The interior of the proposed subdivision, in the vicinity of Test Pit #5, lies in a depressed area and the surface soils encountered consist of native stiff sandy silts, which are considered low- to moderately-expansive. These soils are underlain by native granular soils which consist of medium dense, moist silty and clayey sands with gravels to the depths explored (6.5- to 9.5- feet). No free groundwater was encountered to the depths explored, however depths of approximately 11- feet have previously been reported within the vicinity. The groundwater level can be expected to fluctuate due to factors such as season, temperature, precipitation, influence of adjacent properties and others. Evaluation of these factors was beyond the scope of this report.

Temporary trenches with near vertical sidewalls should be stable to a depth of approximately 3.5 feet. Excavations deeper than 3.5 feet may require shoring or the sidewalls will need to be laid back to maintain adequate stability. Contractor shall follow all regulations presented within Part 1926, Volume 54, Number 209 of the Federal Register as enforced by the State of Nevada Department of Industrial Relation Division of Occupational Safety and Health.

Field observations indicate that the native upper silty sands and sandy silts are considered to be low- to moderately- expansive and have minimally acceptable structural bearing values. It is our opinion that the native silty sands and sandy silts are not considered suitable for the support of the proposed improvements in their present condition. The in-place previously placed medium dense structural fill materials (3- to 5- feet in depth) placed above these silts will allow the proposed single family residences to receive adequate support from conventional spread footings. The native silty sands and sandy silts in the vicinity of Test Pit #5 can remain in-place as long as they are overlain by acceptably densified granular structural fill materials at least 2- feet in thickness and provide at least 2- feet of separation for the structural building components, exterior Portland cement concrete flatwork and the flexible asphaltic concrete pavement section. We are anticipating that the mass grading for the project will be minimal

from the existing ground elevation, except for the depressed area in the center of the proposed development. Therefore we are assuming that no overexcavation of the native silts would be required within the perimeter of the development boundaries. Furthermore, the center portion of the project is to receive structural fill materials overlying the silty soils which should also address the majority of the overexcavation requirement. However, minor in-place silt overexcavation should be anticipated for the structural fill and native soil interface zones surrounding the central depressed area of the development.

Our recommendations intend to minimize potential movement associated with the on-site silty sands and sandy silts. Minor differential movements may occur and should be anticipated with any structural improvement or exterior flatwork, including the asphaltic concrete pavement section, if any of these marginally supportive silty sands and sandy silts remain in-place.

Based on our subsurface investigation we are providing the following site specific geotechnical recommendations:

- 1) All organic material and debris, if present, should be removed from within the proposed building lines of the structures and associated site improvements. Organic (root) laden surface soils should also be removed up to six (6) inches in depth. These strippings cannot be used as structural fill but they may be suitable for use in landscaping areas.
- 2) Subsequently, the upper 6- to 8- inches of the surface soils should be scarified, moisture conditioned and compacted prior to any fill placement to obtain planned foundation and slab-on-grade elevations and the exterior rigid and flexible asphalt subgrade elevations. The exposed soils should be maintained at approximate optimum in-place moisture content and compacted to at least 90 percent (%) relative of the maximum laboratory dry density (as determined by ASTM D-1557). If excessive moisture contents exist within the exposed soils, which prohibit obtaining acceptable in-place relative compaction, these soils may require to be scarified and allowed to dry prior to recompaction.
- 3) All structural fill materials shall be approved by our office and conform to the following gradation and plasticity specifications:

| Sieve Size | Percent Passing – By Weight |
|-------------------------|------------------------------------|
| 4-inch | 100 |
| ¾-inch | 70-100 |
| No. 4 | 45-75 |
| No. 40 | 15-50 |
| No. 200 | 5-20 |
| Liquid Limit | 12 Maximum |
| Plasticity Index | 6 Maximum |

The test pit which was excavated for the possible structural fill source, north of College Parkway, exposed granular subsurface soils approximately 1- foot below the existing surface which meet the intent of the structural fill gradation requirements and can be utilized as such to attain proposed subgrade elevations. Fill excavation should be performed so as to thoroughly mix and moisture condition the encountered granular soil horizons to comply with the specifications and to assist in moisture conditioning the soils prior to and during compactive effort. All native and import fill materials shall be reviewed by our office to verify compliance with the before-mentioned requirements prior to being brought on-site for placement. The above listed gradation requirements are intended to be a guideline of readily available materials.

These guidelines can be adjusted to allow for the use of other proposed structural fill materials pending review of grading contractors intended fill placement methodology and type of compaction equipment. Any adjustments to the structural fill material requirements, must be approved by our office prior to importing or utilizing the proposed fill material.

- 4) Following acceptable preparation of the subsoils, the approved structural fill soils shall be evenly placed in 6- to 8- inch loose lifts. During placement, they should be properly moisture conditioned to within 2% of the approximate optimum moisture content and compacted to not less than 90% relative of the maximum laboratory density (ASTM D-1557 test procedure) up to approximate footing grade, slab-on-grade or pavement subgrade.
- 5) All other structural fill, stemwell or utility trench backfill should be compacted to not less than 90% relative compaction. All proposed backfill soils should be approved prior to placement on-site.
- 6) Concrete slab-on-grade should also be supported by at least six (6) inches of Type 2, Class B Aggregate Base which has been densified to at least 95% relative compaction.
- 7) For the asphaltic concrete pavement we are anticipating light passenger vehicle loads, Traffic Index (T.I.) = 4.0, for the parking areas and the access roads.
- 8) We are also assuming that at least 24- inches of acceptable granular structural fill soils will be placed above the encountered native silts and underly the pavement section at subgrade elevations and that the granular soils will have a minimum R-value of 55. A sealing and maintenance program should also be developed to maintain and increase

the service life to the asphaltic concrete pavement and which adequately addresses preventative repair of any surface distress. We are assuming a Modulus of Subgrade Reaction (K-value) of 250 pounds per cubic inch for the design of the Portland Cement slab-on-grade and dock ramp.

Based on our knowledge of the subgrade soils and our assumptions listed herein, we recommend the following flexible and rigid pavement sections:

| Vehicular Type | Asphaltic Concrete Thickness (Inches) | Portland Cement Concrete (Inches) | Type 2 Class B Aggregate Thickness (Inches) |
|---------------------------|---------------------------------------|-----------------------------------|---|
| Passenger Vehicle Parking | 3.0 | ~~~~ | 6.0 |

- 9) The Asphaltic Concrete should be an approved Type 2 or Type 3 mix that is properly placed in accordance with the Standard Specifications for Public Works Construction (Orange Book) Section 200.02.02, as adopted by Carson City. Type 2, Class B Aggregate Base should also conform to Section 200.01.03 of the Orange Book and densified to at least 95% relative compaction.
- 10) An estimated shrinkage factor of 10- to 20- percent is applicable for the on-site fine soils. There may also be additional material losses due to clearing, grubbing, overexcavation operations, if needed, and shrinkage during excavation and compaction of the on-site in-place soils.
- 11) A moisture barrier should be installed beneath areas, which receive a moisture sensitive floor covering. This barrier may consist of 10ml visqueen covered with two (2) inches of sand or four (4) inches of sub-rounded gravel.

If the above site specific recommendations are utilized, the proposed residence structures can be supported by conventional spread footings designed for a maximum allowable bearing pressure of 1,500 pounds per square foot. A one-third increase in allowable bearing pressure may also be used for short duration loads, such as wind or seismic. The spread footing should also be placed a minimum twenty-four (24) inches below adjacent finished grade for frost depth protection. Total anticipated settlements utilizing the allowable bearing pressures should be on the order of $\frac{3}{4}$ of an inch. Differential settlements between similarly loaded and dimensioned footing should not exceed two-thirds of the total anticipated settlements.

Lateral loads may be resisted by friction between the footing base and supporting soils and lateral bearing pressure against the sides of the footings. For design purposes, a coefficient of friction of 0.40 and active and passive equivalent fluid pressures of 35 and 350 pounds per cubic foot per foot of depth unrestricted and 500 pounds per cubic foot of depth top restricted are applicable. These values do not include any additional surcharge loading due to construction traffic or general loads. If the structural design makes use of passive earth pressures, it is important that representative of this office be present during the placement of any backfill against footings to observe the placement and test the backfill.

The Carson City Region is an arid climate with low relative humidity, and therefore any concrete flatwork is prone to shrinkage and curling. Concrete mix proportions and construction techniques such as the addition of water or improper curing methods can adversely effect the quality of finish concrete and may result in an increase in cracking, spalling or curling of the Portland Cement Concrete slabs. Air content for exterior Portland Cement concrete flatwork should range from 4- to 7- percent (%) to resist spalling during freeze – thaw cycles. Special considerations should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcement should be provided to minimize any damage from shrinkage or curling.

Due to the potential for relatively shallow groundwater and existing moisture contents of the subsurface soils, precautions should be taken during and after construction to minimize saturation of the foundation structural fill soils. Positive drainage should be established away from all exterior walls of the proposed buildings. Downspouts from roof drains should not discharge into planter areas immediately adjacent to the building unless there is positive drainage away at a minimum slope of 5 percent from the structures.

Also, our firm should be allowed to review finalized construction plans and provide Field Quality Control Services during anticipated construction to confirm that our recommendations are correct. Our office should be immediately notified of variations in soil conditions, such as buried debris or unexpected items, if encountered, during construction of the proposed single family development, so that we may have the opportunity to determine if our recommendations as presented herein are valid or require re-evaluation.

This geotechnical report is not intended for use as a bid document. Any person or firm involved prior to or during the construction of this project should perform all necessary independent investigations to satisfy themselves as to the subsurface conditions, the earth work requirements, or the required procedures to be utilized in successfully completing the proposed single family residential development including de-watering practices, if required.

We trust this provides the information needed at this time. However, if you require additional information or have any further questions, please contact our office at your earliest convenience.

Sincerely,

Gary L. Hopper, P.E.
Principal Engineer