# Application No. 8
## Commission District 11 Community Council 11

## APPLICATION SUMMARY

| | |
|---|---|
| Applicant/Representative: | David Brown, Steven Brown, and Victor Brown/ Chad Williard, Esq. |
| Location: | Southside of SW 88th Street west of SW 167th Avenue |
| Total Acreage: | 42.0 Gross Acres, ± 38.5 Net Acres |
| Current Land Use Plan Map Designation: | Agriculture |
| Requested Land Use Plan Map Designation: | 1. Business and Office<br>2. Expand the Urban Development Boundary to include the subject property<br>3. Add Declaration of Restrictions to the Restrictions Table in the Land Use Element |
| Amendment Type: | Standard |
| Existing Zoning/Site Condition: | GU (Interim)/Agriculture |

## RECOMMENDATIONS

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|---|---|
| Staff: | **DENY/DO NOT TRANSMIT** (August 25, 2007) |
| West Kendall Community Council: | **ADOPT AND TRANSMIT** (September 19, 2007) |
| Planning Advisory Board (PAB) acting as Local Planning Agency: | **ADOPT AND TRANSMIT WITH ACCEPTANCE OF PROFFERED COVENANT** (October 15, 2007) |
| Board of County Commissioners: | **TO BE DETERMINED** (November 27, 2007) |
| Final Action of Planning Advisory Board acting as Local Planning Agency: | **TO BE DETERMINED** |
| Final Action of Board of County Commissioners: | **TO BE DETERMINED** |

Staff recommends **DENY AND DO NOT TRANSMIT** the proposed standard amendment to redesignate the subject property located on the southside of SW 88th Street west of SW 167th Avenue from "Agriculture" to "Business and Office" and expand

the 2015 Urban Development Boundary (UDB) to include the subject property on Land Use Plan (LUP) map of the Comprehensive Development Master Plan (CDMP) based on the staff analysis as summarized in the Principal Reasons for Recommendations below:

**Principal Reasons for Recommendations:**

1. This amendment cycle is the second time that the Applicant has filed a CDMP amendment application to move the UDB and change the land use designation on the subject property. In the April 2005 Cycle of Applications to amend the CDMP, the Applicant requested that the subject property be redesignated on the adopted LUP map from "Agriculture" to "Business and Office" (29.44 acres) and to "Office/Residential" (9.06 acres) and include both parcels within the UDB. After careful review of CDMP Goals, Objectives, and Policies, staff determined that the application did not meet the requirements for expanding the UDB as stated in Policy 8G (now Policy LU-8F) of the Land Use Element of the CDMP, and was inconsistent with Policy 8H [now Policy LU-8G(ii)] concerning areas that should be avoided when considering areas for addition to the UDB.

   An issued mentioned at the final BCC hearing on the April 2005 applications by the applicant's representative and area residents was a need for SW 172 Avenue to be built to provide additional access to North Kendall Drive. On September 12, 2006, the Board of County Commissioners adopted resolution No. R-1042-06 directing the County Manager to acquire land required for the construction of SW 172$^{nd}$ Avenue south from Kendall drive south to SW 88$^{th}$ Street, a new half section line road intended to provide access to any ongoing development south of Kendall Drive. Currently, the County is working on the acquisition of this right-of-way.

2. Policy LU-8G of the Land Use Element of the Miami-Dade County CDMP sets the criteria for estimating the adequacy of non-residential land supplies within the UDB. The policy states, "The adequacy of non-residential land supplies shall be determined on the basis of land supplies in sub-areas of the county appropriate to the type of use, as well as countywide supply within the UDB. The adequacy of land supplies for neighborhood and community-oriented businesses and office uses shall be determined on the basis of localized sub-area geography such as Census Tracts, Minor Statistical Areas (MSAs), and combinations thereof. Tiers, Half-Tiers, and combinations thereof shall be considered along with the countywide supply when evaluating the adequacy of land supplies for regional commercial and industrial activities".

   Staff reviewed the supply of vacant commercial land in such geographic subareas as the Analysis Area, MSA and Tier where the application is located. Since the application site is adjacent to the border of MSAs 6.1 and 6.2, the Analysis Area consisted of those two MSAs. The supply of commercial land for the Analysis Area is projected to deplete in the year 2014. The subject property is

situated in MSA 6.2, where the supply of vacant commercial land is projected to deplete in the year 2017. The subject property is located in the South-Central Tier, where the supply of vacant commercial land is projected to deplete in the year 2014. Therefore, to grant the applicant's request to move the UDB to include the subject property and enable expansion of commercial development in the application site would be premature at this time.

3. The applicant refers in the proposed application to a 160-acre mixed-use residential project, the Vizcaya Traditional Neighborhood Development (TND) that is located south and southeast of the subject property between theoretical SW 88th and SW 96th Streets, and between theoretical SW 167th and SW 172nd Avenues (See Land Use and Zoning History). According to the applicant, the Vizcaya TND "has exacerbated the present condition wherein the area (MSAs 6.1 and 6.2, in particular) has an insufficient supply of commercially designated, zoned, and/or developed land."

   TNDs are designed to ensure the development of land follow along the lines of traditional neighborhoods, which adopt development standards that were normal in the U.S. from colonial times until the 1940s. These neighborhood districts incorporate a broad mixture of land uses under specific design standards (which also include provisions for commercial and retail use) that provide significant employment within the neighborhood by allowing both small and large-scale businesses (See Miami-Dade County Zoning Code, Section 33-284.51(C)(1)(2)). The Miami-Dade County Code provides development guidelines for areas with commercial uses in this type of mixed-use development including Shopfront and Workshop areas. The Code states that Shopfront, a land use category within the TND, shall be comprised of lots that will constitute a minimum of 2% to a maximum of 20% of the gross area of the neighborhood proper. In addition, the Code states that for Workshop, another type of land use category within the TND, shall constitute a minimum of 3% to a maximum of 7% of the gross area of the neighborhood proper.

   Vizcaya TND's development plan is on file with the Department of Planning and Zoning (DP&Z) and is entitled, "Kendall Commons." The site plan indicates that approximately 2.18% of commercial uses will be provided in areas designated Shopfront and approximately 3.08% of commercial uses will be provided in areas designated Workshop, thus, approximately 8.42 net acres of commercial uses will be provided in the central and northeastern portions of the TND development. The northeastern commercial area will be located along Kendall Drive just west of the existing Shoppes of Paradise Lakes Shopping Center.

4. Policy LU-8G(ii)(a) of the Land Use Element of the CDMP provides guidelines when considering land to add to the UDB for areas that shall be avoided from inclusion into the UDB. These guidelines include land that is designated as "Agriculture" on the LUP map. The subject property is designated as "Agriculture" on the LUP map. Policy LU-1S of the Land Use Element of the

CDMP, which states that the CDMP shall be consistent with the Miami-Dade County Strategic Plan adopted by the County Commission on June 3, 2003 by Resolution R-664-03, provides more support for the preservation of agricultural land. The Strategic Plan provides for no net loss of agricultural land.

5. Policy LU-8E of the Land Use Element of the Comprehensive Development Master Plan (CDMP) requires Applications requesting amendments to the CDMP Land Use Plan map to be evaluated according to factors such as, the proposed application's ability to satisfy a deficiency in the LUP map to accommodate projected population or economic growth in the County, impacts to County public services, compatibility with abutting and nearby land uses, impacts to environmental and historical resources, and the extent to which the proposed CDMP land use would promote transit ridership and pedestrianism.

   The proposed application will not negatively impact County public services, except for traffic and fire and rescue services. An evaluation of peak-period traffic concurrency conditions as of July 24, 2007, which considers reserved trips from approved development not yet constructed, programmed roadway capacity improvements, and the Application's traffic impacts, indicates that the following roadway segments will operate below their adopted concurrency LOS standards: SW 177$^{th}$ Avenue, between SW 8$^{th}$ and SW 136$^{th}$ Streets, and SW 88$^{th}$ Street from SW 167$^{th}$ and SW 104$^{th}$ Avenues. All other that are currently monitored show acceptable peak period concurrency LOS conditions.

   According to Miami-Dade County Fire Rescue, the current CDMP land use designation will allow a potential development that will generate a total of 2.24 annual fire alarms. The proposed "Business and Office" land use designation will allow a potential development that is anticipated to generate 199.23 annual fire alarms, thus, the Application, if approved, will have a severe impact to existing Fire Rescue services. In addition, since the application site is outside the UDB, an increase in number of alarms will not only affect Fire Rescue service delivery, but also will negatively affect response time into the area as well. There are no planned stations to mitigate this impact.

6. The application site does not impact any historical resources. However, the application does impact environmental resources. According to the Department of Environmental Resources Management (DERM), the subject property is located within the West Wellfield protection area. Therefore, the application site is subject to stringent wellfield protection measures as specified in Section 24-30 (4), (4)(c), and (5) of Miami-Dade County Code. Land uses that do not comply with the aforementioned Code Section require variances from the Miami-Dade County Environmental Quality Control Board (EQCB). In addition, the subject property is in the C-1 Basin. Development criteria for water management and flood protection requires the applicant to set aside 28.6% of the site in the form of lake or 39.5% as dry retention area.

The application area contains a portion of a tree island that is located within isolated wetlands on the southwestern portion of the application site, which will be regulated through a Class IV Wetland Permit. More specifically, parcels where portions this tree island is located within the application site contain Folio No. 3049310010530 and 3049310010580, therefore, any development within the listed folios should plan to avoid impacts to the tree island and locate open space buffers and green areas adjacent to this wetland area to minimize possible secondary impacts. Furthermore, preservation of this tree island is required as a condition of a Class IV Wetland Permit on other parcels that contain portions of this tree island. The site may also contain specimen-sized trees (trunk diameter greater than 18 inches) that must be preserved according to Section 24-49 of Miami-Dade County Code.

According to DERM, a review of the United States Department of Agriculture (USDA) Soils Survey maps, a photographic aerial review of the property, and on-site inspections of the property indicate that the subject property contains isolated wetlands. A Miami-Dade Wetland Permit will be required to perform any work on wetlands within the application area. Other permits that may be required for the proposed projects are from the Army Corps of Engineers, the Florida Department of Environmental Protection, and the South Florida Water Management District as well.

7. Policy LU-1G of the Land Use Element of the Comprehensive Development Master Plan (CDMP) states that business developments shall preferable be placed in clusters or nodes in the vicinity of major roadway intersections, and not in continuous strips or as isolated spots. The applicant stated in the application that a continuous band of commercially designated/zoned/developed land exists for approximately one mile east of the property and that the application would be a continuation of this use. Continuation of a strip of commercial development is not only contrary to the above policy but also to Guideline No. 4 of the Guidelines for Urban Form, which states that the non-residential components, including commercial uses when warranted, of a neighborhood shall be located within activity nodes. A problem with a strip of continuous business development is that it creates excessive friction with traffic entering and exiting the roadway that impedes the ability of the arterial from serving its primary function of moving cars.

   This commercial development proposal would place a commercial node at the UDB along North Kendall Drive. Commercial nodes should be located in the center of their market areas and not at the edge.

   In fact, most of the area surrounding the application site is outside the UDB and is designated as “Agriculture” on the LUP map. The areas to the northeast, north, and west of the subject property are outside the UDB and are designated as “Agriculture” on the LUP map. Only the areas to the south and southeast are located inside the UDB and are designated “Low Density Residential Communities” on the LUP map.

8. The applicant has a draft declaration of restrictions (covenant) submitted that states that the property will be developed with non-residential uses. However, the covenant does not include a development program for commercial, office or institutional uses on this 42- acre application site. Assuming a floor area ratio of 0.4, a parcel of that size could support approximately 670,824 square feet of commercial/retail space, which would generate 1,677 employees. Approving this application could create pressure for further expansion of the 2015 UDB. A major shopping center could be constructed that would be less than a mile west of the proposed Kendall Town Center, which is expected to contain 350,000 square feet of office space, up to 50,000 square feet of community/youth center/municipal use (including a police substation or mini station), up to 750,000 square feet of retail use (including restaurants), a movie theater including ancillary uses, up to 145 hotel rooms, a 30-acre site for West Kendall Baptist Hospital with ancillary facilities, an up to 200-bed/unit home for the aged, or alternatively, an up to 125-unit senior residential building, and a public transportation terminal. The applicant has not demonstrated a need to build at the edge of the UDB a major shopping facility that is less than a mile from the proposed Kendall Town Center.

# STAFF ANALYSIS

## Application Site

The application site is a 42.0 gross acre parcel located outside the 2015 Urban Development Boundary (UDB) on the southside of SW 88th Street, west of SW 167th Avenue; and is situated a little over half a mile west from the proposed Kendall Town Center development. The application site is a little over 4,000 feet west of a future rapid transit station in the vicinity of Kendall Town Center, and three miles northwest of the Kendall-Tamiami Executive Airport.

The current land use designation for the property is "Agriculture" on the LUP map of the CDMP. Residential development that occurs in areas designated for "Agriculture" are allowed at a density of no more than one dwelling unit (DU) per five acres (CDMP, pg. I-58). Therefore, current potential residential development for the application area is eight DUs of single-family detached homes, which would generate 27 persons. The applicant requests to re-designate the application site to "Business and Office" and to include the property within the UDB. Maximum commercial/retail development under the proposed land use category is 670,824 square feet, which would generate 1,677 employees into the application site.

CDMP allows residential uses and a mixing of residential use with commercial uses as long as the scale and intensity, height, and floor area ratio of the residential or mixed-use development is not out of character with that of adjacent development and zoning (CDMP, pg. I-42). Maximum residential development within the application area, under the proposed "Business and Office" land use, is 252 DUs of single-family attached homes. However, the applicant has submitted a Declaration of Restrictions confirming the applicant's voluntary agreement to prohibit residential development of the subject property should this CDMP land use amendment application is ultimately approved.

The existing land use for the application site is agriculture (See Appendix A: Map Series). A portion of an environmentally sensitive tree island is located on the southwestern portion of the site. . The subject property is zoned GU (Interim), where permitted uses depend on the character of the neighborhood; otherwise, EU-2 standards apply.

## Adjacent Land Use and Zoning

The property to the east, west, and north of the application site is designated as "Agriculture' on the LUP map of the CDMP. The property is bounded to the south by "Low Density Residential" land uses, which allows 2.5 to 6 dwelling units per gross acre. The 'Vizcaya' development, which is currently under construction, is located in this 'low density residential' area. Roughly, 284 acres of "Business & Office" and "Office/Residential" land uses are designated in an area east of the application site, approximately 2,000 and 2,800 feet, respectively. Commercial, retail, and office establishments in this area include Publix, China Star, Hair Cuttery, and State Farm

Insurance in the shoppes of Paradise Lakes Shopping Center at 16900 SW 98th Street (See Appendix G: Photos of Application Site and Surroundings).

The proposed Kendall Town Center development is also located in this area approximately ½ mile away. The Kendall Town Center lies at the heart of the Rapidly growing Miami-Dade County suburbs west of the Florida Turnpike. The retail center is one port of a 160-acre landholding that is also entitled for restaurants, theater, office space, medical facilities, municipal uses, hotel, hospital, and senior housing. This mixed-use development consists of up to 350,000 square feet of office space, up to 50,000 square feet of community/youth center/municipal use (including a police substation or mini station), up to 750,000 square feet of retail use (including restaurants), a movie theater including ancillary uses, up to 145 hotel rooms, the 30 acres West Kendall Baptist Hospital with ancillary facilities, an up to 200-bed/unit home for the aged, or alternatively, an up to 125-unit senior residential building, and a public transportation terminal (Metrobus terminals for multiple routes).

Zoning designation adjacent to the application site to the east, north, and west includes GU (interim), AU (Agricultural) to the southwest, which allows one residential unit per five gross acres, and TND (Traditional Neighborhood District, 40 acres gross minimum parcels, mixed uses) to the south of the subject property, which includes the 'Vizcaya' development.

**Land Use and Zoning History**

The subject property was the site of an application filed during the April 2005 Cycle Applications to amend the CDMP. The applicant requested the following changes to the Land Use Plan (LUP) map, Parcel A: from "Agriculture" to "Business and Office" (29.44 acres), and Parcel B: from "Agriculture" to "Office/Residential" (9.06 acres), and include both parcels within the UDB. After careful review of CDMP Goals, Objectives, and Policies, Staff determined that the application did not meet the requirements for expanding the UDB as stated in Policy 8G (now Policy LU-8F) of the Land Use Element of the CDMP and was inconsistent with Policy 8H [now Policy LU-8G(ii)] concerning areas that should be avoided when considering areas for addition to the UDB.

Staff also cited environmental concerns in their recommendation to the Board of County Commissioners (BCC) to deny the application, regarding water management, flood protection, and the preservation of a tree island on the southwestern portion of the subject property and the Application's impact on County infrastructure and public services (See Revised Recommendations, April 2005 Applications to Amend The Comprehensive Development Master Plan, pgs. 21- 23). On April 19, 2006, the Board of County Commissioners adopted Ord. No. 06-42 thus denying the applicant's request for a land use change to the Land Use Plan map of the CDMP, including denying the applicant's request to move the UDB to include the subject property.

An issued mentioned at the final BCC hearing by the applicant's representative and area residents was a need for SW 172 Avenue to be built to provide additional access

to North Kendall Drive. On September 12, 2006, the Board of County Commissioners adopted resolution No. R-1042-06 directing the County Manager to acquire land required for the construction of SW 172nd Avenue south from Kendall drive south to SW 88th Street, a new half section line road intended to provide access to any ongoing development south of Kendall Drive. Currently, the County is working on the acquisition of this right-of-way.

According to Miami-Dade County zoning records, the aforementioned development (Vizcaya TND) was re-zoned from GU (Interim) to Traditional Neighborhood Development (TND, 40 acres gross min, mixed uses) in October 10, 2001 (See Resolution No. CZAB11-28-01). TNDs are designed to ensure the development of land follow along the lines of traditional neighborhoods, which adopt development standards that were normal in the U.S. from colonial times until the 1940s. These neighborhood districts incorporate a broad mixture of land uses under specific design standards (which also include provisions for commercial and retail use) that provide significant employment within the neighborhood by allowing both small and large-scale businesses (See Miami-Dade County Code, Section 33-284.51(C)(1)(2)).

During the April 1993 Cycle Applications to amend the CDMP, Cropseyville Corporation filed an application to amend the CDMP Land Use Plan map requesting a redesignation of a 160-acre parcel located immediately south of the subject property, from "Agriculture" to "Low Density Residential" and to amend the then 2000 Urban Development Boundary to encompass the property. The Board of County Commissioners (BCC) accepted a covenant proffered by the applicant, which limited density of the TND to a maximum of 6 dwelling units (DU) per acre, with no variances allowed to the TND zoning district. In April 7, 1994, the Board of County Commissioners adopted Ordinance No. 94-64 approving Cropseyville Corporation's requested land use change. Subsequently, in May 30, 1997, the applicant filed a request with DP&Z to amend the covenant to allow an increase in density within the TND to a maximum of 10 DUs per acre, and allow for variances to the TND zoning district. In May 7, 1998, the BCC adopted Ordinance No. 98-68 approving the applicant's request.

Currently, the subject application site does not have any pending zoning hearings.

**Supply & Demand**

Commercial Land Analysis

The Minor Statistical Area (MSA) in which the application site is located (MSA 6.2) does not show any deficiency of commercially designated land. The "Projected Absorption of Land for Commercial Uses" table below shows that the supply of vacant commercial land in MSA 6.2 totals 169.7 acres; commercially designated land currently in use totals 545.9 acres, at the average annual rate of absorption of 16.85 acres, the supply of commercial land for MSA 6.2 is projected to deplete in the year 2017. Given the impact that the maximum potential commercial development would in the region, commercial activities in MSAs 6.1 and 6.2 (the Study Area) were evaluated. The supply of vacant

commercial land in the Study Area totals 221.5 acres; commercially designated land currently in use totals 1,058.1 acres, at the average annual rate of absorption of 31.34 acres, the supply of commercial land for the Study Area is projected to deplete in the year 2014.

The subject property is located in the South-Central Tier; supply of vacant commercial land for this Tier totals 312.8 acres; commercial land in use totals 3,744.3; at the average annual rate of absorption of 45.56, commercial land is projected to deplete in the year 2014. Countywide, supply of vacant commercial land totals 2,588.6 acres; commercial land in use totals 13,858.1; at the average annual rate of absorption of 159.97, commercial land is projected to deplete in the County by the year 2023.

Projected Absorption of Land for Commercial Uses
Indicated Year of Depletion and Related Data

| Analysis Area MSA | Vacant Commercial Land 2007 (Acres) | Commercial Acres in Use 2007 | Annual Absorption Rate 2003-2025 (Acres) | Projected Year of Depletion | Total Commercial Acres per Thousand Persons | |
|---|---|---|---|---|---|---|
| | | | | | 2015 | 2025 |
| 6.1 | 51.8 | 512.2 | 14.49 | 2011 | 2.6 | 2.5 |
| 6.2 | 169.7 | 545.9 | 16.85 | 2017 | 4.1 | 4.1 |
| Total | 221.5 | 1,058.1 | 31.34 | 2014 | 3.3 | 3.2 |

Source: Miami-Dade Department of Planning & Zoning, Planning Division, Research Section, August 2007.

## Environmental Conditions

The following information pertains to the environmental conditions of the application site. All YES entries are further described below.

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|---|---|
| **Flood Protection** | |
| County Flood Criteria (NGVD) | 9.50 feet+ |
| Stormwater Management | Surface Water Management Permit |
| Drainage Basin | C-1 |
| Federal Flood Zone | AH – 100-year floodplain, constant surface ponding btw 1-3 ft. |
| Hurricane Evacuation Zone | NO |
| **Biological Conditions** | |
| Wetlands Permits Required | Yes |
| Native Wetland Communities | Yes |
| Specimen Trees | Yes |
| Natural Forest Communities | NO |
| Endangered Species Habitat | NO |
| **Other Considerations** | |
| Within Wellfield Protection Area | Yes |
| Archaeological/Historical Resources | Information Pending |

Stormwater Drainage

Flood protection has been determined to be inadequate to support new development in the application site, due to high gradient in the existing nearby canals. Therefore, cut and fill criteria must be established in order to set aside areas for flood protection and water management. Applicant must set aside 28.6% of the site in the form of lake or 39.5% as dry retention area for flood protection and water management. The applicant shall be required to provide a retention/detention system adequately designed to contain the run-off generated by a 5-year storm event on-site. Off-site overland discharge of stormwater from any proposed development within the application site shall be deemed unacceptable.

According to DERM, proper grading or a structural wall shall be provided along the perimeter of all new developments to ensure full containment of stormwater run-off from new developments on-site. A Surface Water Management Permit, issued by the South Florida Water Management District (SFWMD), would be required for any development on the application site; additionally, other Department of Environmental Resources (DERM) permits might be required or combined with the aforementioned permit requirement.

Wellfield Protection Areas

The subject property is located within the West Wellfield Protection Area, and as such, the property is subject to stringent wellfield protection measures that restrict development and regulates land uses within the wellfield protection area as specified in Section 24-43 (4), (4)(c), (5), and (10) of Miami-Dade County Code. Land uses that do not comply with the aforementioned Code Section require variances from the Miami-Dade County Environmental Quality Control Board (EQCB).

Wetlands

According to DERM, a review of the United States Department of Agriculture (USDA) Soils Survey maps, a photographic aerial review of the property, and on-site inspections of the property indicate that the subject property contains isolated wetlands. A Miami-Dade Wetland Permit will be required to perform any work on wetlands within the application area. Other permits that may be required for the proposed projects are from the Army Corps of Engineers, the Florida Department of Environmental Protection, and the South Florida Water Management District as well.

Specimen Trees

The application area contains a portion of a large tree island that is located within isolated wetlands on the southwestern portion of the application site, which will be regulated through a Class IV Wetland Permit. More specifically, parcels where portions this tree island is located within the application site contain Folio Nos. 3049310010530 and 3049310010580, therefore, any development within the listed folios should plan to

avoid impacts to the tree island and locate open space buffers and green areas adjacent to this wetland area to minimize possible secondary impacts. Furthermore, preservation of this tree island is required as a condition of a Class IV Wetland Permit on other parcels that contain portions of this tree island. The site may also contain specimen-sized trees (trunk diameter greater than 18 inches) that must be preserved according to Section 24-49 of Miami-Dade County Code.

**Water and Sewer**

Water Supply

In April 2007, the Board of County Commissioners (BCC) adopted alternative water supply and reuse projects into the Capital Improvements Element of the CDMP in the amount of $1.6 billion dollars. This commitment by the BCC fully funds the projects outlined in the Lower East Coast Regional Water Supply Plan upon which a 20-year water permit from the South Florida Water Management District, expected in November 2007, is based. A summary of these projects can be found in Application 16 (Water Supply Facilities Workplan) of this report. Appendix A of Application 16 indicates that the City of North Miami Beach will no longer be a retail customer after 2007 and therefore the Miami-Dade Water and Sewer Department's (WASD) system will realize a surplus in water supplies of 4.63 MGD. The water needs of this application will therefore be met by WASD.

It should be noted that the WASD is developing an allocation system to track the water demands from platted and permitted development. This system will correspond to the allocation system currently being used by DERM for wastewater treatment facilities, and will require all development to obtain a water supply allocation letter from WASD stating that adequate water supply capacity is available for the proposed project. WASD's water allocation system is anticipated to be operational in November 2007.

Potable Water

The WASD water treatment plant servicing this area is the Alexander Orr Water Treatment Plant. According to data provided by the Department of Environmental Resources Management (DERM), this water treatment plant currently has a rated treatment capacity of 214.7 million gallons/day (mgd) and a maximum plant production based upon the last 12 months of 198.6 mgd. Based upon these numbers, this treatment plant has 16.1 mgd or 7.5% of treatment plant capacity remaining.

An estimated water demand of 67,082 gallons per day (gpd) for this application was based on a 100% commercial development scenario due to the proffering of a covenant stating that the property will be developed with non-residential uses. Under this development scenario, 670,824 sq. ft. could be built under the "Business and Office" CDMP land use designation. The demand of 67,082 gpd would decrease the 16.1 mgd of remaining treatment plant capacity to 16.03 mgd or 7.47%. The plant's remaining treatment capacity will continue to meet the adopted LOS standard.

Wastewater

The application site is currently not being served by public sanitary sewer facilities. Data provided by DERM indicates that, if the application were approved, three pump stations, numbers 30-0213, 30-0536, and 30-0559 would receive sewage flows from this site; these pump stations are operating within mandated criteria. Ultimate disposal for sewage flows from this site would be the South District Wastewater Treatment Facility. This facility has a design capacity of 112.5 mgd and has a 12-month average flow of 93.32 or 83% of the plant's design capacity.

Based upon the commercial development scenario of 670,824 sq. ft., it is estimated that the sewage demand for this application site will yield 67,082 gpd. These estimated flows would not decrease the average treatment plant flows to a level below the adopted LOS standard.

**Solid Waste**

The application site is located inside the Department of Solid Waste Management (DSWM) waste service area for garbage and trash collections. The closest DSWM facility to the application site is located at 8000 SW 107th Avenue, which is approximately 8 mile from the subject property. Under the DSWM's current policy, only residential customers paying the annual waste collection fee and/or the Trash and Recycling Center fee are allowed the use of this type of facility. Due to the character of the request, however, the impact on collection services would be minimal to none. The impact on the disposal and transfer facilities would be the incremental and the users pay for the cumulative cost of providing disposal capacity for DSWM Collections, private haulers, and municipalities. The DSWM is capable of providing such disposal service.

The adopted Level of Service standard for the County Solid Waste Management System is as follows: to maintain sufficient waste disposal capacity to accommodate waste flows committed to the System through long term contracts or interlocal agreements with municipalities and private waste haulers, and anticipated uncommitted waste flows, for a period of five years. At the present time, the DSWM is in compliance with our Level of Service**.**

**Fire Rescue**

Miami-Dade Fire Rescue Station 56, located at 16250 SW 72nd Street, currently serves the subject property; the facility is equipped with a HazMat Support Advanced Life Support (ALS) Engine, a rescue unit, and is permanently staffed with seven firefighters/paramedics. According to 2006 Fire Rescue data, average travel time to incidents in the vicinity of the application area is approximately 6 minutes and 30 seconds. There were no life threatening or structure fire alarms in the vicinity of the

application site. Furthermore, There are no planned fire station facilities in the vicinity of the subject application site.

**Parks**

The "County Park and Recreation Open Space Facilities" table below describes County parks that are within a two-mile radius of the application site including the name and acreage for each park of these parks.

County Park and Recreation Open Space Facilities
Within a Three-Mile Radius Of The Subject Application

| Name of Park | Park Classification | Acreage |
|---|---|---|
| Forest Lakes Park | Neighborhood Park | 6 |
| Lago Mar Park | Neighborhood Park | 12 |
| Olympic Park | Neighborhood Park | 9 |
| Sandpiper Park | Neighborhood Park | 5 |
| Sun Lakes Park | Neighborhood Park | 7 |
| Source: Miami Dade Parks and Recreation Department, 2007 | | |

The applicant submitted a Declaration of Restrictions confirming the applicant's voluntary agreement to prohibit residential development of the subject property should this CDMP land use amendment application is ultimately approved; therefore, Miami-Dade County parks will not be impacted by potential development on the application site.

**Public Schools**

The applicant submitted a Declaration of Restrictions confirming the applicant's voluntary agreement to prohibit residential development of the subject property should this CDMP land use amendment application is ultimately approved; therefore, Miami-Dade County parks will not be impacted by potential development on the application site.

**Roadways**

Existing Conditions

A Study Area was selected within approximately five-mile radius of the Application site to analyze the impact of this application on the adjacent roadway network. The boundaries of the Study Area are: SW 42nd Street on the north, the Homestead Extension of the Florida's Turnpike (HEFT/SR 821) on the east, SW 136th Street on the south, and Krome Avenue (SW 177th Avenue/SR 997) on the west. Most of the Study Area is located within the adopted 2005 Urban Development Boundary (UDB),

specifically the area east of the cascading line along SW 172nd, SW 167th, and SW 157th Avenues between SW 42nd and SW 136th Streets. The area between the 2005 UDB and Krome Avenue from SW 42 to Theoretical SW 112th Streets is located within the 2015 Urban Expansion Area (UEA).

East-west expressway and arterials include SW 42nd, SW 56th, SW 72nd, SW 88th (SR 94), SW 104th, SW 112th, SW 120th, and SW 136th Streets. North-south expressways and arterials include the Homestead Extension of Florida's Turnpike (HEFT), SW 117th, SW 127th, SW 137th, SW 147th, SW 157th, SW 167th, and SW 177th (Krome) Avenues. Such corridors are the major travel corridors that provide accessibility within the Study Area and to other portions of the County. There is also adequate access to the Homestead Extension of Florida's Turnpike (HEFT) with interchanges at SW 42nd, SW 88th, and SW 120th Streets.

The operating condition, level of service (LOS), of a roadway segment is represented by one of the letters "A" through "F", with "A" representing the most favorable driving conditions and "F" representing the least favorable.

The "Existing Traffic Conditions" table below lists the current operating levels of service on the major roadways within the Study Area. Existing traffic conditions within this Study Area are relatively uncongested during the peak periods. However, five roadway segments are currently operating at their adopted LOS D standard, two roadway segment are operating below their adopted LOS standards, and another is operating at E+10%, but still above its adopted LOS E+20% standard. Krome Avenue, from SW 8th to SW 88th Streets, is operating at LOS D, below its adopted LOS C standard; SW 127th Avenue, between SW 88th and SW 104th Streets, is operating at LOS F, below is adopted LOS D standard; SW 152nd Avenue from SW 88th to SW 96th Streets, SW 137th Avenue from SW 72nd to SW 88th Streets, SW 127th Avenue from SW 72nd to SW 88th Streets, the HEFT from SW 40th to SW 88th Streets, and SW 120th Street from SW 137th to SW 117th Avenues are operating at LOS D; and SW 42nd Street, between SW 127th Avenue and the HEFT, is operating at LOS E+10%, but still above its adopted LOS E+20% standard. The rest of the roadway network is operating at acceptable levels of service.

Existing Traffic Conditions
Roadway Lanes and Peak Period Operating Peak Period Level of Service (LOS)

| Roadway | Location/Link | Lanes | LOS Std.* | LOS |
|---|---|---|---|---|
| SW 177 Ave. (SR 997) | SW 8 Street to SW 88 Street | 2 UD | C | D (06) |
| | SW 88 Street to SW 136 Street | 2 UD | C | C (06) |
| SW 157 Avenue | SW 72 Street to SW 88 Street | 4 DV | E+20% | C (04) |
| | SW 88 Street to SW 104 Street | 4 DV | D | C (06) |
| Hammocks Boulevard | SW 88 Street to SW 104 Street | 4 DV | D | C (04) |
| SW 152 Avenue | SW 88 Street to SW 96 Street | 2 UD | D | D (04) |
| SW 147 Avenue | SW 42 Street to SW 56 Street | 4 DV | E+20% | C (04) |
| | SW 56 Street to SW 72 Street | 4 DV | D | B (04) |
| | SW 72 Street to SW 88 Street | 4 DV | D | B (04) |
| | SW 88 Street to SW 104 Street | 4 DV | D | C (04) |

Existing Traffic Conditions
Roadway Lanes and Peak Period Operating Peak Period Level of Service (LOS)

| Roadway | Location/Link | Lanes | LOS Std.* | LOS |
|---|---|---|---|---|
| | SW 104 Street to SW 120 Street | 4 DV | D | B (04) |
| SW 137 Avenue | SW 42 Street to SW 56 Street | 6 DV | D | C (04) |
| | SW 56 Street to SW 72 Street | 4 DV | D | C (04) |
| | SW 72 Street to SW 88 Street | 4 DV | D | D (04) |
| SW 137 Avenue (SR 825) | SW 88 Street to SW 104 Street | 6 DV | D | C (06) |
| | SW 104 Street to SW 120 Street | 6 DV | D | C (06) |
| SW 137 Avenue | SW 120 Street to SW 136 Street | 6 DV | D | A (04) |
| SW 127 Avenue | SW 42 Street to SW 56 Street | 4 DV | D | C (04) |
| | SW 56 Street to SW 72 Street | 4 DV | D | C (04) |
| | SW 72 Street to SW 88 Street | 4 DV | D | D (04) |
| | SW 88 Street to SW 104 Street | 2 UD | D | F (04) |
| | SW 104 Street to SW 120 Street | 2UD | D | B (04) |
| SW 122 Avenue | SW 104 Street to SW 123 Terrace | 4 DV | D | C (04) |
| HEFT (SR 821) | SW 40 Street to SW 88 Street | 6 LA | D | D (06) |
| | SW 88 Street to SW 120 Street | 6 LA | D | C (06) |
| | SW 120 Street to SR 874 | 6 LA | D | C (06) |
| | SR 874 to SW 152 Street | 8 LA | D | C (06) |
| SW 42 St/Bird Rd | SW 157 Ave. to SW 147 Ave. | 4DV | D | A (04) |
| | SW 147 Ave. to SW 137 Ave. | 4DV | E+20% | B (04) |
| | SW 137 Ave. to SW 127 Ave | 4DV | E+20% | A (04) |
| | SW 127 Ave. to HEFT/SR 821 | 4DV | E+20% | E+10% (04) |
| SW 56 Street/Miller Dr. | SW 157 Avenue to SW 147 Avenue | 4 DV | D | B (04) |
| | SW 147 Avenue to SW 137 Avenue | 4 DV | D | C (04) |
| | SW 137 Avenue to SW 127 Avenue | 4 DV | D | C (04) |
| | SW 127 Avenue to SW 117 Avenue | 4 DV | D | B (04) |
| SW 72 Street/Sunset Dr. | SW 162 Avenue to SW 157 Avenue | 4DV | E+20% | B (04) |
| | SW 157 Avenue to SW 147 Avenue | 4 DV | E+20% | B (04) |
| | SW 147 Avenue to SW 137 Avenue | 4 DV | E+20% | D (04) |
| | SW 137 Avenue to SW 127 Avenue | 4 DV | E+20% | D (04) |
| | SW 127 Avenue to SW 117 Avenue | 4 DV | E+20% | B (04) |
| Kendall Dr. (SR 90) | SW 177 Avenue to SW 167 Avenue | 4 DV | D | C (06) |
| | SW 167 Avenue to SW 152 Avenue | 4 DV | E+20% | C (06) |
| | SW 152 Avenue to SW 137 Avenue | 6 DV | E+20% | C (06) |
| | SW 137 Avenue to SW 127 Avenue | 6 DV | E+20% | D (06) |
| | SW 127 Avenue to SW 117 Avenue | 8 DV | E+20% | D (06) |
| SW 104 Street | SW 157 Avenue to SW 147 Avenue | 4 DV | E+20% | E (04) |
| | SW 147 Avenue to SW 137 Avenue | 4 DV | E+20% | E (04) |
| | SW 137 Avenue to SW 127 Avenue | 6 DV | E+20% | C (04) |
| | SW 127 Avenue to SW 117 Avenue | 6 DV | E+20% | B (04) |
| SW 120 Street | SW 147 Avenue to SW 137 Avenue | 4 DV | D | B (04) |
| | SW 137 Avenue to SW 117 Avenue | 4 DV | D | D (04) |

Source: Miami-Dade Department of Planning and Zoning; Miami-Dade Public Works Department; and Florida Department of Transportation, July 2007.

Note: () in LOS column identifies year traffic count was revised/updated
DV= Divided Roadway, UD= Undivided Roadway, LA Limited Access
*LOS Std. means the adopted minimum acceptable peak period Level of Service standard for all State and County roadways.
E+20% means 120 percent of roadway capacity.

Trip Generation

The "Estimated Peak Hour Trip Generation" below identifies the number of PM peak-hour trips estimated to be generated by the potential development that could occur under the requested CDMP land use designation and compares them to the number of trips that would be generated by the potential development that could occur under the current CDMP land use designation.

Two development scenarios were analyzed. Both development scenarios assume the Application site developed with residential use (8 single-family units) under the current CDMP Land Use Plan designation (Agriculture). Scenario 1 assumes the Application site developed with 670,824 sq. ft. of commercial retail under the requested Land Use designation (Business and Office). Scenario 2 assumes Application site developed with residential use only (252 single-family units), since residential use may be authorized to occur in the "Business and Office" land use category at a density up to one density category higher than the LUP designated density of the adjacent or adjoining residentially designated area.

Scenario 1, under the requested "Business and Office" CDMP land use designation, is estimated to generate approximately 1,696 more PM peak-hour trips than the current CDMP land use designation. Scenario 2, on the other hand, is estimated to generate 235 more PM peak-hour trips than the current land use category.

Estimated Peak Hour Trip Generation
By Current and Requested CDMP Use Designations

| Application Number | Assumed Use for Current CDMP Land Use Designation/ Estimated No. of Trips* | Assumed Use for Requested CDMP Land Use Designation/ Estimated No. of Trips* | Trip Difference Between Current and Requested CDMP Use Designation |
|---|---|---|---|
| 8 (Scenario 1)[1] | Agriculture – Single-Family Residential (8 units) | Business and Office – (670,824 sq. ft. Commercial) | |
| | 11 | 1,707[3] | +1,696 |
| 8 (Scenario 2)[2] | Agriculture – Single-Family Residential (8 units)/ | Low Density Residential – Single-Family Residential (252 units)/ | |
| | 11 | 246 | +235 |

Source: Institute of Transportation Engineers, Trip Generation, and 7th Edition, 2003.
Miami-Dade County Public Works Department, July 2007.

Notes: * PM Peak Hour trips

[1] Scenario 1 assumes application property developed with single-family homes under the current land use designation and with a shopping center under the requested land use designation.

[2] Scenario 2 assumes application property developed with Residential development under the requested land use designation.

[3] Includes pass-by trips adjustment factor, ITE Trip Generation, 7th Edition, 2003.

Traffic Concurrency Evaluation

An evaluation of peak-period traffic concurrency conditions as of July 24, 2007, which considers reserved trips from approved development not yet constructed, programmed roadway capacity improvements, and the Application's traffic impacts, indicates that the following roadway segments will operate below their adopted concurrency LOS standards under scenario 1: SW 177th Avenue, between SW 8th Street and SW 136th Street, and SW 88th Street, from SW 167th Avenue to SW 152nd Avenue. All other that are currently monitored show acceptable peak period concurrency LOS conditions. The "Traffic Impact Analysis" table below shows the concurrency levels of services for roadways in the vicinity of the Application site.

Future Conditions

The "Programmed Roadway Capacity Improvements" table below lists the roadway capacity improvements within the Study Area programmed in the 2008 Transportation Improvement Program (TIP) for construction in Fiscal Years 2007/2008-2011/2012. A number of significant projects are programmed in the vicinity of the Application site including: the six-lane widening of SW 88th Street between SW 162nd Avenue and SW 150th Avenue, the six-lane widening of SW 104th Street from SW 147th Avenue to SW 137th Avenue, and the new 4-lane construction of SW 157th Avenue from SW 112th Street to SW 136th Streets.

Traffic Impact Analysis on Roadways Serving and in the Vicinity of the Application Site
Roadway Lanes, Existing and Concurrency Peak Period Operating Level of Service (LOS)

| Roadway | Location/Link | Number Lanes | Adopted LOS Std.[1] | Peak Hour Capacity | Peak Hour Volume | Existing LOS | Approved D.O's Trips | Amend. Peak Hour Trips | Total Trips With Amend. | Concurrency LOS with Amend. |
|---|---|---|---|---|---|---|---|---|---|---|
| Scenario 1: Commercial Retail Use | | | | | | | | | | |
| SW 177 Avenue (SR 997) | SW 8 St. to SW 88 Street | 2 UD | C | 1,310 | 1,421 | D | 0 | 38 | 1,459 | D (06) |
| SW 177 Avenue (SR 997) | SW 88 Street to SW 136 Street | 2 UD | C | 1,310 | 1,141 | C | 250 | 58 | 1,449 | D (06) |
| SW 88 Street (SR 90) | SW 177 Avenue to SW 167 Ave. | 4 DV | D | 3,390 | 1,263 | B | 20 | 96 | 1,379 | B (06) |
| SW 88 Street (SR 90) | SW 167 Avenue to SW 152 Ave. | 4 DV/6 DV[2] | E+20% | 3924/5904 | 2,108 | C | 2,607 | 1,611 | 6,326 | E+29% (06) |
| SW 157 Avenue | SW 72 Street to SW 88 Street | 4 DV | D | 3,100 | 1,253 | C | 268 | 173 | 1,694 | C (04) |
| SW 157 Avenue | SW 88 Street to SW 104 Street | 4 DV | D | NA | | | | | | (06) |
| Scenario 2: Residential Use | | | | | | | | | | |
| SW 177 Avenue (SR 997) | SW 8 Street to SW 88 Street | 2 UD | C | 1,310 | 1,421 | D | 0 | 6 | 1,427 | D (06) |
| SW 177 Avenue (SR 997) | SW 88 Street to SW 136 Street | 2 UD | C | 1,310 | 1,141 | C | 250 | 8 | 1,399 | D (06) |
| SW 88 Street (SR 90) | SW 177 Avenue to SW 167 Ave. | 4 DV | D | 3,390 | 1,263 | B | 20 | 14 | 1,297 | B (06) |
| SW 88 Street (SR 90) | SW 167 Avenue to SW 152 Ave. | 4 DV/6 DV[2] | E+20% | 3924/5904 | 2,108 | C | 2,607 | 232 | 4,947 | E+1% (06) |
| SW 157 Avenue | SW 72 Street to SW 88 Street | 4 DV | D | 3,100 | 1,253 | C | 268 | 25 | 1,546 | C (04) |
| SW 157 Avenue | SW 88 Street to SW 104 Street | 4 DV | D | NA | | | | 30 | | (06) |

Source: Miami-Dade County Department of Planning and Zoning; Miami-Dade Public Works Department and Florida Department of Transportation, July 2007.
Notes: DV= Divided Roadway, UD= Undivided Roadway, LA Limited Access
[1] County adopted roadway level of service standard applicable to the roadway segment
[2] Roadway segment is currently 4 lanes divided but will be widened to 6 lanes divided by private developer; therefore, the operating level of service will improve from LOS _ to LOS _.
() Year traffic count was updated or LOS Revised

Programmed Roadway Capacity Improvements
Fiscal Years 2007/2008 – 2011/2012

| Roadway | From | To | Type of Improvement | Fiscal Year |
|---|---|---|---|---|
| SW 42 Street | SW 150 Avenue | SW 149 Avenue | Widen 2 to 4 lanes | Prior Funding |
| SW 56 Street | SW 158 Avenue | SW 152 Avenue | Widen 2 to 4 lanes | UC |
| SW 88 St. (SR 94) | SW 162 Avenue | SW 157 Avenue | Widen 4 to 6 lanes | Private Sector |
| SW 88 St. (SR 94) | SW 157 Avenue | SW 150 Avenue | Widen 4 to 6 lanes | Private Sector |
| SW 96 Street | SW 162 Avenue | SW 157 Avenue | New construction: 4 lanes | Private Sector |
| SW 96 Street | SW 172 Avenue | SW 167 Avenue | 2 lanes and ½ of turn lane (South Side) | Private Sector |
| SW 104 Street | SW 147 Avenue | SW 137 Avenue | Widen 4 to 6 lanes | 2007 – 2008 |
| SW 120 Street | SW 137 Avenue | SW 117 Avenue | Widen 4 to 6 lanes | 2011 – 2012 |
| SW 120 Street | SW 157 Avenue | SW 152 Avenue | 2 lanes of 4 lanes divided | Private Sector |
| SW 136 Street | SW 127 Avenue | HEFT | Widen 2 to 4 lanes | 2011 – 2012 |
| SW 136 Street | SW 149 Avenue | SW 139 Court | Widen 2 to 4 lanes | 2008 – 2009 |
| SW 136 Street | SW 162 Avenue | SW 157 Avenue | ½ of R4.4 (4-lane divided; South Side) | Private Sector |
| HEFT (SR 821) | Kendall Dr (SR 94) | SW 117 Avenue | Add lanes and reconstruct | 2009 – 2010 |
| SW 127 Avenue | SW 128 Street | SW 132 Street | New construction: 2 of 4 future lanes | Private Sector |
| SW 127 Avenue | SW 88 Street | SW 120 Street | Widening: 2 to 4 lanes | 2007 – 2008 |
| SW 127 Avenue | SW 121 Street | SW 124 Street | ½ of R4.4 (4-lane divided; East Side) | Private Sector |
| SW 137 Avenue | SW 72 Street | SW 88 Street | Widen 4 to 6 lanes | Private Sector |
| SW 152 Avenue | SW 88 Street | SW 96 Street | ½ of R4.5 (4-lane divided; East Side) | Private Sector |
| SW 157 Avenue | SW 52 Street | SW 54 Terrace | Widen 2 to 4 lanes | 2007 – 2008 |
| SW 157 Avenue | SW 70 Street | SW 72 Street | New construction: 4 lanes | 2007-2008 |
| SW 157 Avenue | SW 94 Street | SW 96 Street | New construction: SB lane | Private Sector |
| SW 157 Avenue | SW 112 Street | SW 120 Street | New 4 lanes | 2007 – 2008 |
| SW 157 Avenue | SW 120 Street | SW 136 Street | New 4 lanes | 2008 – 2009 |
| SW 162 Avenue | SW 88 Street | SW 96 Street | New construction: 4 lanes | UC |
| SW 167 Avenue | SW 42 Street | SW 43 Street | 2 lanes of 4 lanes divided | UC |
| SW 167 Avenue | SW 88 Street | SW 96 Street | Matching existing 2 lanes to the north; West Side | UC |
| SW 172 Avenue | SW 96 Street | SW 88 Street | 2 lanes and ½ of turn lane; East side | Private Sector |
| Krome Avenue | 350" N/O SW 8 Street | MP 3.478 | Add lanes and reconstruct (2 to 4 lanes) | 2009– 2010 |

Source: 2008 Transportation Improvement Program, Metropolitan Planning Organization for the Miami Urbanized Area, May 2007.

Notes: UC means under construction

Private Sector: Project to be constructed by a developer. Construction of improvements normally linked to specific dates, but usually depend upon construction schedule of a development project, which can vary considerably according to the market and other conditions.

According to the Miami-Dade Transportation Plan to the Year 2030, Cost Feasible Plan, a number of additional roadway capacity improvements are planned for this Study Area. As indicated in the "Planned Roadway Capacity Improvements" table below, these

improvements are listed as Priority I, and Priority II projects, with construction planned between 2005 and 2015.

Planned Roadway Capacity Improvements
Year 2015 Planned Roadway Improvements

| Roadway | From | To | Type of Improvement | Priority |
|---|---|---|---|---|
| SW 42 Street | SW 167 Avenue | SW 157 Avenue | New 2 lane | I |
| SW 42 Street | SW 162 Avenue | SW 157 Avenue | Widen 2 to 4 lanes | I |
| SW 56 Street | SW 167 Avenue | SW 158 Avenue | New 2-lane road | I |
| SW 88 St. (SR 94) | SW 167 Avenue | SW 162 Avenue | Widen 4 to 6 lanes | I |
| SW 136 Street | SW 157 Avenue | HEFT | Widen 2 to 4 lanes | I |
| Krome Ave. (SR 997) | | | Add turn lanes at SW 136 Street | I |
| SW 142 Avenue | SW 8 Street | SW 42 Street | New 2-lane road | I |
| SW 72 Street | SW 157 Avenue | SW 117 Avenue | New 2-lane road | II |
| SW 88 St. (SR 94) | SW 177 Avenue | SW 167 Avenue | Widen 4 to 6 lanes | II |
| Krome Ave. (SR 997) | SW 8 Street | SW 136 Street | Widen 2 to 4 lanes | II |
| Krome Ave. (SR 997) | SW 136 Street | SW 296 Street | Widen 2 to 4 lanes | II |
| SW 167 Avenue | SW 56 Street | SW 88 Street | New 2-lane road | II |
| HEFT (SR 821) | SW 88 Street | SW 117 Avenue | 12 lanes + 3 lane CD/ 8 lanes | II |

Source: Miami-Dade Transportation Plan to the Year 2030, Metropolitan Planning Organization for the Miami Urbanized Area, December 2004.
Notes: Priority I – Project improvement to be funded by 2009
Priority II – Project improvements planned to be funded between 2010 and 2015

The "2015 Roadway Levels-of-Service" table below, shows the roadway segments within the Study Area projected to operate below their adopted LOS standards, with and without the Application's impact, in 2015. As the table indicates, a number of roadways are projected to exceed their adopted LOS standards, including segments of SW 88$^{th}$, SW 96$^{th}$, SW 104$^{th}$, SW 120$^{th}$, and SW 128$^{th}$ Streets, and SW 127$^{th}$, SW 147$^{th}$, SW 157$^{th}$, and SW 177$^{th}$ Avenues.

Application Impact

As indicated below, two development scenarios were analyzed. Scenario 1 (Commercial Retail use), under the requested "Business and Office" CDMP Land Use designation, is estimated to generate approximately 1,696 more PM peak-hour trips than the current CDMP land use designation. Scenario 2 (Residential use), on the other hand, is estimated to generate 235 more PM peak-hour trips than the current land use category.

It should be pointed out that the applicant submitted a Declaration of Restriction prohibiting the development of residential use on the application site. However, DP&Z staff performed a traffic analysis assuming the site developed with residential use because under the requested "Business and Office" Land Use category, residential use

may be authorized. Also, the applicant submitted a Concurrency Impact Assessment, prepared by Fandrei Consulting, Inc., dated June 2007; and a FSUTMS Modeling Analysis, prepared by Cathy Sweetapple & Associates dated August 2007, in support of this application. Fandrei Consulting concluded that the application meets the County's adopted concurrency requirements at all traffic count stations studied. Cathy Sweetapple & Associates concludes that the cumulative impacts of the amendment trips were found not to significantly impact the surrounding roadway network through the year 2015.

2015 Roadway Levels-of-Service (LOS)
Volume to Capacity (V/C) Ratios

| Roadway | Segment | Base Scenario[1] | Scenario 1[2] | Scenario 2[3] | Adopted LOS Std. |
|---|---|---|---|---|---|
| SW 88 Street | SW 117 Ave. to HEFT | 1.33 | 1.33 | 1.31 | E+20% |
| | HEFT to SW 127 Avenue | 1.01 – 1.33 | 0.99 – 1.30 | 1.00 – 1.31 | E+20% |
| SW 96 Street | SW 137 Ave. to SW 142 Ave. | 0.90– 1.12 | 0.90– 1.12 | 0.90– 1.12 | D |
| SW 104 Street | SW 122 Ave. to SW 127 Ave. | 1.28 | 1.28 | 1.28 | E+20% |
| SW 120 Street | SW 117 Ave. to HEFT | 0.94 | 0.97 | 0.98 | D |
| | HEFT to SW 127 Avenue | 0.91 – 1.21 | 0.93 – 1.25 | 0.93 – 1.26 | D |
| | SW 132 Ave. to SW 137 Ave. | 0.81 – 0.91 | 0.88 – 0.91 | 0.89 –0.91 | D |
| SW 128 Street | SW 122 Ave. to SW 127 Ave. | 0.88 | 0.96 | 1.03 | D |
| | SW 132 Ave. to SW 137 Ave. | 1.12 | 1.11 | 1.11 | D |
| SW 142 Ave. | SW 42 Street to SW 47 Street | 1.54 – 1.69 | 1.18 – 1.33 | 1.36 – 1.51 | D |
| SW 147 Ave. | SW 42 Street to SW 47 Street | 0.83 – 0.99 | 0.91 – 1.06 | 0.90 – 1.06 | D |
| | SW 56 Street to SW 72 Street | 0.99 – 1.03 | 1.01 – 1.05 | 1.01 – 1.05 | D |
| SW 157 Ave. | SW 42 Street to SW 56 Street | 1.29 | 1.36 | 1.39 | D |
| | SW 56 Street to SW 72 Street | 0.94 | 0.95 | 0.95 | D |
| | SW 96 St. to SW 104 Street | 0.85 – 1.07 | 0.88 – 1.10 | 0.85 – 1.08 | D |
| | SW 104 St. to SW 112 Street | 1.03 | 1.03 | 1.02 | D |
| Krome Ave. | Theo. SW 64 St. to SW 88 St. | 0.90 | 0.87 | 0.88 | B |
| | SW 88 St. to Theo. SW 96 St. | 0.54 - 0.77 | 0.54 - 0.77 | 0.51 - 0.72 | B |

Source: Miami-Dade County Metropolitan Planning Organization for the Miami Urbanized Area, July 2007.
Notes: [1] Base Scenario represents the traffic conditions with the application's current land use designation.
[2] Scenario 1 assumes application site developed with retail commercial use under the requested land use designation and represents projected traffic conditions with this use.
[3] Scenario 2 assumes application site developed with residential use under the requested land use designation and represents projected traffic conditions with this use.

DP&Z's traffic analysis indicates that Krome Avenue from SW 8th Street to SW 136th Street is currently operating at LOS D, below the adopted LOS C standard. The concurrency analysis, on the other hand, indicates that Krome Avenue, between SW 8th and SW 88th Streets and from SW 88th Street to SW 136th Street, is predicted to continue to operate at LOS D, below the adopted LOS C standard; and SW 88th Street, from SW 167th and SW 152nd Avenues, is predicted to operate at LOS E+29%, below the adopted LOS E+20% standard. With regard to the 2015 traffic analysis, the

County's FSUTMS Modeling results indicate that a number of roadways, without the Application's impact, are projected to exceed their adopted LOS standards by 2015. These roadways are: SW 88th between SW 127th Avenue and SW 117th Avenue, SW 96th Street from SW 142nd to SW 137th Avenues, SW 104th Street between SW 122nd and SW 127th Avenues, SW 157th Avenue from SW 42nd to SW 112th Streets, and SW 177th Avenue from Theoretical SW 64th Street to Theoretical SW 96th Street. However, none of these roadways seem to be significantly impacted by the application's trips.

**Transit**

The Miami-Dade Transit's (MDT) Metrobus Routes nearest to the application site are Metrobus 204, 272, and 288. The "Metrobus Route Service" table below shows the existing service frequency scheduled for these routes and the nearest bus stop to the Application site.

Metrobus Route Service

| Route | Headways (in minutes) | | | | Stop Locations | Type of Service |
|---|---|---|---|---|---|---|
| | Peak | Off-Peak | Sat | Sun | | |
| 204 | 6 | N/A | 40 | 45 | SW 88 St and SW 167 Ave (Shops at Paradise Lakes) | F – Dadeland North |
| 272 | 7.5 | N/A | N/A | N/A | SW 88 St and SW 167 Ave (Shops at Paradise Lakes) | F – Dadeland North |
| 288 | 12 | N/A | N/A | N/A | SW 88 St and SW 167 Ave (Shops at Paradise Lakes) | F – Dadeland North |

Source: Miami Dade Transit, 2007
Note: F: Feeder service to Metrorail

Planned Improvements

MDT's programmed service improvements for Routes 204, 272, and 288 include extending services of all three routes west to the West Kendall Bus Terminal. Proposed new service routes include the West Kendall Crosstown, which will be operating 7 days a week from the West Dade Bus Terminal to Coral Reef Drive and SW 137th Avenue primarily along SW 147th, 152nd, 157th, and 162nd Avenues.

A traffic impact analysis performed in the Traffic Analysis Zone (TAZ) where the subject property is located (TAZ# 1251), indicated that the expected transit impact potentially generated by the proposed application would be minimal and could be absorbed by the transit improvements scheduled in the area.

Other Planning Considerations

In June 28, 2007, the Applicant submitted a *Study of Comparative Water Uses* in support of this application. According to the report, the purpose of the Study is to compare historical water uses under the current "Agriculture" CDMP land use

designation, with the water uses anticipated in the future under the proposed "Business and Office" land use designation.

The Study concludes that the proposed "Business and Office" land use designation will demand significantly less water withdrawal from the Miami-Dade's Biscayne Aquifer than the current "Agriculture" land use designation; according to the report, calculations show a reduction of water demand to be approximately 50% (See Study of Comparative Water Uses, Summary of Findings). On July 25, 2007, the Department of Planning and Zoning submitted the Study to the Department of Environmental Resources for review and comment.

**Consistency Review with CDMP Goals, Objectives, Policies, Concepts, and Guidelines**

The following CDMP goals, objectives, policies, concepts, and guidelines will be enhanced if the proposed designation is approved:

- Policy LU-8B: Distribution of neighborhood or commercial-servicing retail uses and personal and professional offices shall reflect the spatial distribution of the residential population;

The following CDMP goals, objectives, policies, concepts, and guidelines will be impeded if the proposed designation is approved:

- Policy LU-1B: Major centers of activity, industrial complexes, regional shopping centers, large-scale office centers and other concentrations of significant employment […] shall be sited on the basis of metropolitan scale considerations at locations with good countywide, multi-modal accessibility.
- Policy LU-1G: Business developments shall preferably be placed in clusters or nodes in the vicinity of major roadway intersections, and not in continuous strips or as isolated spots.
- Policy LU-2B: Urban services and facilities, which support or encourage urban development in Agriculture and Open Land areas, shall be avoided.
- Policy LU-8F: The adequacy of non-residential land supplies shall be determined on the basis of land supplies in subareas of the County;
- Policy LU-8G(ii): Areas that shall be avoided for inclusion to the UDB;

  (a) Land designated Agriculture on the Land Use Plan map;
- Concepts No. 13: Avoid excessive scattering of industrial or commercial employment locations.

# APPENDICES

Appendix A Map Series

Appendix B Amendment Application

Appendix C Miami-Dade County Public Schools Analysis

Appendix D Applicant's Traffic Study

Appendix E Fiscal Impact Analysis

Appendix F Proposed Declaration of Restrictions

Appendix G Photos of Site and Surroundings (from site visit)

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# APPENDIX A

Map Series

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## AERIAL PHOTO: APPLICATION NO. 8


APPLICATION AREA

URBAN DEVELOPMENT BOUNDARY (UDB)

URBAN EXPANSION AREA (UEA)

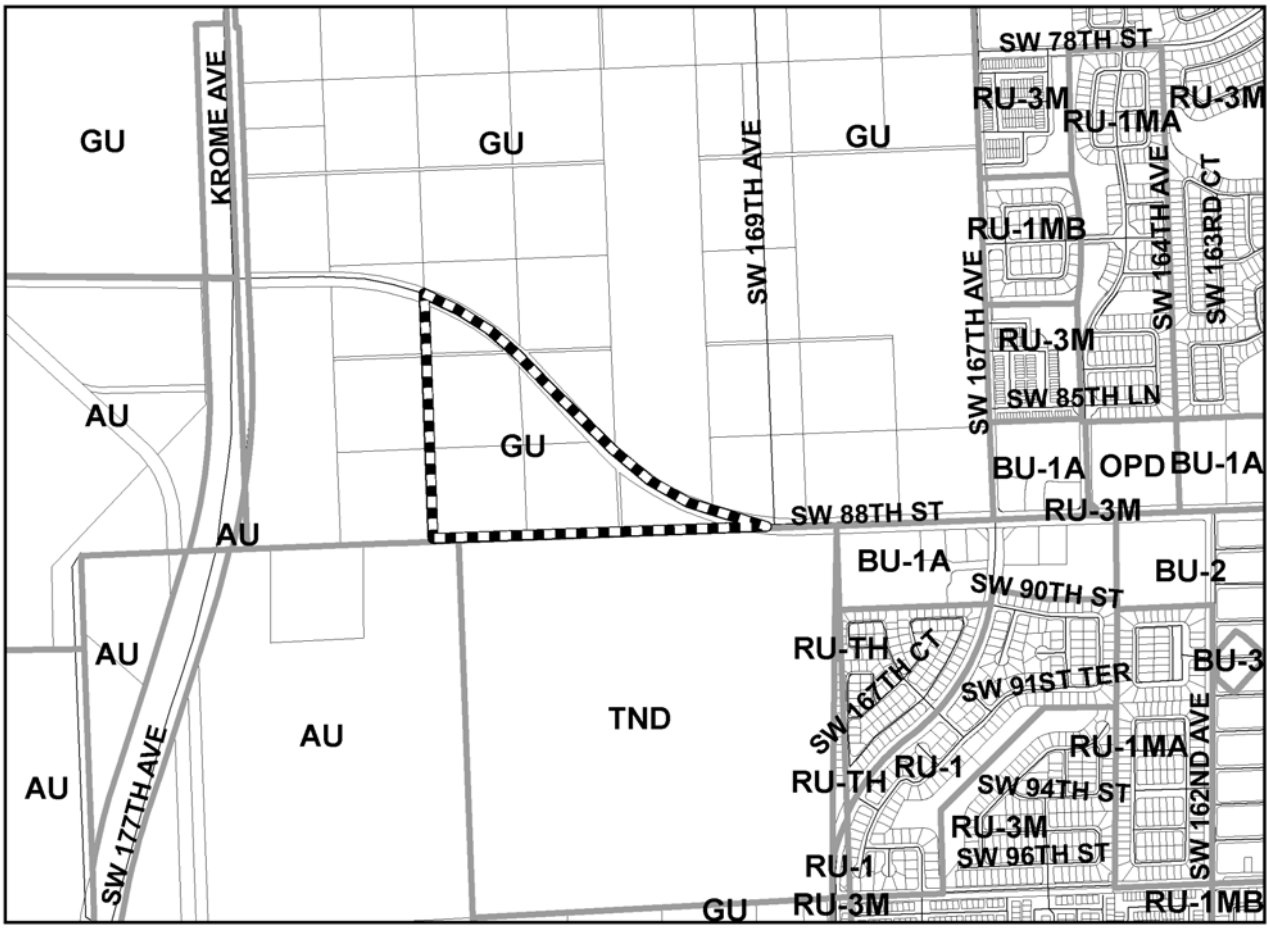
0 0.125 0.25 0.5

Miles

N

SOURCE: MIAMI-DADE COUNTY, DEPARTMENT OF PLANNING AND ZONING, AUGUST 2007

## APPLICATION NO. 8
## CURRENT ZONING MAP




APPLICATION AREA

**MIAMI-DADE ZONING DISTRICTS**

| | |
|---|---|
| GU | INTERIM - USES DEPEND ON CHARACTER OF NEIGHBORHOOD, OTHERWISE EU-2 STANDARDS APPLY |
| AU | AGRICULTURAL - 1 RESIDENTIAL DWELLING UNIT ON 5 GROSS ACRES |
| RU-1 | SINGLE FAMILY RESIDENCE ON 7,500 SQ. FT. NET LOT |
| RU-1MA | SINGLE-FAMILY MODIFIED RESIDENTIAL DISTRICT - ON 5,000 SQ. FT. NET LOT |
| RU-1MB | SINGLE-FAMILY MODIFIED RESIDENTIAL DISTRICT - ON 6,000 SQ. FT. NET LOT |
| RU-TH | TOWNHOUSE - 8.5 UNITS/NET ACRE |
| RU-3M | MINIMUM APARTMENT HOUSE DISTRICT - 12.9 UNITS PER ACRE |
| OPD | OFFICE PARK DISTRICT - 3 ACRES GROSS. OFFICE BUILDINGS & LABORATORIES FOR SCIENTIFIC AND INDUSTRIAL RESEARCH |
| TND | TRADITIONAL NEIGHBORHOOD DISTRICT 40 ACRES GROSS MIN. MIXED USES |
| BU-1A | LIMITED BUSINESS DISTRICT |
| BU-2 | SPECIAL BUSINESS DISTRICT |
| BU-3 | LIBERAL BUSINESS DISTRICT - (WHOLESALE) INCLUDES MECHANICAL GARAGE AND USED CAR LOTS |

0 0.15 0.3 0.6

Miles

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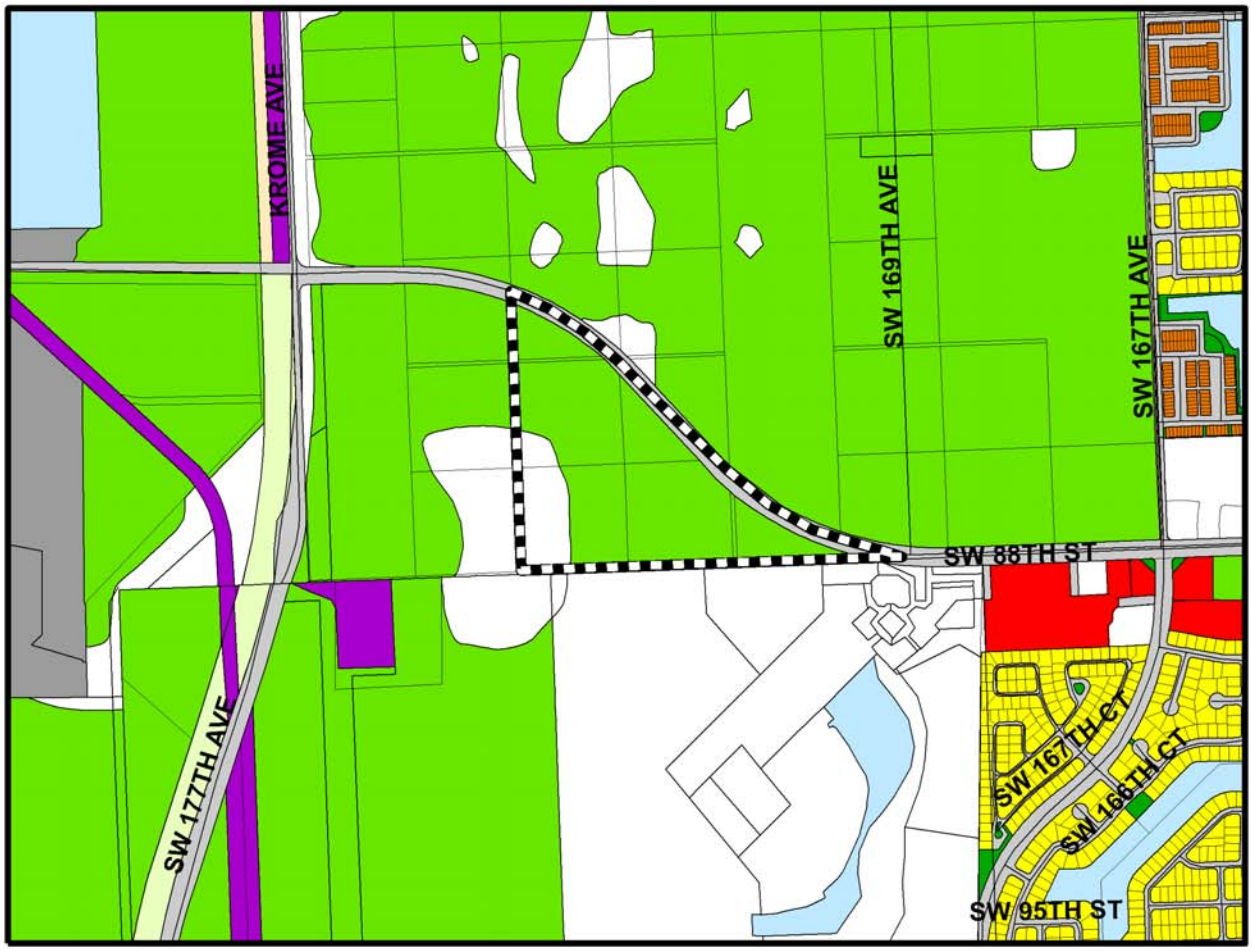
SOURCE: MIAMI-DADE COUNTY, DEPARTMENT OF PLANNING AND ZONING, AUGUST 2007

## APPLICATION NO. 8
## EXISTING LAND USE




### LEGEND

APPLICATION AREA

**EXISTING LAND USE**

- SINGLE FAMILY
- TOWNHOUSES
- COMMERCIAL, SHOPPING CENTERS, STADIUMS
- INDUSTRIAL EXTRACTION
- COMMUNICATIONS, UTILITIES, TERMINALS
- STREETS, ROADS, EXPRESSWAYS, RAMPS
- SWALES, RIGHT-OF-WAYS
- AGRICULTURE
- PARKS, PRESERVES, CONSERVATION AREAS
- VACANT - UNPROTECTED
- INLAND WATERS

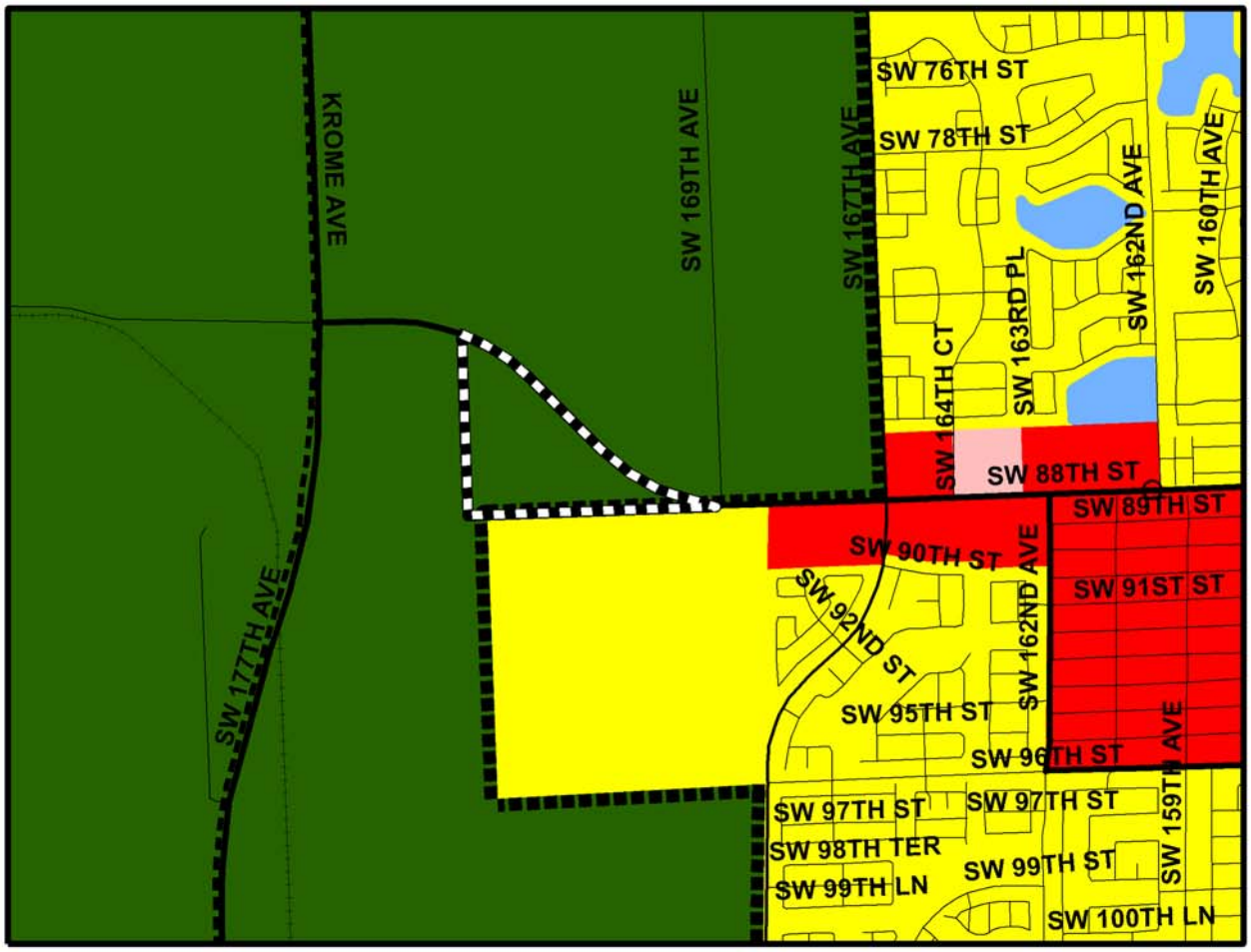
0 0.1 0.2 0.4

Miles

N

SOURCE: MIAMI-DADE COUNTY, DEPARTMENT OF PLANNING AND ZONING, AUGUST 2007

## APPLICATION NO. 8
## CDMP LAND USE PLAN




### LEGEND

APPLICATION AREA

**CDMP LAND USE**

RESIDENTIAL COMMUNITIES
LOW DENSITY RESIDENTIAL (LDR) 2.5 TO 6 DU/AC
BUSINESS AND OFFICE
OFFICE/RESIDENTIAL
WATER
AGRICULTURE
MAJOR ROADWAYS (3 OR MORE LANES)
MINOR ROADWAYS
FUTURE RAPID TRANSIT
RAILROAD
2015 URBAN DEVELOPMENT BOUNDARY
2025 EXPANSION AREA BOUNDARY

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Miles

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SOURCE: MIAMI-DADE COUNTY, DEPARTMENT OF PLANNING AND ZONING, AUGUST 2007

# APPENDIX B

Amendment Application

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**APPLICATION TO AMEND THE**
**LAND USE PLAN MAP**
**OF THE MIAMI-DADE COUNTY**
**COMPREHENSIVE DEVELOPMENT MASTER PLAN**

2007 APR 19 P 3:43

PLANNING & ZONING
METROPOLITAN PLANNING SECT

1. APPLICANT

David Brown, Steven Brown & Victor Brown
500 South Dixie Highway
Suite 220
Coral Gables, FL 33146

2. APPLICANT'S REPRESENTATIVE

Chad Williard, Esq.
Carlos Williard & Flanagan, P.A.
999 Ponce de Leon, Suite 1000
Coral Gables, FL 33134
(305) 444-1500
(305)443-8617 (FAX)
chadw@cwfpa.com

By: _____ 4/19/2007
Chad Williard, Esq. Date

3. DESCRIPTION OF REQUESTED CHANGE

A. A change to the Land Use Element, 2015/2025 Land Use Plan map.

B. Description of Subject Area

The subject property (the "Property") consists of 42.0 gross acres of land located in Section 31, Township 54 South, Range 39 East, in unincorporated Miami-Dade County. More specifically, the Property is located south of North Kendall Drive, west of SW 167th Avenue and is bordered to the south by the 2015 Urban Development Boundary (and the "Vizcaya TND").

C. Acreage

Subject Application Area: 38.5 net acres (42.0 gross acres)
Acreage Owned by Applicant: 0 acres (the Applicant has a Contract to purchase 38.4 acres of the Property).

D. Requested Change

1. It is requested that the Property be redesignated on the 2015/2025 Land Use Plan map from "Agriculture" and "2025 Expansion Area Boundary" to "Business and Office."

2. It is also requested that the 2015 Urban Development Boundary be amended to include the Property.

3. If a Declaration of Restrictions (voluntarily proffered by the Applicant) is accepted by the Miami Dade County Board of County Commissioners, then it is also requested that said Declaration of Restrictions be added to the Table entitled, "Restrictions Accepted by the Board of County Commissioners in Association with Land Use Plan Map Amendments," as memorialized in the Land Use Element.

4. REASONS FOR AMENDMENT

The Property is located on the south side of Kendall Drive (SW 88 Street), west of SW 167 Avenue and abuts the 2015 Urban Development Boundary (the "UDB") on its southern boundary. Inherent in the Property's location is an important fact: while the Property is technically outside the UDB, approval of this request to include it within the UDB will essentially amount to nothing more than a continuation of the present westerly boundary to intersect Kendall Drive; thereby filling a small gap in the positioning of the UDB created by the approval of the "Cropseyville" CDMP Application many years ago.

The Property is located within the CDMP Land Use Plan map's "2025 Expansion Area Boundary" in an area of Miami-Dade County (West Kendall) which has experienced, and continues to experience, rapid residential growth. In fact, one has to look no further than immediately south of the Property, where the "Vizcaya TND" community is currently being developed. This significant residential development has exacerbated the present condition wherein the area (Minor Statistical Areas 6.1 and 6.2, in particular) has an insufficient supply of commercially designated, zoned and/or developed land.

As further explained herein, given this inadequate commercial land supply, the Property's "Agriculture" land use designation is no longer the best use of the Property. That is, in order for the County to adequately plan for the future needs of its residents – in furtherance of certain Goals, Objectives and Policies of the Land Use Element of the CDMP - the Property should be redesignated from "Agriculture" to "Business and Office" and included within the 2015 UDB.

There is a clear and present need for additional commercially designated land in West Kendall (MSAs 6.1 & 6.2). A review of the data with respect to commercial supply and demand plainly demonstrates this point. The analysis generated by the Planning & Zoning Department (the "Department") during the April 2006 Cycle ("Projected Absorption of Land for Commercial Uses, April 2006 Cycle; page 10-5 of the Initial Recommendations) indicated at that time that there were 384.9 vacant commercial acres, being absorbed at an average annual rate of 27.29 acres per year, resulting in a projected

depletion year of 2020 for MSAs 6.1 & 6.2. This same rate initially was acknowledged as accurate when the County considered this application during the April 2005 Cycle.[1]

In April 2006, the Department's data identified 384.9 acres of vacant commercial land in MSAs 6.1 & 6.2; however, as of February 2007, Department data indicated **that the acreage had dropped to 255.5 acres.** Thus, the vacant commercial acreage has dropped dramatically – a 130-acre reduction (almost 34%) in less than one year. Extrapolating from this data, the vacant commercial land supply in MSAs 6.1 & 6.2 will be depleted in approximately 2 years – resulting in a projected depletion year of **2010 – roughly 10 years earlier than the County's projected depletion; and, almost 13 years less than the 15 year planning horizon recommended in the Land Use Element of the CDMP.**

Nonetheless, assuming for argument's sake, that the County's annual absorption rate of 27.3 acres per year is accurate, the vacant commercial land would still be depleted in less than 10 years. Thus, regardless of the criteria relied upon to conduct the analysis, the fact is that there may be as little as 2 years of vacant commercial land supply in MSAs 6.1 & 6.2; but, under no circumstances, is there more than an approximate 9 year supply. And of the 255.5 acre vacant commercial land supply, over 100 acres is in one contiguous project ("Kendall Town Center" located at Kendall Drive and SW 152 Avenue) which will be developed in the very near future. Clearly, there is an overwhelming need to approve this Application in order to provide, at least a portion of, the commercial land needed in this area.

In its previous recommendation for this Application (from the April 2005 CDMP cycle), the Department referenced Policy 8H in stating that "land designated 'Agricultural' on the Land Use Plan map should be avoided." While it is true that the Property is designated "Agriculture," it is equally true that the Property lies within the 2025 Urban Expansion Area – a key fact that supports the reality that the site was not intended to remain in agricultural use perpetually. Agriculture is no longer an appropriate designation for this Property. One has only to look where the Property is situated – it has a major state road to its north (Kendall Drive, SR 94), a half section line road to its west (theoretical) and the developing, Vizcaya community to its south. As such, it is unrealistic to argue that a relatively small, 40 acre parcel, bounded by urban uses, and with SW 172 Avenue cutting through the Property, can long remain a viable agricultural property. Given the rapid rate at which the residential development of Vizcaya is progressing to the south, maintaining an agricultural use – with its use of overhead irrigation, fertilizers, pesticides and heavy equipment - will actually be hostile and incompatible to this neighboring, 1,200-unit residential community.

Regional water managers have publicly expressed great concern regarding Miami Dade County's water supply. This application will actually reduce the property's water supply demand from its current agricultural use. A study prepared by the Applicant's consultant demonstrates that the current agricultural use of the Property results in a net loss of approximately 3670 gallons per acre per day of water through irrigation – water drawn

[1] In the final hearing before the Miami-Dade County Commission where this similar application was considered in April 2006, the applicant argued (and the Planning & Zoning Director confirmed) that the absorption rate for this area was closer to 41 acres per year -which will result in a depletion year of approximately 2012 - significantly earlier than the 15 year planning horizon required by the Land Use Element of the CDMP.

from the Biscayne aquifer through shallow wells. Business and office uses, on the other hand, will require **less than half that amount**. Therefore, in approving the Application, the County will significantly reduce the amount of water the Property will use on a daily basis.

In its Revised Recommendation with respect to the aforementioned, 2005 version of this application, the Department acknowledged that Miami-Dade County's concurrency for roadways in the general vicinity of this application would not be negatively impacted as a result of the Application's approval. Approval of the Application will have no negative impact on roadway capacity levels. In fact, the Application actually has the potential to reduce trips with respect to peak (east/west) direction on the roadway network. Furthermore - a very important point that cannot be overstated - approval of the Application will result in the Applicant's construction and dedication of SW 172 Avenue.

This new, half-section line road will provide an important north/south link between the Vizcaya community to the south and Kendall Drive: without this SW 172 Avenue extension, the residents of the 1200-unit, Vizcaya development will be forced to access Kendall Drive via SW 96th Street/SW 167 Avenue – exacerbating the problem at a point where the roadway already experiences "bottleneck" conditions. The importance of SW 172nd Avenue to this area was confirmed by the Miami-Dade County Commission when it passed a resolution (Miami Dade County Resolution No. R-1042-06) directing the County Manager to acquire land for the construction of this portion of SW 172nd Avenue. Clearly the construction of this road will address an important County need – a need which the Applicant is willing to provide (at its sole cost and expense) upon approval of this Application.

Another comment made by the Department during the prior consideration of the Application was that this proposal will place a commercial node at the UDB and that such nodes should be located at the center of the market and not the edge. This statement is inconsistent with past CDMP amendments and, in this case, does not reflect the best interest of the surrounding community. First, there is a continuous band of commercially designated/zoned/developed land for approximately one mile east of the Property. Therefore, while it is technically correct that the Property lies on the western boundary of this commercial band, the fact remains that it is a continuation of the existing commercial use. Furthermore, the 2025 Urban Expansion Area lies west of the Property, so ultimately, the Property will not lie at the western edge of the UDB.

In no way would approval of this Application mark a precedent-setting extension of commercially designated lands, rather it will establish a natural termination point in that its approval will not move the UDB any further west than what already exists. It will simply "fill in" the thin sliver of land between Kendall Drive and the development to the south of the Property which was created by the approval of the "Cropseyville" Application.

Second, and most importantly (from a consistency and credibility standpoint), in the recent past the Department has frequently recommended approval of similar, CDMP Amendment requests. Specifically, the Department has routinely acknowledged instances where it is appropriate to locate commercial development - recommending

approval of "Business and Office" redesignation requests, in particular - at the Urban Development Boundary. [2]

With each of these prior applications, the Department acknowledged that, due to the lack of availability of viable alternate locations, it is necessary "in order to provide required commercial properties to serve the community," to permit such commercial development at the UDB. As such, if there was ever an instance where the opportunity to provide much-needed commercial land supply in an area where there are very few (if any) viable, alternate sites – while also providing vital infrastructure (e.g., SW 172 Avenue, in the instant case) – warranted the support of the Department, this Application epitomizes such a request: there is a scarcity of vacant commercial land in MSAs 6.1 & 6.2; and even with the addition of the Property's 40 acres, there will still be a shortage of commercially designated land in this area when compared to Countywide averages. Thus, the Department is obligated to discharge its responsibility to provide for the future needs of Miami Dade County's residents by recommending approval of this Application – just as it has done with prior, less meritorious requests.

Also, please note that the Applicant will proffer a covenant prohibiting all residential uses on the Property; such that, if the Application is approved, the Property will be developed entirely with non-residential uses. Therefore, no residential analysis will be necessary by the Department or the Miami Dade County School Board.

Finally, approval of this Application is consistent with Objective 1 and Policies 1H, and 8B, as well as certain Guidelines for Urban Form memorialized in the Land Use Element of the CDMP: the Property is located at the intersection of a section line and a half section line road; and approving this Application will provide a transitional activity node adjacent to major roadways, as suggested in the Miami Dade County's Guidelines for Urban Form (CDMP page I-22).

For all the reasons set forth herein, the Applicant respectfully submits that the need for additional commercial and office land is clear and that there is no better or more logical place to provide for this additional capacity than that location proposed by this Application.

5. ADDITIONAL MATERIALS SUBMITTED

1. legal description and sketch of property
2. section map
3. aerial photograph
4. 8 ½"x11" page showing application area

The Applicant reserves the right to supplement the Application with additional documentation within the time permitted by the Code of Miami-Dade County.

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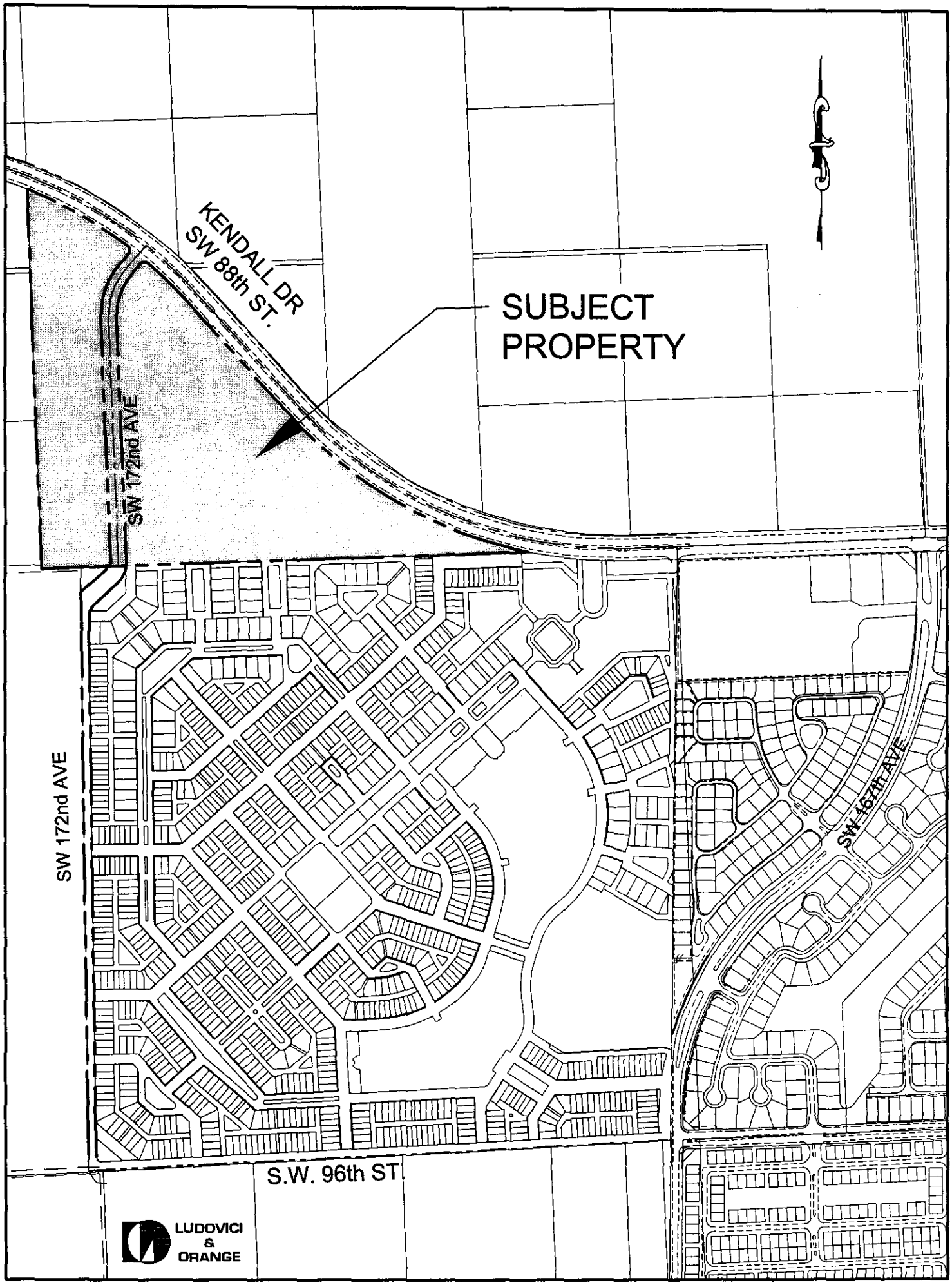
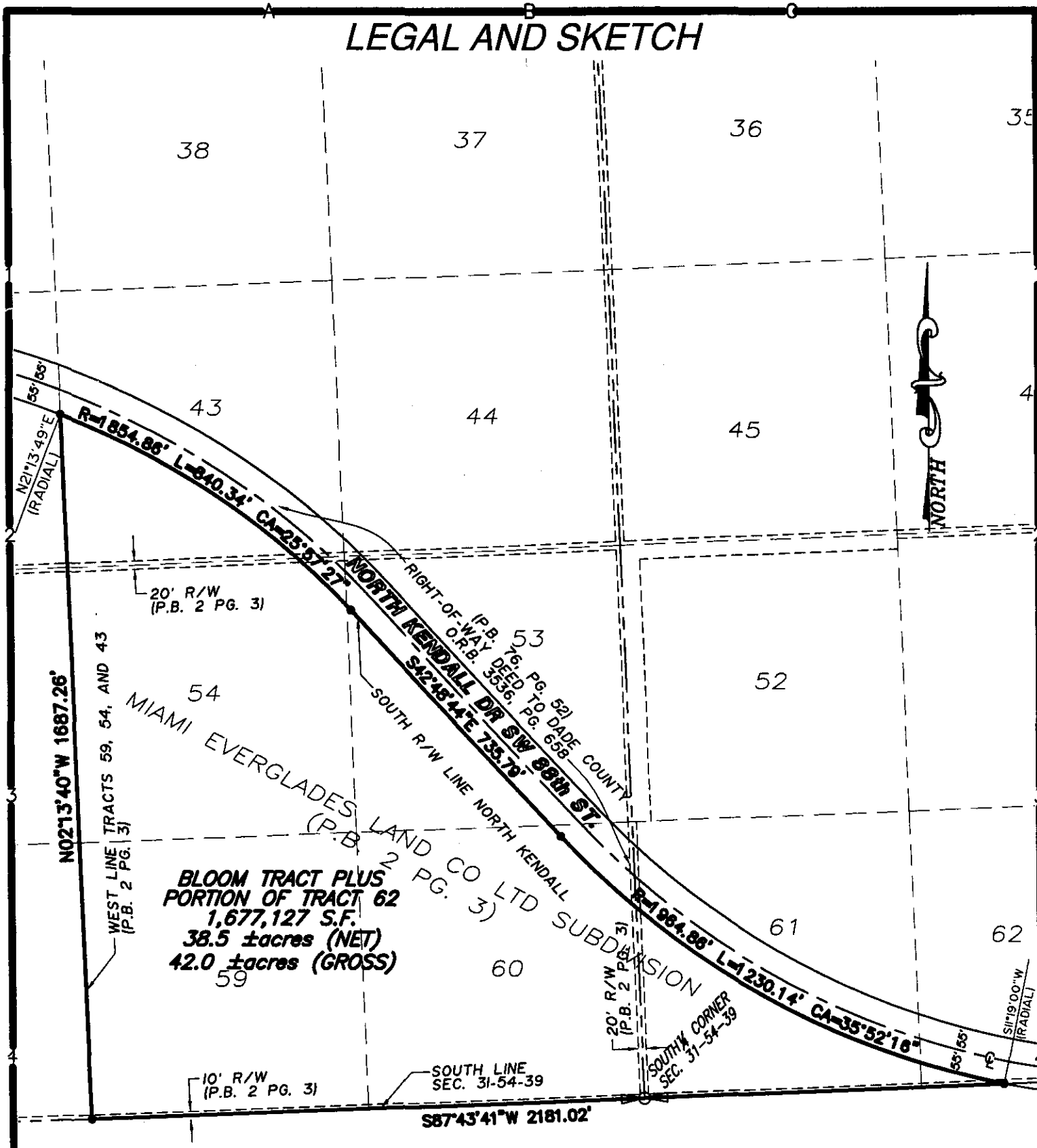
[2] Application No. 6, April 1998 CDMP Amendment Cycle - The Paradise Group; Application No.7, April 1998 CDMP Amendment Cycle - Gerald M. Higier; Application No.11, April 2001 CDMP Amendment Cycle - Peters Trust; Application No.4, October 2001 CDMP Amendment Cycle - Ferro Development Inc; Application No. 4, April 2002 CDMP Amendment Cycle – CB 152, LLC; Application No. 15, April 2005 CDMP Amendment Cycle – Pasadena Capital Group; and, Application No. 24, April 2005 CDMP Amendment Cycle - Talamas, Valdes, et al.

6. COMPLETED DISCLOSURE FORMS

See Attached


KENDALL DR
SW 88th ST.
SUBJECT
PROPERTY
SW 172nd AVE
SW 172nd AVE
SW 167th AVE
S.W. 96th ST
LUDOVICI
&
ORANGE

# LEGAL AND SKETCH

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**LUDOVICI & ORANGE**
CONSULTING ENGINEERS, INC.
329 PALERMO AVENUE, CORAL GABLES, FLORIDA 33134 • 305/448-1600 • LB 1012


**OVERALL TRACT**

SHEET 2 OF 2 SHEETS

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# LEGAL AND SKETCH

*SURVEYOR' S NOTES:*

1. Bearings are based on an assumed meridian on the South line of Section 31-54-39 (S87°43'41"W), Miami-Dade County, Florida.
2. Not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.
3. This sketch does not represent a land survey

*LEGEND:*

| | |
|---|---|
| ℄ | Centerline |
| P.B. | Plat Book |
| PG. | Page |
| R | Radius |
| CA | Central Angle of Curve |
| L | Length |
| SF | Square Feet |
| SEC. | Section |
| O.R.B. | Official Record Book |

*LEGAL DESCRIPTION: (FROM COMMITMENT NO. CF-1527299)*

All that part of Tracts 53, 60, 61 and 62 lying South and West of North Kendall Drive right-of-way in Section 31, Township 54 South, Range 39 East, according to the plat thereof of "MIAMI EVERGLADES LAND COMPANY SUBDIVISION", recorded in Plat Book 2, at Page 3, of the Public Records of Miami-Dade County, Florida.

Tract 59 of Section 31, Township 54 South, Range 39 East, "MIAMI EVERGLADES LAND COMPANY SUBDIVISION", according to the plat thereof, recorded in Plat Book 2, Page 3, of the Public Records of Miami-Dade County. Florida.

All of Tract 43 lying South of North Kendall Drive, and all of Tract 54, less right-of-way for North Kendall Drive, in Section 31, Township 54 South, Range 39 East, according to the plat thereof of "MIAMI EVERGLADES LAND COMPANY SUBDIVISION, recorded in Plat Book 2, Page 3 of the Public Records of Miami-Dade County, Florida. Containing 1,677,127 square feet or 38.50 acres, more or less. And the street dedications shown on the above described property.

SURVEYOR'S NOTE: Kendall Drive is recorded in O.R.B. 3536, Page 658 of the Public Records of Miami-Dade County, Florida.

*SURVEYOR'S CERTIFICATE:*

I HEREBY CERTIFY: that the LEGAL AND SKETCH of the property described hereon was made under my supervision and that the LEGAL AND SKETCH meets the Minimum Technical Standards set forth by the Florida Board of Professional Land Surveyors and Mappers in Chapter 61G17-6. Florida Administrative Code pursuant to Section 472.027, Florida Statutes. And, that the sketch hereon is true and correct to the best of my knowledge and belief. Subject to notes and notations shown hereon. This sketch does not represent a land survey. Ludovici and Orange Consulting Engineers Inc. L.B. #1012

By: _____

Arturo A. Sosa
Surveyor and Mapper 2629
State of Florida

| PROJ. NO: 2005 22 | DATE: 04-21-2005 | DRAWN: AJ | CHECKED: AS | SCALE: AS NOTED |
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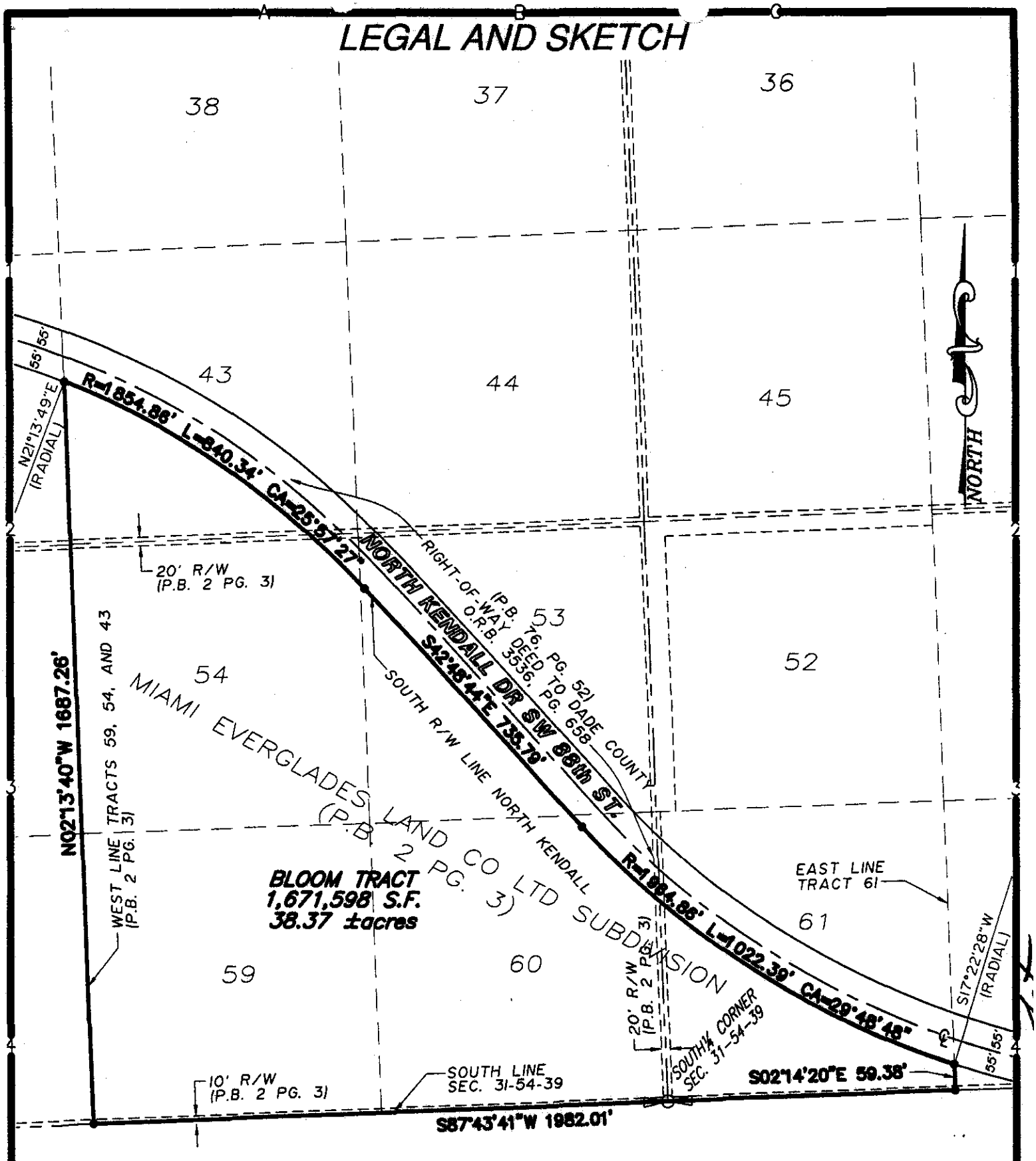
**LUDOVICI & ORANGE**
CONSULTING ENGINEERS, INC.
329 PALERMO AVENUE, CORAL GABLES, FLORIDA 33134 • 305/448-1600 • LB 1012

OVERALL TRACT

# LEGAL AND SKETCH

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**LUDOVICI & ORANGE**
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329 PALERMO AVENUE, CORAL GABLES, FLORIDA 33134 • 305/448-1600 • LB 1012


**BLOOM TRACT**
SHEET 2 OF 2 SHEETS

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# LEGAL AND SKETCH

*SURVEYOR' S NOTES:*

1. Bearings are based on an assumed meridian on the South line of Section 31-54-39 (S87°43'41"W), Miami-Dade County, Florida.
2. Not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.
3. This sketch does not represent a land survey

*LEGEND:*

| | |
|---|---|
| ℄ | Centerline |
| P.B. | Plat Book |
| PG. | Page |
| R | Radius |
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| L | Length |
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| SEC. | Section |
| O.R.B. | Official Record Book |

*LEGAL DESCRIPTION: (FROM COMMITMENT NO. CF-1527299)*

All that part of Tracts 53, 60 and 61 lying South and West of North Kendall Drive right-of-way in Section 31, Township 54 South, Range 39 East, according to the plat thereof of "MIAMI EVERGLADES LAND COMPANY SUBDIVISION", recorded in Plat Book 2, at Page 3, of the Public Records of Miami-Dade County, Florida.

Tract 59 of Section 31, Township 54 South, Range 39 East, "MIAMI EVERGLADES LAND COMPANY SUBDIVISION", according to the plat thereof, recorded in Plat Book 2, Page 3, of the Public Records of Miami-Dade County. Florida.

All of Tract 43 lying South of North Kendall Drive, and all of Tract 54, less right-of-way for North Kendall Drive, in Section 31, Township 54 South, Range 39 East, according to the plat thereof of "MIAMI EVERGLADES LAND COMPANY SUBDIVISION, recorded in Plat Book 2, Page 3 of the Public Records of Miami-Dade County, Florida. Containing 1,671,598 square feet or 38.37 acres, more or less. And the street dedications shown on the above described property.

SURVEYOR'S NOTE: Kendall Drive is recorded in O.R.B. 3536, Page 658 of the Public Records of Miami-Dade County, Florida.

*SURVEYOR'S CERTIFICATE:*

I HEREBY CERTIFY: that the LEGAL AND SKETCH of the property described hereon was made under my supervision and that the LEGAL AND SKETCH meets the Minimum Technical Standards set forth by the Florida Board of Professional Land Surveyors and Mappers in Chapter 61G17-6. Florida Administrative Code pursuant to Section 472.027, Florida Statutes. And, that the sketch hereon is true and correct to the best of my knowledge and belief. Subject to notes and notations shown hereon. This sketch does not represent a land survey. Ludovici and Orange Consulting Engineers Inc. L.B. #1012

By: _____

Arturo A. Sosa
Surveyor and Mapper 2629
State of Florida

| PROJ. NO: 2005 22 | DATE: 04-21-2005 | DRAWN: AJ | CHECKED: AS | SCALE: AS NOTED |
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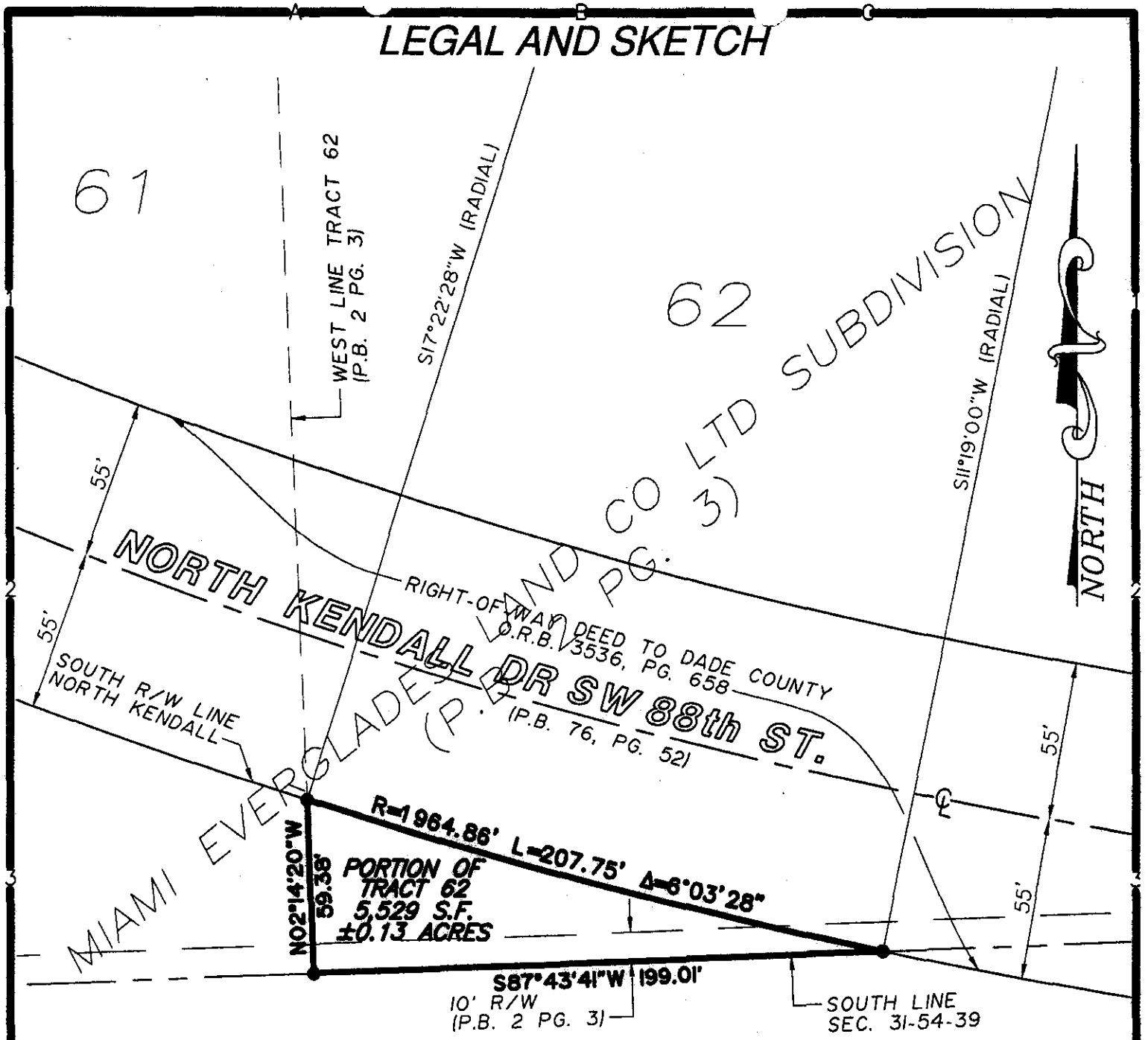
**LUDOVICI & ORANGE**
CONSULTING ENGINEERS, INC.
329 PALERMO AVENUE, CORAL GABLES, FLORIDA 33134 • 305/448-1600 • LB 1012

BLOOM TRACT

# LEGAL AND SKETCH




GRAPHIC SCALE

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( IN FEET )

1 inch = 50 ft.

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PORTION TRACT 62

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# LEGAL AND SKETCH

*SURVEYOR' S NOTES:*

1. Bearings are based on an assumed meridian on the South line of Section 31-54-39 (S87°43'41"W), Miami-Dade County, Florida.
2. Not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.
3. This sketch does not represent a land survey

*LEGEND:*

| | |
|---|---|
| ℄ | Centerline |
| P.B. | Plat Book |
| PG. | Page |
| R | Radius |
| CA | Central Angle of Curve |
| L | Length |
| SF | Square Feet |
| SEC. | Section |
| O.R.B. | Official Record Book |

*LEGAL DESCRIPTION:*

All that part of Tract 62 lying South of North Kendall Drive right-of-way in Section 31, Township 54 South, Range 39 East, according to the plat thereof of "MIAMI EVERGLADES LAND COMPANY SUBDIVISION", recorded in Plat Book 2, at Page 3, of the Public Records of Miami-Dade County, Florida. Containing 5,529 square feet. And the street dedications shown on the above described property.

SURVEYOR'S NOTE: Kendall Drive is recorded in O.R.B. 3536, Page 658 of the Public Records of Miami-Dade County, Florida.

*SURVEYOR'S CERTIFICATE:*

I HEREBY CERTIFY: that the LEGAL AND SKETCH of the property described hereon was made under my supervision and that the LEGAL AND SKETCH meets the Minimum Technical Standards set forth by the Florida Board of Professional Land Surveyors and Mappers in Chapter 61G17-6. Florida Administrative Code pursuant to Section 472.027, Florida Statutes. And, that the sketch hereon is true and correct to the best of my knowledge and belief. Subject to notes and notations shown hereon. This sketch does not represent a land survey. Ludovici and Orange Consulting Engineers Inc. L.B. #1012

By: _____

Arturo A. Sosa
Surveyor and Mapper 2629
State of Florida

| PROJ. NO: 2005 22 | DATE: 04-21-2005 | DRAWN: AJ | CHECKED: AS | SCALE: AS NOTED |
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**LUDOVICI & ORANGE**
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PORTION TRACT 62

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# APPENDIX C

Miami-Dade County Public Schools Analysis

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Miami-Dade County Public Schools
giving our students the world

**Superintendent of Schools**
*Rudolph F. Crew, Ed.D.*

**Chief Facilities Officer**
*Jaime G. Torrens*

**Planning Officer**
*Ana Rijo-Conde, AICP*



August 20, 2007

Mr. Subrata Basu, AIA, AICP, Interim Director
Miami-Dade County
Department of Planning and Zoning
Zoning Evaluation Section
111 NW 1 Street, 11th Floor
Miami, Florida 33128

**Re: Land Use Amendments April 2007 Cycle**

Dear Mr. Basu:

As a follow-up to our letter of July 10, 2007, attached are the results from dialogues conducted with several of the applicant's representatives: Applications 5, 8 and Opa-Locka West Airport, have provided covenants to the County stating there would not be any residential development; therefore they would not impact the District; Applications 7 and 11 would generate sufficient impact fees to fully mitigate their additional impact; Application 3 requires further discussions to explore the opportunity of building an educational facility within the development; Application 10 has proffered a monetary donation to mitigate its impact; and we are still trying to meet with representatives from application 9.

Please note that land use amendments 2, 4, 12 and 13 do not impact the District; and amendments 1and 6 do not meet the review threshold.

As always, thank you for your consideration and continued partnership in our mutual goal to enhance the quality of life for the residents of our community.

Sincerely,

Ivan M. Rodriguez, R.A.
Director II

IMR:ir
L100
Attachments
cc: Ms. Ana Rijo-Conde
Mr. Fernando Albuerne
Mr. Michael A. Levine
Ms. Vivian Villaamil
Ms. Corina Esquijarosa
Ms. Helen Brown

Miami-Dade County Public Schools
giving our students the world

**Superintendent of Schools**
*Rudolph F. Crew, Ed.D.*

**Chief Facilities Officer**
*Jaime G. Torrens*

**Planning Officer**
*Ana Rijo-Conde, AICP*



August 9, 2007

Mr. Subrata Basu, AIA, AICP, Interim Director
Department of Planning and Zoning
Miami-Dade County
111 NW 1 Street, 11th Floor
Miami, Florida 33128

Re: **Land Use Amendment April 2007 Cycle**
**Application No. 8**
**David Brown, Steven Brown and Victor Brown**

Dear Mr. Basu:

It is the School District's understanding that the applicant is proffering a covenant to Miami-Dade County indicating a prohibition of residential uses on the subject property. Since the applicant is not considering a residential development, the above referenced zoning application will not impact area schools at this time. In the event that this condition changes in the future, a dialogue may need to be conducted to address its impact. Should you have any questions please call me at (305) 995-4899.

As always, thank you for your consideration and continued partnership in our mutual goal to enhance the quality of life for the residents of our community.

Sincerely,

Corina S. Esquijarosa
Coordinator III

CSE:rr
L-091

cc: Ms. Ana Rijo-Conde
Mr. Fernando Albuerne
Mr. Michael A. Levine
Mr. Ivan M. Rodriguez
Ms. Vivian Villaamil

**School Board Administration Building** • *1450 N.E. 2nd Avenue, Suite 525 • Miami, Florida 33132*
*305-995-7285 • FAX 305-995-4760 •* ***arijo@dadeschools.net***

**SCHOOL IMPACT REVIEW ANALYSIS**
July 6, 2007

| | | | |
|---|---|---|---|
| **APPLICATION:** | No. 8, David Brown, Steven Brown, and Victor Brown | | |
| **REQUEST:** | Change Land Use from Agriculture to Business and Office. | | |
| **ACRES:** | 42 gross acres | | |
| **LOCATION:** | Northwest corner of SW 88 Street and SW 169 Avenue | | |
| **MSA/ MULTIPLIER:** | 6.2 / .65 Single-Family Detached | | |
| **NUMBER OF UNITS:** | 244 additional units* | Proposed Land Use 252 SF Detached | Existing Land Use 8 SF Detached |
| **ESTIMATED STUDENT POPULATION:** | 159 | | |
| **ELEMENTARY:** | 76 | | |
| **MIDDLE:** | 35 | | |
| **SENIOR HIGH:** | 48 | | |

**SCHOOLS SERVING AREA OF APPLICATION**

| | |
|---|---|
| **ELEMENTARY:** | Christina M. Eve Elementary – 16251 SW 99 Street |
| **MIDDLE:** | Hammocks Middle – 9889 Hammocks Blvd. |
| **SENIOR:** | Felix Varela Senior – 15255 SW 9 Street |

All schools are located in Regional Center VI.

*Based on Census 2000 information provided by Miami-Dade County Department of Planning and Zoning.

**The following population and facility capacity data are as reported by the Office of Information Technology, as of October 2006:**

| | STUDENT POPULATION | FISH DESIGN CAPACITY PERMANENT | % UTILIZATION FISH DESIGN CAPACITY PERMANENT | NUMBER OF PORTABLE STUDENT STATIONS | % UTILIZATION FISH DESIGN CAPACITY PERMANENT AND RELCOATABLE | CUMULATIVE STUDENTS** |
|---|---|---|---|---|---|---|
| Christina M. Eve Elementary | 760 | 710 | 107% | 0 | 107% | 833 |
| | 833 * | | 117% | | **117%** | |
| Hammocks Middle | 2,190 | 1,450 | 151% | 218 | **131%** | 2,367 |
| | 2,225 * | | 153% | | **133%** | |
| Felix Varela Senior | 3,759 | 2,888 | 130% | 0 | **130%** | 3,951 |
| | 3,807 * | | 132% | | **132%** | |

*Student population increase as a result of the proposed development
**Estimated number of students (cumulative) based on zoning/land use log (2001- present) and assuming all approved developments are built; also assumes none of the prior cumulative students are figured in current population.
Notes:

1) Figures above reflect the impact of the class size amendment.
2) Pursuant to the Interlocal Agreement, all of the schools meet the review threshold.

**PLANNED RELIEF SCHOOLS IN THE AREA**
**(Information included in proposed 5-Year Capital Plan, 2006-2010, dated July 2006 and November 2006 Workshop)**

**Projects in Planning, Design or Construction**

| **School** | **Status** | **Projected Occupancy Date** |
|---|---|---|
| N/A | | |

**Proposed Relief Schools**

| **School** | | **Funding year** |
|---|---|---|
| State School "M-1"<br>New Elementary School<br>(Christina Eve, Hoover and Kendale Lakes Elementary Schools relief)<br>(826 student stations) | Site Acquisition | FY 07-08 |
| State School "HHH-1"<br>New Senior High School<br>(Varela, Sunset and Southridge Senior High Schools relief)<br>(2,858 student stations) | Site Acquisition | FY 07-08 |

| | |
|---|---|
| Estimated Permanent Elementary Seats (Current and Proposed in 5-Year Plan) | 1,536 |
| Estimated Permanent Middle Seats (Current and Proposed in 5-Year Plan) | 1,450 |
| Estimated Permanent Senior High Seats (Current and Proposed in 5-Year Plan) | 5,746 |

Note: Some of the proposed schools will add relief to more than one school and new seats will be assigned based on projected need.

**OPERATING COSTS:** Accounting to Financial Affairs, the average cost for K-12 grade students amounts to $6,549 per student. The total annual operating cost for additional students residing in this development, if approved, would total $1,041,291.

**CAPITAL COSTS:** Based on the State's July 2007 student station cost factors*, capital costs for the estimated additional students to be generated by the proposed development are:

| | | | | | |
|---|---|---|---|---|---|
| ELEMENTARY | 76 | x | $18,549 | = | $1,409,724 |
| MIDDLE | 35 | x | $20,031 | = | $701,085 |
| SENIOR HIGH | 48 | x | $26,019 | = | $1,248,912 |
| **Total Potential Capital Cost** | | | | | **$3,359,721** |

*Based on Information provided by the Florida Department of Education, Office of Educational Facilities Budgeting. Cost per student station does not include land cost.

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# APPENDIX D

Traffic Study

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# Traffic Impact Assessment

**For:**

## 2007 BROWN, et al. APPLICATION TO AMEND THE MIAMI-DADE COUNTY COMPREHENSIVE DEVELOPMENT MASTER PLAN MAP

June 2007

FANDREI CONSULTING INC.
Traffic Engineering Services

# *TRAFFIC IMPACT ASSESSMENT*

# BROWN, et al.
# 2007 APPLICATION TO AMEND THE MIAMI-DADE COUNTY COMPREHENSIVE DEVELOPMENT MASTER PLAN AND PLAN MAP

Prepared for

**David Brown, Steven Brown & Victor Brown**

500 South Dixie Highway, Suite 220

Coral Gables, Florida 33143


Prepared by

**FANDREI CONSULTING, INC.**

12651 S. Dixie Highway, Suite 333

Miami, Florida 33156

E.B. No. 26574

in association with

**TRANSPORT ANALYSIS PROFESSIONALS, INC.**

8701 SW 137th Avenue

Miami, Florida 331836

E.B. No. 3766



June 2007

0705

**BROWN, et al.**
**2007 APPLICATION TO AMEND**
**THE MIAMI-DADE COUNTY COMPREHENSIVE DEVELOPMENT**
**MASTER PLAN AND PLAN MAP**

# TRAFFIC IMPACT ASSESSMENT

## EXECUTIVE SUMMARY

This Traffic Impact Assessment pertains to an application for CDMP amendment for a 38.5-acre site (approximately 36 developable acres) south of Kendall Drive and west of SW 167 Avenue. The site lies in a triangular notch in the urban development boundary between Kendall Drive and the Kendall Commons TND, a mixed-use development which is currently under construction.

The CDMP amendment application proposes to change the master planned use from "Agriculture" to "Business and Office". This traffic analysis is based on retail uses because these uses have the potential to generate the greatest traffic impacts.

Data was gathered from new traffic counts for analyses of concurrency and from the MPO for projected traffic volumes and improvements. The data was analyzed for short-term and long-term impacts. The analyses show that the traffic generated by the proposed change in land use can be accommodated by the existing and currently programmed roadway system and that, over the longer term, the proposed change will not cause any roadway or section of roadway to exceed its capacity (service volume) nor will it create a significant impact on any roadway which is operating, or is projected to operate, over Miami-Dade County's adopted Level of Service standards.

Further, the construction of a full four lane divided roadway on SW 172$^{nd}$ Avenue as proposed by the developer will provide significant beneficial impacts on the local roadway network and the important intersections near the site. This north-south link will relive pressure on and reduce concentration of turning movements at the intersection of Kendall Drive and SW 167$^{th}$ Avenue to the east. The reduction in impact at SW 167$^{th}$ Avenue will, in turn, improve capacity on Kendall Drive by providing more green time to east-west through traffic at the intersection and improving arterial flow on Kendall Drive through the area. The improvement will also relieve pressure on Krome Avenue and the intersection of Kendall Drive at Krome Avenue if SW 104$^{th}$ Street is extended to Krome Avenue.

This CDMP application has a very real potential to reduce trips, especially in the peak direction on critical roadways. The proposed retail uses will offer shopping opportunities to the many people in the residential developments within the immediate area. This will mean that the number of retail trips to the east on Kendall Drive can be reduced because shoppers will be able to use the more readily accessible retail associated with this application. The vehicle miles traveled by existing residents should also be reduced by this more convenient access to retail.

If the ultimate development includes less traffic intensive office uses, most of the traffic generated will be in the non-peak direction on the roadway network and the local employment opportunities provided by such office uses have the potential to reduce vehicle miles traveled by providing nearby employment.

In summary, the proposed amendment will meet Miami-Dade standards for traffic concurrency and can be accommodated by the existing and future roadway system. In addition, the convenience of nearby shopping and jobs, coupled with the completion of the SW 172$^{nd}$ Avenue link to Kendall Drive, can reduce total trip lengths and relieve roadways and intersections in the area of congestion.

**BROWN, et al.**

# 2007 APPLICATION TO AMEND THE MIAMI-DADE COUNTY COMPREHENSIVE DEVELOPMENT MASTER PLAN AND PLAN MAP

# TRAFFIC IMPACT ASSESSMENT

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## TABLES



## FIGURES



## APPENDICES

# 2007 BROWN, et al.
# APPLICATION TO AMEND
# THE MIAMI-DADE COUNTY COMPREHENSIVE DEVELOPMENT MASTER PLAN AND PLAN MAP

# TRAFFIC IMPACT ASSESSMENT

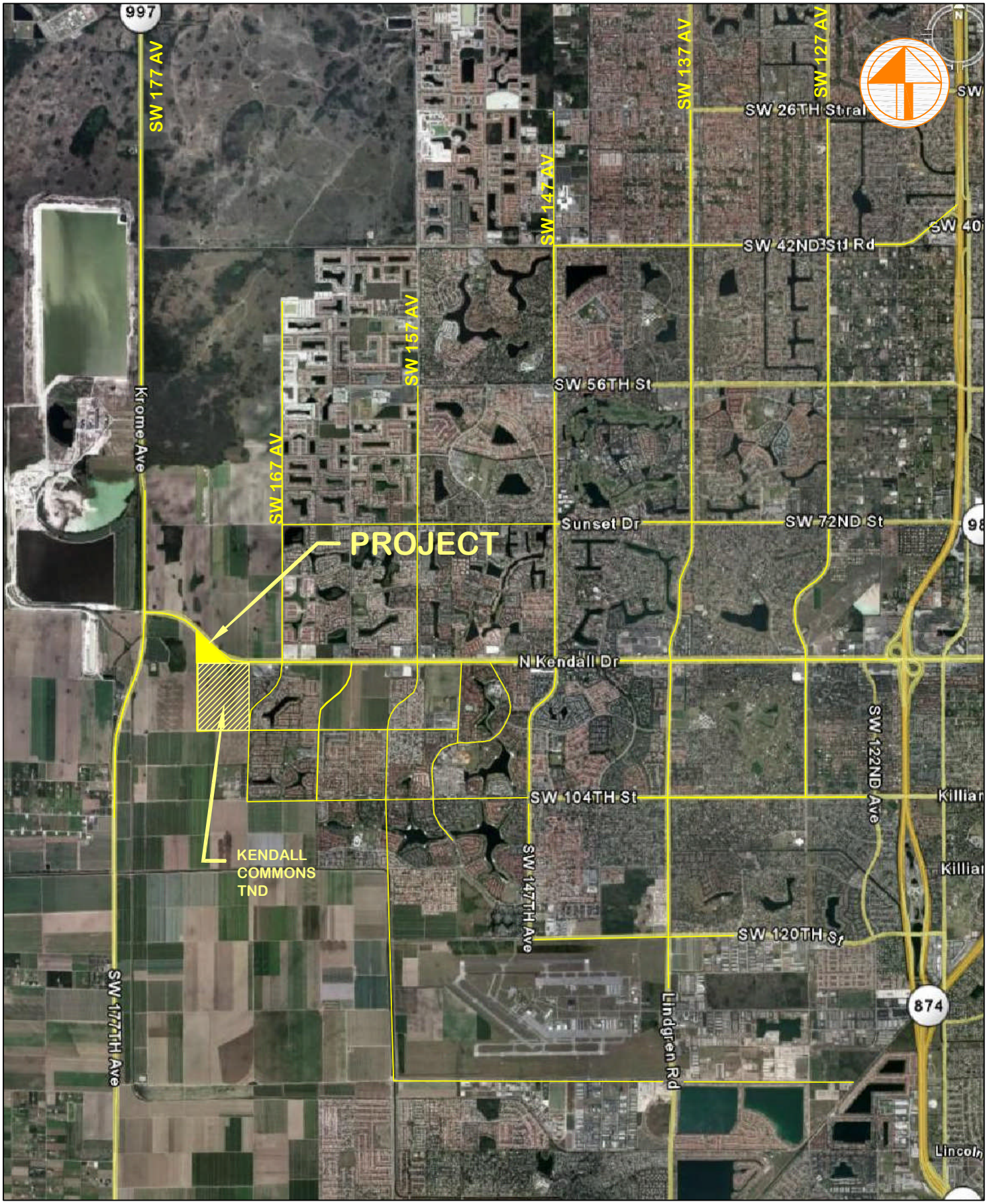
## PROJECT DESCRIPTION

The Comprehensive Development Master Plan amendment proposed by David Brown, et al. is for 38.5-acre site (approximately 36 developable acres) south of Kendall Drive and west of SW 167 Avenue. The site lies in a triangular notch in the urban development boundary between Kendall Drive and the Kendall Commons TND, a mixed-use development currently under construction.

The land in question is bordered by Kendall Drive on the north; the theoretical extension of SW 88th Street/UDB on the south and approximately SW 172nd Avenue on the west. See Figure 1, Location Map and Figure 2, Subject Property.

The applicant proposes to amend the Comprehensive Development Master Plan (CDMP) to allow for development of retail and/or office uses on this parcel. There will be no residential development on this parcel.

This report examines the transportation impacts associated with the change in land use on this parcel and the capability of the existing and proposed transportation system to accommodate this development at full buildout.




*Brown CDMP Amendment*

Figure 1

Location Map & Study Area

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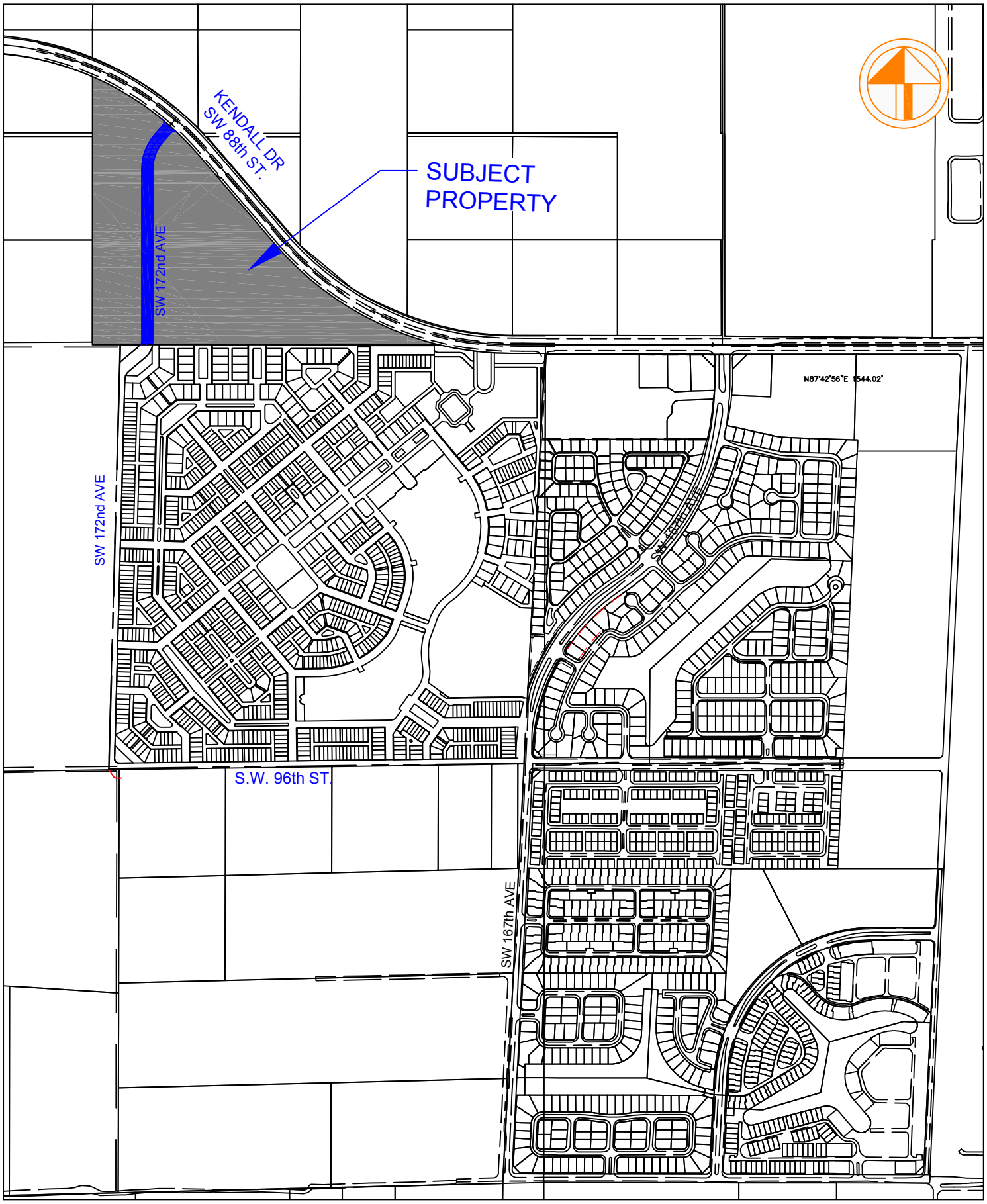
Traffic Engineering Services

JUNE/07




*Brown CDMP Amendment*

Figure 2

Subject Property

## EXISTING AND PROJECTED ROADWAYS AND ROADWAY CAPACITIES

The number of lanes of important roadway segments in the vicinity of this project and programmed improvements as defined in the current Transportation Improvement Program (TIP) are described in Table 1 below:

**Table 1**
**IMPORTANT ROADWAY SEGMENTS**

| Roadway Segment | Limits | Number of Lanes |
|---|---|---|
| Kendall Drive | Krome Ave to SW 172 Ave | 4 |
| Kendall Drive | SW 167 Ave to SW 172 Ave | 4 |
| Kendall Drive | SW 152 Ave to 167 Ave | 4 to 6* |
| Krome Avenue | SW 88 St to SW 8 St | 2 |
| Krome Avenue | SW 88 St to 232 St | 2 |
| SW 104 Street | SW 147 Av to 157 Av | 4 |
| SW 172 Ave** | SW 96 Street to Kendall Drive | 2 and 4 |
| SW 96 St | SW 172 Avenue to 167 Avenue | 2* |
| * Programmed ** See note below | | |

Without this CDMP amendment, construction of this portion of SW 172nd Avenue between theoretical SW 88th Street and Kendall Drive, all of which falls within the subject property, will require right of way. Also note that the CDMP must be amended to include this roadway segment because the roadway segment is outside of the existing designated Urban Development Boundary.

Current year traffic volumes for the critical roadway links in the area of this project were collected in early May 2007. These data were then combined with existing Miami-Dade County concurrency records and recent studies of arterial level of service in the area. This allowed calculation of existing and projected levels of service on all significant roadway links in the vicinity of the project.

Existing traffic volumes and programmed roadway capacity are described in the Traffic Concurrency section of this document.

## TRIP GENERATION AND DISTRIBUTION

Retail uses generate the greater traffic impact of the two potential uses proposed on the subject property, office and retail. An objective of this study is to evaluate the traffic impacts of the worst-case scenario for traffic. Therefore, these analyses assume that the site will be developed entirely as retail uses.

Any retail development on this property having more than 400,000 square feet of floor area would be defined as a Development of Regional Impact (DRI). DRI's are required to go through a more rigorous review and approval process than that required for the County's CDMP Amendment process.

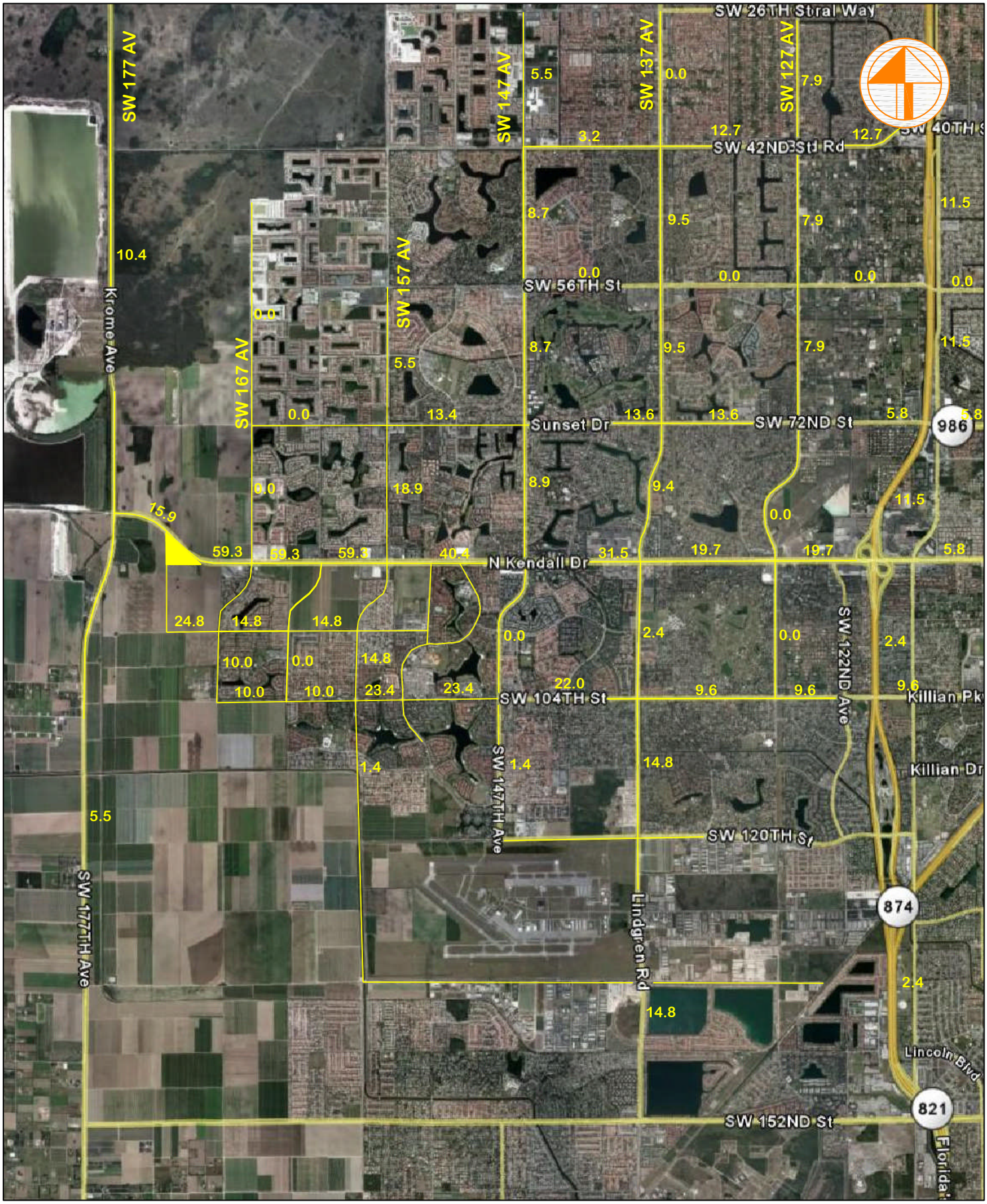
Therefore, these analyses consider the impacts of a shopping center containing 400,000 ft.² of gross leasable floor area. Traffic which would typically be generated by this use is shown in Table 2.

**Table 2**
**TRIP GENERATION OF POTENTIAL DEVELOPMENT**

| Land Use | Size | ITE Land Use Code | Daily 2-Way trips | PM Peak Hour Enter | Exit | Total |
|---|---|---|---|---|---|---|
| Shopping Center | 400,000 sf | 820 | 16,722 | 750 | 813 | 1,563 |
| Pass-By Trips* | | | -4,344 | -195 | -211 | -406 |
| | Net Trips | | **12,378** | **555** | **602** | **1,157** |

The trip generation numbers described above do not take into account the shorter average trip lengths generally associated with retail when compared to residential uses. They are conservative in that they do not address the potential of the retail to absorb shopping trips which are already on the road, many of which currently access retail to the east of this area.

The maximum non-DRI development traffic described above was assigned to the surrounding roadway network using the Metropolitan Planning Organization's Cardinal Distribution of Trips for Traffic Analysis Zone (TAZ) 1251. The actual project is within TAZ 1250, however the cardinal distribution for TAZ 1250 is not consistent with distributions for existing, developed TAZ's in the area. So the distribution for adjacent zone 1251 was used instead. This MPO trip distribution summary is an output of the FSUTMS modeling performed by Miami-Dade County. The project trip distribution is shown graphically in Figure 3 and 4. In reviewing Figure 4, please note that project trips are assumed to attenuate at a rate of 10% per mile of travel distance from the project.




*Brown CDMP Amendment*

*Note:*
**Project Trip Assignment in %**

Figure 3

Project Trip Distribution

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Traffic Engineering Services

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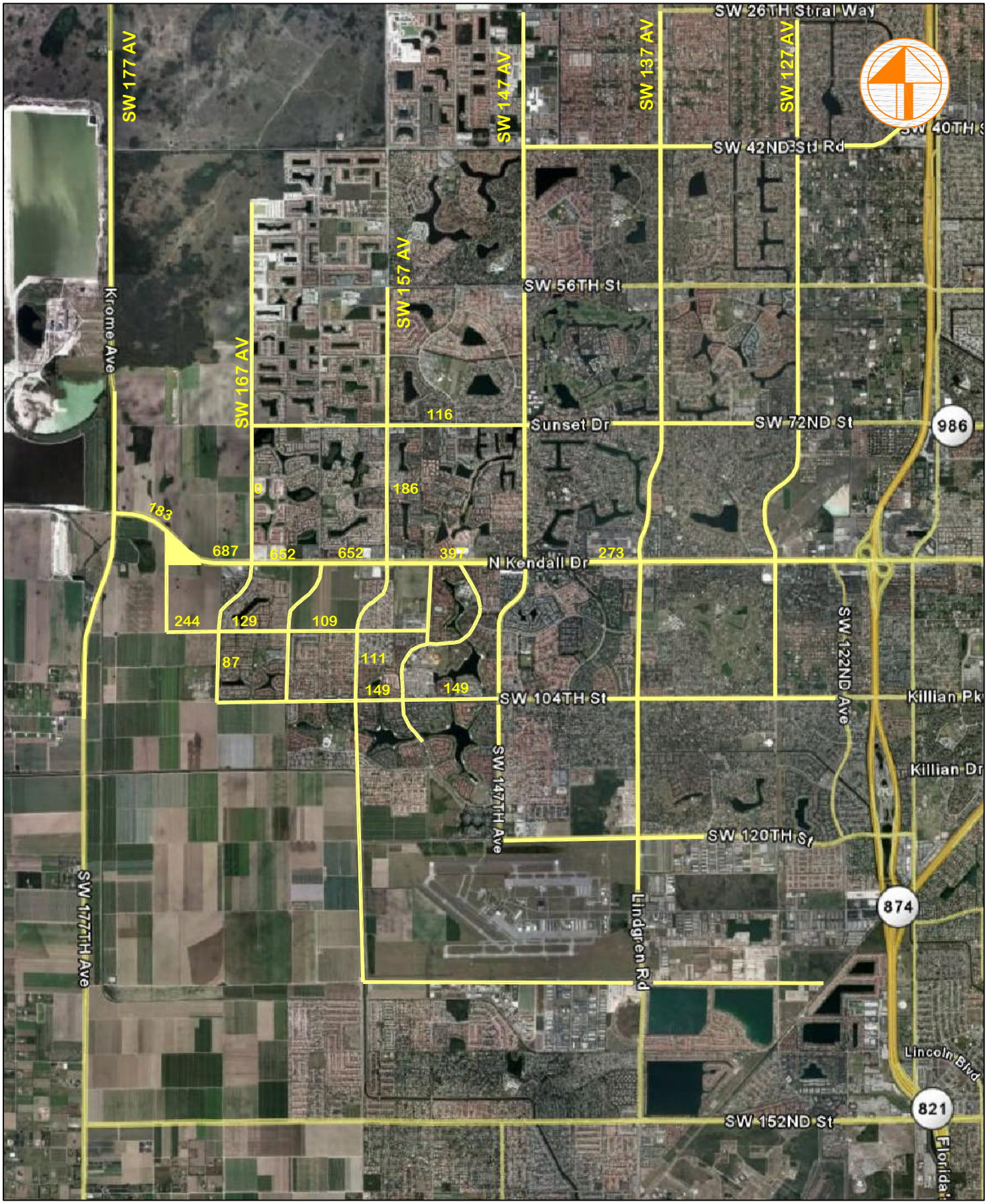


*Brown CDMP Amendment*

*Note:*
**PM PK HR 2-WAY Trips**

# Figure 4

## Project Trip Assignment

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Traffic Engineering Services

JUNE/07

## TRAFFIC CONCURRENCY

The procedures for evaluation of traffic concurrency within Miami-Dade County require assignment of project related traffic through the concurrency stations which effectively surround the project. The traffic associated with this application will be evaluated at Concurrency Count Stations located on Kendall Drive west of SW 167th Avenue (Station # 2559), on Kendall Drive east of Krome Avenue (Station #0010) and on SW 104th Street west of SW 147th Avenue (Station #9724). Table 3 shows that there is adequate reserve capacity at these stations to accommodate the proposed amendment and not violate County LOS standards for traffic concurrency.

The applicant is aware of the County's concerns regarding impacts on Kendall Drive to the east of SW 167th Avenue and on Krome Avenue both north and south of Kendall Drive. The concurrency analyses, shown in Table 3, have been expanded to include Stations 0004, 0682 and 2529 to address these concerns.

**Table 3**

**EXPANDED CONCURRENCY ANALYSIS**

| Station # | Roadway | Location | Lanes | Max LOS | PHP May 2007 | Seasonal Adjustm't | PHP 2007 | Comm Dev Trips* | Backgnd Traffic | Project Trips | Total Trips | LOS Std | V/C** | LOS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0004 | Krome Ave | N/of SW 88 St (Kendall Drive to SW 8 St | 2UD | 3190 | 1315 | 1.03 | 1354 | 0 | 1354 | 119 | 1473 | C | 0.46 | A |
| 0682 | Krome Ave | S/of SW 88 St (Kendall Drive to SW 232 St | 2UD | 2260 | 1491 | 1.03 | 1536 | 250 | 1786 | 64 | 1850 | C | 0.82 | C |
| 0010 | Kendall Dr | East of Krome Ave (Krome to 172 Ave) | 4LD | 4360 | 1158 | 1.03 | 1193 | 81 | 1274 | 183 | 1457 | D | 0.33 | A |
| 2529 | Kendall Dr | West of SW 157 Ave (SW 152 Av to 167 Av) | 6LD | 7560 | 1973 | 1.03 | 2032 | 4679 | 6711 | 652 | 7363 | EE | 0.97 | EE |
| 2559 | Kendall Dr | West of SW 167 Ave (SW 172 Av to 167 Av) | 4LD | 4060 | 1234 | 1.03 | 1271 | 1546 | 2817 | 687 | 3504 | EE | 0.86 | EE |
| 9724 | SW 104 St | West of SW 147 Ave (SW 147 Av to 157 Av) | 4LD | 3560 | 2682 | 1.03 | 2762 | 537 | 3299 | 149 | 3448 | EE | 0.97 | EE |

* per MDPWD records ** V/C is Volume/Allowable Service Volume

Table 3 shows that the application will meet traffic concurrency standards at all of the concurrency monitoring stations described above even under the most intense development scenario.

## IMPACT ON 2015 ROADWAY NETWORK

The impacts of the proposed amendment on the year 2015 roadway system were evaluated using 2015 daily traffic volumes provided by the Metropolitan Planning Organization. The specific data used were the daily traffic projections shown on the *Miami-Dade 2030 LRTP; 2015 Bidirectional Volume Plot*.

The MPO's transit network and transit services included in the MPO's multi-modal transportation modeling and resulting network assignment of vehicular traffic were assumed in place -- the transit improvements and the resulting transit ridership. We assumed no more nor no less transit ridership in the study area than what was in the MPO's 2015 assignment.

These 24-hour data were converted to hourly rates using a ”k” factor of 0.095. The “k” factor represents the ratio of the peak hour volumes to daily traffic. Using a “k” factor of 0.095 to estimate the peak hour period traffic provides a very conservative estimate of expected conditions. The ”k” factor for existing traffic counts generally ranges between 0.07 and 0.08. The higher value is used to reduce the likelihood of underestimating peak hour traffic volumes. The projected Peak Hour Period volumes are shown in Table 4.

Traffic from the Kendall Commons TND was then added to this future background traffic to create 2015 peak hour period traffic volumes without the impact of the proposed amendment. These volumes were then compared to the level of service standard for the roadway in question by calculating V/C ratios for each roadway segment. For purposes of these analyses, V/C represents projected volume divided by the service volume associated with the level of service standard for each roadway link.

Roadway segments with V/C ratios greater than 1.0 are therefore projected to exceed Miami-Dade level of service standards in the year 2015. The service volumes used for these analyses are based upon a transportation system that includes the MPO’s Priority 1 and 2 projects per the traffic study requirements provided by the Miami-Dade County Planning and Zoning Department.

Potential traffic from the proposed amendment was then assigned to each of the 2015 roadway links and compared to the service volume to evaluate the significance of the amendment's impact on the roadway link. Roadway segments which had project impacts of less than 2.5% of the road segment's service volume were assumed to receive insignificant impact from development of the proposed project. Developments of Regional Impact must address impacts on all roadway links where the DRI traffic equals or exceeds 5% of the service volume. The analyses contained in this report utilize a standard that is twice as strict as the DRI requirement.

In reviewing Table 4, it can be seen in that development of the property described in the proposed amendment to the CDMP will not cause any roadway segment to exceed Miami-Dade County's level of service standard nor will the subject property create a significant impact on any roadway projected to operate beyond its level of service standard.

**Table 4**

**2015 ROADWAY NETWORK WITH PROJECT**

| Roadway Segment | Type, # of Lanes | LOS Standard | Service Volume | Source | Projected Daily Link Volume | K | Projected PHP | Kendall Commons | Adjusted Peak Hour | V/C* w/o Project | LOS w/o project | Project Trips | Backgnd plus Proj | V/C* with Project | LOS with Project | Percent of Ser Vol |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SW 127 Ave | | | | | | | | | | | | | | | | |
| SW 42 to 56 St | 4LD | D | 2,950 | T | 29,266 | 0.095 | 2,780 | 34 | 2,814 | 0.94 | D | | | | | |
| SW 56 to 72 St | 4LD | D | 2,950 | T | 38,957 | 0.095 | 3,701 | 44 | 3,745 | 1.25 | F | | | | | |
| SW 72 to 88 St | 4LD | D | 2,950 | T | 31,076 | 0.095 | 2,952 | 0 | 2,952 | 1.00 | D | | | | | |
| SW 88 to 104 St | 5UD | D | 2,800 | T | 25,995 | 0.095 | 2,470 | 0 | 2,470 | 0.88 | D | | | | | |
| SW 104 to 120 St | 5UD | D | 2,800 | T | 31,333 | 0.095 | 2,977 | 0 | 2,977 | 1.06 | E | | | | | |
| SW 137 Ave | | | | | | | | | | | | | | | | |
| SW 42 to 56 St | 6LD | D | 4,450 | T | 41,406 | 0.095 | 3,934 | 53 | 3,987 | 0.88 | D | | | | | |
| SW 56 to 72 St | 4LD | D | 2,950 | T | 37,927 | 0.095 | 3,603 | 65 | 3,668 | 1.22 | F | | | | | |
| SW 72 to 88 St | 6LD | D | 4,450 | T | 42,649 | 0.095 | 4,052 | 76 | 4,128 | 0.91 | D | | | | | |
| SW 88 to 104 St | 6LD | D | 4,450 | T | 43,582 | 0.095 | 4,140 | 19 | 4,159 | 0.93 | D | | | | | |
| SW 104 to 120 St | 6LD | D | 4,450 | T | 40,865 | 0.095 | 3,882 | 65 | 3,947 | 0.87 | D | | | | | |
| SW 120 to 136 St | 6LD | D | 4,450 | T | 58,126 | 0.095 | 5,522 | 46 | 5,568 | 1.24 | F | | | | | |
| SW 147 Ave | | | | | | | | | | | | | | | | |
| SW 42 to 56 St | 4LD | EE | 3,540 | T | 37,787 | 0.095 | 3,590 | 59 | 3,649 | 1.01 | EE | | | | | |
| SW 56 to 72 St | 4LD | D | 3,204 | M | 37,568 | 0.095 | 3,569 | 70 | 3,639 | 1.11 | F | | | | | |
| SW 72 to 88 St | 4LD | D | 4,250 | M | 26,843 | 0.095 | 2,550 | 83 | 2,633 | 0.60 | C | | | | | |
| SW 88 to 104 St | 4LD | D | 2,950 | T | 24,339 | 0.095 | 2,312 | 0 | 2,312 | 0.78 | C | | | | | |
| SW 104 to 120 St | 4LD | D | 2,950 | T | 18,337 | 0.095 | 1,742 | 8 | 1,750 | 0.59 | C | | | | | |
| SW 157 Ave | | | | | | | | | | | | | | | | |
| SW 72 to 88 St | 4LD | EE | 3,744 | T | 13,058 | 0.095 | 1,241 | 200 | 1,441 | 0.33 | B | 186 | 1,627 | 0.43 | B | 5.0% |
| SW 88 to 104 St | 4LD | D | 2,950 | T | 23,570 | 0.095 | 2,239 | 0 | 2,239 | 0.76 | C | | | | | |
| SW 104 to 120 St | 4LD | D | 2,950 | T | 23,484 | 0.095 | 2,231 | 119 | 2,350 | 0.76 | C | 111 | 2,461 | 0.83 | C | 3.8% |
| SW 120 to 136 St | 4LD | D | 2,950 | T | 22,821 | 0.095 | 2,168 | 10 | 2,178 | 0.73 | C | | | | | |
| SW 167 Ave | | | | | | | | | | | | | | | | |
| SW 56 to 72 St | 2LU | D | 1,390 | T | 7,283 | 0.095 | 692 | 0 | 692 | 0.50 | B | | | | | |
| SW 72 to 88 St | 2LU | D | 1,390 | T | 5,470 | 0.095 | 520 | 0 | 520 | 0.37 | B | | | | | |
| SW 88 to 96St | 4LD | D | 2,930 | T | 12,007 | 0.095 | 1,141 | 0 | 1,141 | 0.39 | B | | | | | |
| SW 96 to 104 St | 2LU | D | 1,390 | T | 1,627 | 0.095 | 155 | 94 | 249 | 0.11 | A | 87 | 336 | 0.24 | A | 6.3% |
| Krome Av (SW 177 Ave) | | | | | | | | | | | | | | | | |
| SW 42 St to 88 St | 4LD | B | 6,390 | C | 31,670 | 0.095 | 3,009 | 128 | 3,137 | 0.47 | A | | | | | |
| SW 88 to 136 St | 4LD | B | 2,780 | T | 23,867 | 0.095 | 2,267 | 69 | 2,336 | 0.82 | B | | | | | |
| Bird Rd (SW 42 St) | | | | | | | | | | | | | | | | |
| SW 167 to 157 Ave | 4LD | EE | 3,744 | T | 2,646 | 0.095 | 251 | 0 | 251 | 0.07 | A | | | | | |
| SW 157 to 147 Ave | 4LD | EE | 3,744 | T | 14,559 | 0.095 | 1,383 | 0 | 1,383 | 0.37 | B | | | | | |
| SW 147 to 137 Ave | 4LD | EE | 3,744 | T | 37,605 | 0.095 | 3,572 | 107 | 3,679 | 0.95 | EE | | | | | |
| SW 137 to 127 Ave | 4LD | EE | 3,744 | T | 33,434 | 0.095 | 3,176 | 55 | 3,231 | 0.85 | EE | | | | | |
| SW 127 to FL Tpk | 4LD | EE | 3,744 | T | 46,624 | 0.095 | 4,429 | 40 | 4,469 | 1.18 | F | | | | | |

**Table 4 (continued)**

**2015 ROADWAY NETWORK WITH PROJECT**

| Roadway Segment | Type, # of Lanes | LOS Standard | Service Volume* | Source | Projected Daily Link Volume | K | Projected PHP | Kendall Commons | Adjusted Peak Hour | V/C** w/o Project | LOS w/o project | Project Trips | Backgnd plus Proj | V/C* with Project | LOS with Project | Percent of Ser Vol |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Miller Dr (SW 56 St) | | | | | | | | | | | | | | | | |
| SW 167 to 157 Ave | 4LD | D | 2,950 | T | 6,989 | 0.095 | 664 | 0 | 664 | 0.23 | A | | | | | |
| SW 157 to 147 Ave | 4LD | D | 2,950 | T | 23,853 | 0.095 | 2,266 | 0 | 2,266 | 0.77 | C | | | | | |
| SW 147 to 137 Ave | 6LD | D | 4,450 | T | 34,657 | 0.095 | 3,292 | 0 | 3,292 | 0.74 | C | | | | | |
| SW 137 to 127 Ave | 6LD | D | 4,450 | T | 34,548 | 0.095 | 3,282 | 0 | 3,282 | 0.74 | C | | | | | |
| SW 127 to 117 Ave | 6LD | D | 4,450 | T | 42,558 | 0.095 | 4,043 | 0 | 4,043 | 0.91 | D | | | | | |
| Sunset Dr.(SW 72 St) | | | | | | | | | | | | | | | | |
| SW 167 to 157 Ave | 4LD | D | 2,950 | T | 13,738 | 0.095 | 1,305 | 0 | 1,305 | 0.44 | C | | | | | |
| SW 157 to 147 Ave | 4LD | EE | 4,300 | M | 32,189 | 0.095 | 3,058 | 125 | 3,183 | 0.71 | D | 116 | 3,299 | 0.77 | D | 2.7% |
| SW 147 to 137 Ave | 6LD | EE | 5,630 | T | 40,335 | 0.095 | 3,832 | 111 | 3,943 | 0.68 | D | | | | | |
| SW 137 to 127 Ave | 6LD | EE | 5,630 | T | 53,185 | 0.095 | 5,053 | 92 | 5,145 | 0.90 | EE | | | | | |
| SW 127 to 117 Ave | 6LD | EE | 5,630 | T | 51,243 | 0.095 | 4,868 | 32 | 4,900 | 0.86 | EE | | | | | |
| Kendall Dr (SW 88 St) | | | | | | | | | | | | | | | | |
| Krome to SW 172Ave | 6LD | D | 5,540 | C | 27,220 | 0.095 | 2,586 | 197 | 2,783 | 0.47 | B | 183 | 2,966 | 0.54 | B | 3.3% |
| SW 172 to 167 Ave | 6LD | D | 5,540 | C | 27,366 | 0.095 | 2,600 | 739 | 3,339 | 0.47 | B | 687 | 4,026 | 0.73 | B | 12.4% |
| SW 167 to 152 Ave | 6LD | EE | 7,560 | C | 26,599 | 0.095 | 2,527 | 702 | 3,229 | 0.33 | C | 652 | 3,881 | 0.51 | C | 8.6% |
| SW 152 to 147 Ave | 6LD | EE | 7,510 | M | 25,795 | 0.095 | 2,451 | 427 | 2,878 | 0.33 | C | 397 | 3,275 | 0.44 | C | 5.3% |
| SW 147 to 137 Ave | 6LD | EE | 7,510 | M | 50,589 | 0.095 | 4,806 | 294 | 5,100 | 0.64 | D | 273 | 5,373 | 0.72 | D | 3.6% |
| SW 137 to 127 Ave | 6LD | EE | 7,510 | M | 57,663 | 0.095 | 5,478 | 159 | 5,637 | 0.73 | D | | | | | |
| SW 127 to FL Tpk | 8LD | EE | 9,140 | M | 68,271 | 0.095 | 6,486 | 134 | 6,620 | 0.71 | D | | | | | |
| SW 96 St | | | | | | | | | | | | | | | | |
| SW 172 to 167 Ave | 2LU | D | 1,390 | T | 3,683 | 0.095 | 350 | 263 | 613 | 0.25 | A | 244 | 857 | 0.62 | A | 17.6% |
| SW 167 to 157 Ave | 4LD | D | 2,950 | T | 3,683 | 0.095 | 350 | 139 | 489 | 0.12 | A | 129 | 618 | 0.21 | A | 4.4% |
| SW 157 to 152 Ave | 4LD | D | 2,950 | T | 14,491 | 0.095 | 1,377 | 0 | 1,377 | 0.47 | B | | | | | |
| SW 104 St | | | | | | | | | | | | | | | | |
| SW 167 to 157 Ave | 4LD | EE | 3,744 | T | 1,268 | 0.095 | 120 | 81 | 201 | 0.03 | A | | | | | |
| SW 157 to 147 Ave | 4LD | EE | 3,744 | T | 16,986 | 0.095 | 1,614 | 160 | 1,774 | 0.43 | D | 149 | 1,923 | 0.51 | D | 4.0% |
| SW 147 to 137 Ave | 6LD | EE | 5,628 | T | 28,193 | 0.095 | 2,678 | 124 | 2,802 | 0.48 | D | | | | | |
| SW 137 to 127 Ave | 6LD | EE | 5,628 | T | 46,577 | 0.095 | 4,425 | 45 | 4,470 | 0.79 | E | | | | | |
| SW 127 to117 Ave | 6LD | EE | 5,628 | T | 53,533 | 0.095 | 5,086 | 33 | 5,119 | 0.90 | EE | | | | | |
| SW 120 St | | | | | | | | | | | | | | | | |
| SW 157 to 147 Ave | 4LD | D | 2,950 | T | 2,934 | 0.095 | 279 | 0 | 279 | 0.09 | A | | | | | |
| SW 147 to 137 Ave | 4LD | D | 2,950 | T | 24,493 | 0.095 | 2,327 | 0 | 2,327 | 0.79 | C | | | | | |
| SW 137 to 127 Ave | 4LD | D | 3,560 | M | 51,710 | 0.095 | 4,912 | 0 | 4,912 | 1.38 | F | | | | | |
| SW 127 to FL Tpk | 4LD | D | 3,560 | M | 52,496 | 0.095 | 4,987 | 0 | 4,987 | 1.40 | F | | | | | |
| SW 136 St | | | | | | | | | | | | | | | | |
| SW 157 to 147 Ave | 4LD | D | 2,950 | T | 2,934 | 0.095 | 279 | 0 | 279 | 0.09 | A | | | | | |
| SW 147 to 137 Ave | 4LD | D | 2,950 | T | 24,493 | 0.095 | 2,327 | 0 | 2,327 | 0.79 | C | | | | | |
| SW 137 to 127 Ave | 4LD | D | 2,950 | T | 51,710 | 0.095 | 4,912 | 0 | 4,912 | 1.67 | F | | | | | |

* Service Volume Source: C = Calculated w/ArtPlan; T = FDOT LOS Tables; Miami-Dade Concurrency Report

** V/C is Volume/Allowable Service Volume  Means the Project has no significant impact on the segment

## RECOMMENDED IMPROVEMENTS TO THE ROADWAY SYSTEM

Construction of a four lane divided roadway on SW 172nd Avenue between the northwest corner of the Kendall Commons development and Kendall Drive, coupled with the construction of SW 172nd Avenue abutting the Kendall Commons development, will provide significant relief to local traffic conditions in the West Kendall area. It will provide alternate routes for traffic which would otherwise be forced through the intersection of Kendall Drive and SW 167th Avenue.

Without the SW 172nd Avenue improvement, vehicles with destinations to the northwest or southwest from Kendall Commons and the subject development will have to pass through the Kendall Drive and SW 167th Avenue intersection either by turning right out of the Kendall Commons primary entry and making a U-turn at SW 167th Avenue or by entering SW 167th Avenue from the south of Kendall Drive and then making a left turn at Kendall. Providing an alternate route for many of these vehicles will provide relief to an intersection which is very likely to become jammed in the near future as large-scale residential developments in the area come on line. The reduction in impact at SW 167th Avenue will, in turn, improve capacity on Kendall Drive by providing more green time to east-west through traffic at the intersection and improving arterial flow on Kendall Drive through the area.

It is recommended that development of the Brown parcel include the construction of a full four-lane roadway on SW 172nd Avenue from Kendall Drive to the southwest corner of the project and that the roadway improvement be aligned with the SW 172nd Avenue construction to be provided by Kendall Commons.

## CONCLUSIONS

The change in land use proposed for the Brown parcel can be accommodated by the existing and currently programmed roadway system. Furthermore, development on the subject property will not cause any roadway link to exceed its capacity (service volume) nor will it create a significant impact on any roadway which is operating or is projected to operate over Miami-Dade County's adopted Level of Service standards.

The construction of a full four lane divided roadway on SW 172nd Avenue as proposed by the applicant will provide a significant benefit to the arterial and collector roadway network.

**Application 8 (Brown)**

**Using 670,824 sf of Retail**

**Concurrency Analysis Using MDPWD Data & New Calculations**

| Station # | Roadway | Location | Lanes | Max LOS | PHP May 2007 | Seasonal Adjustm't | PHP 2007 | Committed Devel. Trips* | Backgnd Traffic | Total Project Trips (PM Pk Hr) | % on Link | Project Trips | Total Trips | LOS Std | V/C | LOS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0010 | Kendall Dr | East of Krome Ave (Krome to 172 Ave) | 4LD | 4360 | 1323 | 1.02 | 1349 | 236 | 1585 | 1909 | 25% | 477 | 2062 | D | 0.47 | A |
| 2559 | Kendall Dr | West of SW 167 Ave (SW 172 Av to 167 Av) | 4LD | 4060 | 1328 | 1.02 | 1355 | 1546 | 2901 | 1909 | 54% | 1031 | 3932 | EE | 0.97 | EE |
| 9724 | SW 104 St | West of SW 147 Ave (SW 147 Av to 157 Av) | 4LD | 3560 | 2732 | 1.02 | 2787 | 448 | 3235 | 1909 | 8% | 153 | 3388 | EE | 0.95 | EE |

**Other Nearby Concurrency Stations**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0004 | Krome Ave | N/of SW 88 St (Kendall Drive to SW 8 St) | 2UD | ***3190*** | 1337 | 1.02 | 1364 | 0 | 1364 | 1909 | 15% | 286 | 1650 | C | 0.52 | A |
| 0682 | Krome Ave | S/of SW 88 St (Kendall Drive to SW 232 St) | 2UD | 2260 | 1534 | 1.02 | 1565 | 250 | 1815 | 1909 | 10% | 191 | 2006 | C | 0.89 | A |
| 2529 | Kendall Dr | West of SW 157 Ave (SW 152 Av to 167 Av) | 6LD | ***7560*** | 2019 | 1.02 | 2059 | 2607 | 4666 | 1909 | 41% | 783 | 5449 | EE | 0.72 | EE |

***000*** *per new data & Calculations; all others are MDPWD Values* * per MDPWD records

Source:FCI, Aug, '07

# CDMP Amendment FSUTMS Modeling Analysis

## 2007 Brown CDMP Amendment Application Number 8

August 2007

Prepared for:
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2007 Brown CDMP Amendment
FSUTMS Modeling Analysis
Summary of Tables and Figures

Table 1 – Summary of Modeling Results
- 400,000 SF of Retail Use
- 1.0% Significance Threshold

Table 2 – Summary of Modeling Results
- 670,834 SF of Retail Use
- 5.0% Significance Threshold

Table 3 – Daily and PM Peak Hour Trip Generation
- 400,000 SF of Retail Use
- 670,834 SF of Retail Use
- Pass-by limited to 10% of the adjacent street future background volume

Table 4 - Project Distribution
- 400,000 SF of Retail Use – FSUTMS Select Zone Modeling Distribution
- 670,834 SF of Retail Use - FSUTMS Select Zone Modeling Distribution
- 400,000 SF of Retail Use - Manual Assignment from the June 2007 Traffic Impact Assessment

Table 5 – 2015 Total Traffic Conditions – Daily FSUTMS Volumes
- Incorporates the 2015 Future Background + Committed Development Traffic Outputs from FSUTMS
- Incorporates Kendall Commons into Zdata2 (Zdata1 did not need any changes)
- Incorporates the funded 6LD improvement on SW 88 Street from SW 162 Ave to SW 167 Ave
- Incorporates the FSUTMS Select Zone Modeling Distribution for 400,000 SF of Retail Use
- Summarizes the 2015 Future Background + Committed + Project - Analysis A
- Identifies the 2015 Total Traffic with Project Outputs from FSUTMS – Analysis B
- Includes 2015 Daily LOS and V/C for Analysis A and B for Comparison
- Calculates the Daily Project Trips for 400,000 SF of Retail Use as a % of Maximum Service Volume
- Highlights roadways where Project Trips > 1.0% of the Adopted LOS, where the standard is not met
- Two roadway links were identified as carrying project traffic equal to or greater than 1.0% of the adopted level of service maximum service volume, and these were found to operate below the adopted level of service standards

Table 6 – 2015 Total Traffic Conditions – Daily FSUTMS Volumes
- Incorporates the 2015 Future Background + Committed Development Traffic Outputs from FSUTMS
- Incorporates Kendall Commons into Zdata2 (Zdata1 did not need any changes)
- Incorporates the funded 6LD improvement on SW 88 Street from SW 162 Ave to SW 167 Ave
- Incorporates the FSUTMS Select Zone Modeling Distribution for 670,834 SF of Retail Use
- Summarizes the 2015 Future Background + Committed + Project - Analysis A
- Identifies the 2015 Total Traffic with Project Outputs from FSUTMS – Analysis B
- Includes 2015 Daily LOS and V/C for Analysis A and B for Comparison
- Calculates the Daily Project Trips for 670,834 SF of Retail Use as a % of Maximum Service Volume
- Highlights roadways where Project Trips > 5.0% of the Adopted LOS, where the standard is not met
- Uses the 5.0% significance threshold for impact evaluation pursuant to Rule 9J-2.045, F.S., since the 670,834 SF exceeds the threshold for a DRI
- No roadway links carrying project traffic equal to or greater than 5.0% of the adopted level of service maximum service volume were found to operate below the adopted level of service standards

Table 7 – Employee Calculations for Project Zone TAZ 1251

- Calculates the employees for 400,000 SF of Retail Use for Zdata2
- Calculates the employees for 670,834 SF of Retail Use for Zdata2

Table 8 – Employee Calculations for Zone TAZ 1250 – Kendall Commons as a Committed Development

- Calculates the employees for 22,400 SF of Retail Use for Zdata2
- Calculates the employees for 44,100 SF of Office Use for Zdata2

Tables 9A and 9B – Summary of Zdata2 for Zone TAZ 1250 and 1251

- Table 9A - 400,000 SF of Retail Use for Zdata2
- Table 9B - 670,834 SF of Retail Use for Zdata2

Table 10 – Summary of Zdata1 for Zone TAZ 1250 and 1251

- Residential zonal data

Figure 1 – 2015 Future Background + Committed Development Traffic Outputs from FSUTMS
Figure 2A – FSUTMS Select Zone Modeling Distribution for 400,000 SF of Retail Use
Figure 2B – FSUTMS Select Zone Modeling Distribution for 670,834 SF of Retail Use
Figure 3A – 2015 Total Traffic with Project Outputs from FSUTMS for 400,000 SF of Retail Use
Figure 3B – 2015 Total Traffic with Project Outputs from FSUTMS for 670,834 SF of Retail Use

## Summary of the FSUTMS Modeling Results
## 400,000 SF of Retail Use

For the planning analysis year 2015 using 400,000 SF of retail use, the cumulative impact of the amendment trips was found to exceed 1.0% of the adopted maximum service volume for twenty-eight segments on the adjacent study area roadway network as outlined below and as shown in detail in Table 5. All but two of these segments were found to operate within the adopted level of service standards as defined by the CDMP.

### Table 1 – Summary of Project Significance
### 400,000 SF of Retail Use

| Segment | 2015 Adopted LOS | Amendment Trips as a % of MSV | 2015 LOS with the Amendment |
|---|---|---|---|
| SW 147 Ave – SW 104 St to SW 120 St | D | 1.80% | C |
| SW 157 Ave – SW 96 St to SW 104 St | D | 7.56% | D |
| SW 157 Ave – SW 104 St to SW 120 St | D | 3.60% | D |
| SW 157 Ave – SW 120 St to SW 136 St | D | 2.70% | D |
| SW 167 Ave – SW 56 St to SW 72 St | D | 11.51% | C |
| SW 167 Ave – SW 72 St to SW 88 St | D | 11.51% | C |
| SW 177 Ave – SW 8 St to SW 88 St | B | 6.69% | B |
| SW 177 Ave – SW 88 St to SW 136 St | B | 5.26% | B |
| SW 56 St – SW 167 Ave to SW 157 Ave | D | 4.95% | C |
| SW 56 St – SW 157 Ave to SW 147 Ave | D | 4.50% | D |
| SW 56 St – SW 147 Ave to SW 137 Ave | D | 1.80% | E |
| SW 56 St – SW 137 Ave to SW 127 Ave | D | 1.35% | F |
| SW 72 St – SW 167 Ave to SW 157 Ave | D | 4.95% | D |
| SW 72 St – SW 167 Ave to SW 157 Ave | EE | 2.13% | D |
| SW 72 St – SW 167 Ave to SW 157 Ave | EE | 1.42% | D |
| SW 72 St – SW 167 Ave to SW 157 Ave | EE | 1.18% | E |
| SW 88 St – SW 177 Ave to SW 172 Ave | D | 7.11% | C |
| SW 88 St – SW 172 Ave to SW 167 Ave | D | 16.51% | C |
| SW 88 St – SW 167 Ave to SW 157 Ave | EE | 10.36% | C |
| SW 88 St – SW 157 Ave to SW 147 Ave | EE | 4.73% | C |
| SW 88 St – SW 147 Ave to SW 137 Ave | EE | 3.15% | E + 0.002 |
| SW 88 St – SW 137 Ave to SW 127 Ave | EE | 1.80% | E + 0.14 |
| SW 88 St – SW 127 Ave to HEFT | EE | 1.22% | E |
| SW 96 St – SW 172 Ave to SW 167 Ave | D | 14.36% | C |
| SW 96 St – SW 167 Ave to SW 157 Ave | D | 6.30% | C |
| SW 96 St – SW 157 Ave to SW 147 Ave | D | 8.10% | C |
| SW 104 St – SW 157 Ave to SW 147 Ave | D | 2.84% | C |
| SW 120 St – SW 147 Ave to SW 137 Ave | D | 1.80% | D |

## Summary of the FSUTMS Modeling Results
## 670,834 SF of Retail Use

For the planning analysis year 2015 using 670,834 SF of retail use, the cumulative impact of the amendment trips was found to exceed 5.0% of the adopted maximum service volume for sixteen segments on the adjacent study area roadway network as outlined below and as shown in detail in Table 6.

Each of these segments carrying project trips equal to or greater than 5.0% or the adopted maximum service volume were found to operate within the adopted level of service standards as defined by the CDMP. Since the maximum allowable square footage for the site equates to 670,834 SF of retail use (placing the project over the DRI threshold), then DRI rules would apply in evaluating project impacts.

Pursuant to Rule 9J-2.045, F.S., a significant impact to the adjacent roadway network could only occur if the cumulative impact of the project trips were to consume 5.0% or more of the adopted maximum service volume of the state and regionally significant roadway network analyzed, and a roadway was found to be operating below the adopted level of service standard for the analysis time period.

As indicated in Table 2 below, none of the roadway segments impacted by 5.0% or more of project trips were found to operate below the adopted LOS standards for the planning analysis year 2015. Based upon these findings, the impact of the new land uses proposed for the amendment site are not found to significantly impact the surrounding roadway network through the year 2015.

### Table 2 – Summary of Project Significance
### 670,834 SF of Retail Use

| Segment | 2015 Adopted LOS | Amendment Trips as a % of MSV | 2015 LOS with the Amendment |
|---|---|---|---|
| SW 157 Ave – SW 96 St to SW 104 St | D | 11.97% | D |
| SW 157 Ave – SW 104 St to SW 120 St | D | 5.32% | D |
| SW 167 Ave – SW 56 St to SW 72 St | D | 17.00% | C |
| SW 167 Ave – SW 72 St to SW 88 St | D | 17.00% | C |
| SW 177 Ave – SW 8 St to SW 88 St | B | 10.59% | B |
| SW 177 Ave – SW 88 St to SW 136 St | B | 7.06% | B |
| SW 56 St – SW 167 Ave to SW 157 Ave | D | 7.98% | C |
| SW 56 St – SW 157 Ave to SW 147 Ave | D | 6.65% | D |
| SW 72 St – SW 167 Ave to SW 157 Ave | D | 7.31% | D |
| SW 88 St – SW 177 Ave to SW 172 Ave | D | 10.51% | C |
| SW 88 St – SW 172 Ave to SW 167 Ave | D | 22.70% | C |
| SW 88 St – SW 167 Ave to SW 157 Ave | EE | 13.64% | C |
| SW 88 St – SW 157 Ave to SW 147 Ave | EE | 6.99% | C |
| SW 96 St – SW 172 Ave to SW 167 Ave | D | 26.91% | C |
| SW 96 St – SW 167 Ave to SW 157 Ave | D | 11.97% | C |
| SW 96 St – SW 157 Ave to SW 147 Ave | D | 11.97% | C |

**TABLE 3**
**BROWN AMENDMENT**
**DAILY AND PM PEAK HOUR TRIP GENERATION**

13-Aug-07

| LAND USE | TIMEFRAME | UNITS | | ITE LUC | ITE 7TH EDITION TRIP RATE OR FORMULA | TRIPS | IN | | OUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | % | TRIPS | % | TRIPS |
| RETAIL | **Daily** | 400,000 | SQ. FT. | 820 | Ln (T) = 0.65 Ln (X) + 5.83 | 16,722 | 50% | 8,361 | 50% | 8,361 |
| PASS BY REDUCTION | | | | | [1] | 2,720 | 50% | 1,360 | 50% | 1,360 |
| NET EXTERNAL TRIPS | | | | | | **14,002** | **50%** | **7,001** | **50%** | **7,001** |
| | | | | | | | | | | |
| RETAIL | **PM Peak Hour** | 400,000 | SQ. FT. | 820 | Ln (T) = 0.66 Ln (X) + 3.40 | 1,563 | 48% | 750 | 52% | 813 |
| PASS BY REDUCTION | | | | | [1] | 290 | 50% | 145 | 50% | 145 |
| NET EXTERNAL TRIPS | | | | | | **1,273** | **48%** | **605** | **52%** | **668** |
| | | | | | | | | | | |
| **LAND USE** | **TIMEFRAME** | **UNITS** | | **ITE LUC** | **ITE 7TH EDITION TRIP RATE OR FORMULA** | **TRIPS** | **IN** | | **OUT** | |
| | | | | | | | **%** | **TRIPS** | **%** | **TRIPS** |
| RETAIL | **Daily** | 670,834 | SQ. FT. | 820 | Ln (T) = 0.65 Ln (X) + 5.83 | 23,401 | 50% | 11,701 | 50% | 11,700 |
| PASS BY REDUCTION | | | | | [1] | 2,720 | 50% | 1,360 | 50% | 1,360 |
| NET EXTERNAL TRIPS | | | | | | **20,681** | **50%** | **10,341** | **50%** | **10,340** |
| | | | | | | | | | | |
| RETAIL | **PM Peak Hour** | 670,834 | SQ. FT. | 820 | Ln (T) = 0.66 Ln (X) + 3.40 | 2,199 | 48% | 1,056 | 52% | 1,143 |
| PASS BY REDUCTION | | | | | [1] | 290 | 50% | 145 | 50% | 145 |
| NET EXTERNAL TRIPS | | | | | | **1,909** | **48%** | **911** | **52%** | **998** |

[1] Pursuant to the FDOT Site Impact Handbook, the pass-by reduction (for a DRI) is limited to 10% of the adjacent street future background traffic.

Future background volumes for SW 88 Street and SW 96 Street have been used to determine the 10% threshold.

The ITE pass-by formula yields a pass-by reduction that exceeds the 10% threshold; therefore it has not been used in this analysis.

Table 4
Project Distribution
Daily Traffic Assignment

| ROADWAY SEGMENTS | YEAR 2015 LANES | CDMP ADOPTED LOS STANDARD | Brown Amendment FSUTMS Project Distribution Percent | Brown Amendment 670,834 sf Retail Use - A PM Trips 20681 | Brown Amendment FSUTMS Project Distribution Percent | Brown Amendment 400.000 sf Retail Use - B PM Trips 14002 | Brown Amendment Manual Project Distribution Percent | Brown Amendment 400.000 sf Retail Use - C PM Trips 14002 | DAILY MAXIMUM SERVICE VOLUME | Project Trips Retail Use - A AS A PERCENT OF MSV | Project Trips Retail Use - B AS A PERCENT OF MSV | Project Trips Retail Use - C AS A PERCENT OF MSV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SW 127 Avenue** | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 7.90% | 1,106 | 31,100 | 0.00% | 0.00% | 3.56% |
| SW 56 Street to SW 72 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 7.90% | 1,106 | 31,100 | 0.00% | 0.00% | 3.56% |
| SW 72 Street to SW 88 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 7.90% | 1,106 | 31,100 | 0.00% | 0.00% | 3.56% |
| SW 88 Street to SW 104 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 31,100 | 0.00% | 0.00% | 0.00% |
| SW 104 Street to SW 120 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 31,100 | 0.00% | 0.00% | 0.00% |
| **SW 137 Avenue** | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 6LD | D | 1.00% | 207 | 1.00% | 140 | 9.50% | 1,330 | 46,800 | 0.44% | 0.30% | 2.84% |
| SW 56 Street to SW 72 Street | 4LD | D | 1.00% | 207 | 1.00% | 140 | 9.50% | 1,330 | 31,100 | 0.66% | 0.45% | 4.28% |
| SW 72 Street to SW 88 Street | 4LD | D | 1.00% | 207 | 1.00% | 140 | 9.40% | 1,316 | 31,100 | 0.66% | 0.45% | 4.23% |
| SW 88 Street to SW 96 Street | 6LD | D | 1.00% | 207 | 1.00% | 140 | 2.40% | 336 | 49,200 | 0.42% | 0.28% | 0.68% |
| SW 96 Street to SW 104 Street | 6LD | D | 2.00% | 414 | 2.00% | 280 | 4.20% | 588 | 49,200 | 0.84% | 0.57% | 1.20% |
| SW 104 Street to SW 120 Street | 6LD | D | 1.00% | 207 | 1.00% | 140 | 14.80% | 2,072 | 49,200 | 0.42% | 0.28% | 4.21% |
| SW 120 Street to SW 136 Street | 6LD | D | 1.00% | 207 | 1.00% | 140 | 14.80% | 2,072 | 49,200 | 0.42% | 0.28% | 4.21% |
| **SW 147 Avenue** | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | EE | 2.00% | 414 | 2.00% | 280 | 8.70% | 1,218 | 39,480 | 1.05% | 0.71% | 3.09% |
| SW 56 Street to SW 72 Street | 4LD | D | 2.00% | 414 | 2.00% | 280 | 8.70% | 1,218 | 31,100 | 1.33% | 0.90% | 3.92% |
| SW 72 Street to SW 88 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 8.90% | 1,246 | 31,100 | 0.00% | 0.00% | 4.01% |
| SW 88 Street to SW 96 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 31,100 | 0.00% | 0.00% | 0.00% |
| SW 96 Street to SW 104 Street | 4LD | D | 2.00% | 414 | 2.00% | 280 | 0.00% | 0 | 31,100 | 1.33% | 0.90% | 0.00% |
| SW 104 Street to SW 120 Street | 4LD | D | 4.00% | 827 | 4.00% | 560 | 1.40% | 196 | 31,100 | 2.66% | 1.80% | 0.63% |
| **SW 157 Avenue** | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 5.50% | 770 | 31,100 | 0.00% | 0.00% | 2.48% |
| SW 56 Street to SW 72 Street | 4LD | D | 1.00% | 207 | 1.00% | 140 | 5.50% | 770 | 31,100 | 0.66% | 0.45% | 2.48% |
| SW 72 Street to SW 88 Street | 4LD | EE | 2.00% | 414 | 2.00% | 280 | 18.90% | 2,646 | 39,480 | 1.05% | 0.71% | 6.70% |
| SW 88 Street to SW 96 Street | 4LD | D | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 31,100 | 0.00% | 0.00% | 0.00% |
| SW 96 Street to SW 104 Street | 4LD | D | 18.00% | 3,723 | 17.00% | 2,380 | 14.80% | 2,072 | 31,100 | 11.97% | 7.65% | 6.66% |
| SW 104 Street to SW 120 Street | **4LD** | D | 8.00% | 1,654 | 8.00% | 1,120 | 1.40% | 196 | 31,100 | 5.32% | 3.60% | 0.63% |
| SW 120 Street to SW 136 Street | **4LD** | D | 6.00% | 1,241 | 6.00% | 840 | 1.40% | 196 | 31,100 | 3.99% | 2.70% | 0.63% |
| **SW 167 Avenue** | | | | | | | | | | | | |
| SW 56 Street to SW 72 Street | 2LU | D | 12.00% | 2,482 | 12.00% | 1,680 | 0.00% | 0 | 14,600 | 17.00% | 11.51% | 0.00% |
| SW 72 Street to SW 88 Street | 2LU | D | 12.00% | 2,482 | 12.00% | 1,680 | 0.00% | 0 | 14,600 | 17.00% | 11.51% | 0.00% |
| SW 88 Street to SW 96 Street | 4LD | D | 1.00% | 207 | 1.00% | 140 | 0.00% | 0 | 31,100 | 0.66% | 0.45% | 0.00% |
| SW 96 Street to SW 104 Street | 2LU | D | 1.00% | 207 | 1.00% | 140 | 10.00% | 1,400 | 14,600 | 1.42% | 0.96% | 9.59% |
| **SW 177 Avenue** | | | | | | | | | | | | |
| SW 8 Street to SW 88 Street | **4LD** | B | 15.00% | 3,102 | 14.00% | 1,960 | 10.40% | 1,456 | 29,300 | 10.59% | 6.69% | 4.97% |
| SW 88 Street to SW 136 Street | **4LD** | B | 10.00% | 2,068 | 11.00% | 1,540 | 5.50% | 770 | 29,300 | 7.06% | 5.26% | 2.63% |
| **SW 42 Street** | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 31,100 | 0.00% | 0.00% | 0.00% |
| SW 157 Avenue to SW 147 Avenue | 4LD | D | 1.00% | 207 | 1.00% | 140 | 0.00% | 0 | 31,100 | 0.66% | 0.45% | 0.00% |
| SW 147 Avenue to SW 137 Avenue | 4LD | EE | 1.00% | 207 | 1.00% | 140 | 3.20% | 448 | 39,480 | 0.52% | 0.35% | 1.13% |
| SW 137 Avenue to SW 127 Avenue | 4LD | EE | 1.00% | 207 | 1.00% | 140 | 12.70% | 1,778 | 39,480 | 0.52% | 0.35% | 4.50% |
| SW 127 Avenue to HEFT | 4LD | EE | 1.00% | 207 | 1.00% | 140 | 12.70% | 1,778 | 39,480 | 0.52% | 0.35% | 4.50% |
| **SW 56 Street** | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 12.00% | 2,482 | 11.00% | 1,540 | 0.00% | 0 | 31,100 | 7.98% | 4.95% | 0.00% |
| SW 157 Avenue to SW 147 Avenue | 4LD | D | 10.00% | 2,068 | 10.00% | 1,400 | 0.00% | 0 | 31,100 | 6.65% | 4.50% | 0.00% |
| SW 147 Avenue to SW 137 Avenue | 4LD | D | 4.00% | 827 | 4.00% | 560 | 0.00% | 0 | 31,100 | 2.66% | 1.80% | 0.00% |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 3.00% | 620 | 3.00% | 420 | 0.00% | 0 | 31,100 | 1.99% | 1.35% | 0.00% |
| SW 127 Avenue to SW 117 Avenue | 4LD | D | 2.00% | 414 | 2.00% | 280 | 0.00% | 0 | 31,100 | 1.33% | 0.90% | 0.00% |
| **SW 72 Street** | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 11.00% | 2,275 | 11.00% | 1,540 | 0.00% | 0 | 31,100 | 7.31% | 4.95% | 0.00% |
| SW 157 Avenue to SW 147 Avenue | **6LD** | EE | 9.00% | 1,861 | 9.00% | 1,260 | 13.40% | 1,876 | 59,160 | 3.15% | 2.13% | 3.17% |
| SW 147 Avenue to SW 137 Avenue | **6LD** | EE | 6.00% | 1,241 | 6.00% | 840 | 13.60% | 1,904 | 59,160 | 2.10% | 1.42% | 3.22% |
| SW 137 Avenue to SW 127 Avenue | **6LD** | EE | 5.00% | 1,034 | 5.00% | 700 | 13.60% | 1,904 | 59,160 | 1.75% | 1.18% | 3.22% |
| SW 127 Avenue to SW 117 Avenue | **6LD** | EE | 4.00% | 827 | 4.00% | 560 | 5.80% | 812 | 59,160 | 1.40% | 0.95% | 1.37% |
| **SW 88 Street** | | | | | | | | | | | | |
| SW 177 Avenue to SW 172 Avenue | **6LD** | D | 25.00% | 5,170 | 25.00% | 3,501 | 15.90% | 2,226 | 49,200 | 10.51% | 7.11% | 4.53% |
| SW 172 Avenue to SW 167 Avenue | **6LD** | D | 54.00% | 11,168 | 58.00% | 8,121 | 59.30% | 8,303 | 49,200 | 22.70% | 16.51% | 16.88% |
| SW 167 Avenue to SW 157 Avenue | **6LD** | EE | 41.00% | 8,479 | 46.00% | 6,441 | 59.30% | 8,303 | 62,160 | 13.64% | 10.36% | 13.36% |
| SW 157 Avenue to SW 147 Avenue | **6LD** | EE | 21.00% | 4,343 | 21.00% | 2,940 | 40.40% | 5,657 | 62,160 | 6.99% | 4.73% | 9.10% |
| SW 147 Avenue to SW 137 Avenue | 6LD | EE | 14.00% | 2,895 | 14.00% | 1,960 | 31.50% | 4,411 | 62,160 | 4.66% | 3.15% | 7.10% |
| SW 137 Avenue to SW 127 Avenue | 6LD | EE | 7.00% | 1,448 | 8.00% | 1,120 | 19.70% | 2,758 | 62,160 | 2.33% | 1.80% | 4.44% |
| SW 127 Avenue to SR 821/HEFT | 8LD | EE | 6.00% | 1,241 | 7.00% | 980 | 19.70% | 2,758 | 80,400 | 1.54% | 1.22% | 3.43% |

Table 4
Project Distribution
Daily Traffic Assignment

| ROADWAY SEGMENTS | YEAR 2015 LANES | CDMP ADOPTED LOS STANDARD | Brown Amendment FSUTMS Project Distribution Percent | Brown Amendment 670,834 sf Retail Use - A PM Trips 20681 | Brown Amendment FSUTMS Project Distribution Percent | Brown Amendment 400.000 sf Retail Use - B PM Trips 14002 | Brown Amendment Manual Project Distribution Percent | Brown Amendment 400.000 sf Retail Use - C PM Trips 14002 | DAILY MAXIMUM SERVICE VOLUME | Project Trips Retail Use - A AS A PERCENT OF MSV | Project Trips Retail Use - B AS A PERCENT OF MSV | Project Trips Retail Use - C AS A PERCENT OF MSV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SW 96 Street** | | | | | | | | | | | | |
| SW 172 Avenue to SW 167 Avenue | 2LU | D | 19.00% | 3,929 | 15.00% | 2,100 | 24.80% | 3,472 | 14,600 | 26.91% | 14.39% | 23.78% |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 18.00% | 3,723 | 14.00% | 1,960 | 14.80% | 2,072 | 31,100 | 11.97% | 6.30% | 6.66% |
| SW 157 Avenue to SW 152 Avenue | 4LD | D | 18.00% | 3,723 | 18.00% | 2,520 | 0.00% | 0 | 31,100 | 11.97% | 8.10% | 0.00% |
| **SW 104 Street** | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 0.00% | 0 | 0.00% | 0 | 10.00% | 1,400 | 31,100 | 0.00% | 0.00% | 4.50% |
| SW 157 Avenue to SW 147 Avenue | 4LD | EE | 8.00% | 1,654 | 8.00% | 1,120 | 23.40% | 3,276 | 39,480 | 4.19% | 2.84% | 8.30% |
| SW 147 Avenue to SW 137 Avenue | **6LD** | EE | 3.00% | 620 | 3.00% | 420 | 22.00% | 3,080 | 59,160 | 1.05% | 0.71% | 5.21% |
| SW 137 Avenue to SW 127 Avenue | 6LD | EE | 3.00% | 620 | 3.00% | 420 | 9.60% | 1,344 | 59,160 | 1.05% | 0.71% | 2.27% |
| SW 127 Avenue to SW 117 Avenue | 6LD | EE | 2.00% | 414 | 2.00% | 280 | 9.60% | 1,344 | 59,160 | 0.70% | 0.47% | 2.27% |
| **SW 120 Street** | | | | | | | | | | | | |
| SW 157 Avenue to SW 147 Avenue | **4LD** | D | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 31,100 | 0.00% | 0.00% | 0.00% |
| SW 147 Avenue to SW 137 Avenue | 4LD | D | 4.00% | 827 | 4.00% | 560 | 0.00% | 0 | 31,100 | 2.66% | 1.80% | 0.00% |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 2.00% | 414 | 2.00% | 280 | 0.00% | 0 | 31,100 | 1.33% | 0.90% | 0.00% |
| SW 127 Avenue to SW 122 Avenue | 4LD | D | 2.00% | 414 | 2.00% | 280 | 0.00% | 0 | 31,100 | 1.33% | 0.90% | 0.00% |
| SW 122 Avenue to SR 821/HEFT | 4LD | D | 2.00% | 414 | 2.00% | 280 | 0.00% | 0 | 31,100 | 1.33% | 0.90% | 0.00% |
| SR 821/HEFT to SW 117 Avenue | 4LD | D | 1.00% | 207 | 1.00% | 140 | 0.00% | 0 | 31,100 | 0.66% | 0.45% | 0.00% |
| **SW 136 Street** | | | | | | | | | | | | |
| SW 157 Avenue to SW 147 Avenue | **4LD** | D | 2.00% | 414 | 2.00% | 280 | 0.00% | 0 | 31,100 | 1.33% | 0.90% | 0.00% |
| SW 147 Avenue to SW 137 Avenue | **4LD** | D | 1.00% | 207 | 1.00% | 140 | 0.00% | 0 | 31,100 | 0.66% | 0.45% | 0.00% |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 0.00% | 0 | 0.00% | 0 | 0.00% | 0 | 31,100 | 0.00% | 0.00% | 0.00% |

Table 5
Year 2015 Total Traffic Conditions
2015 Daily FSUTMS Volumes - Project at 400,000 SF of Retail Use

| ROADWAY SEGMENTS | YEAR 2015 LANES | CDMP ADOPTED LOS STANDARD | 2015 - A FUTURE + COMMITTED FSUTMS VOLUMES | Brown 400,000 sf Amendment PM Trips 14002 | 2015 - A FUTURE + COMMITTED + PROJECT VOLUMES | 2015 - B TOTAL with PROJECT FSUTMS VOLUMES | DAILY MAXIMUM SERVICE VOLUME | 2015 - A DAILY LOS | 2015 - B DAILY LOS | A V/C | B V/C | PROJECT AS A PERCENT OF MSV | PROJECT TRIPS ≥ 1% YES / NO | PROJECT ≥ 1% AND ROADWAY FAILING YES / NO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SW 127 Avenue** | | | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | D | 32,900 | 0 | 32,900 | 31,900 | 31,100 | E | E | 1.06 | 1.03 | 0.00% | NO | NO |
| SW 56 Street to SW 72 Street | 4LD | D | 41,500 | 0 | 41,500 | 41,300 | 31,100 | F | F | 1.33 | 1.33 | 0.00% | NO | NO |
| SW 72 Street to SW 88 Street | 4LD | D | 31,400 | 0 | 31,400 | 31,000 | 31,100 | E | D | 1.01 | 1.00 | 0.00% | NO | NO |
| SW 88 Street to SW 104 Street | 4LD | D | 26,100 | 0 | 26,100 | 25,900 | 31,100 | D | D | 0.84 | 0.83 | 0.00% | NO | NO |
| SW 104 Street to SW 120 Street | 4LD | D | 30,200 | 0 | 30,200 | 30,300 | 31,100 | D | D | 0.97 | 0.97 | 0.00% | NO | NO |
| **SW 137 Avenue** | | | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 6LD | D | 41,300 | 140 | 41,440 | 42,200 | 46,800 | D | D | 0.89 | 0.90 | 0.30% | NO | NO |
| SW 56 Street to SW 72 Street | 4LD | D | 37,400 | 140 | 37,540 | 38,000 | 31,100 | F | F | 1.21 | 1.22 | 0.45% | NO | NO |
| SW 72 Street to SW 88 Street | 4LD | D | 43,100 | 140 | 43,240 | 41,500 | 31,100 | F | F | 1.39 | 1.33 | 0.45% | NO | NO |
| SW 88 Street to SW 96 Street | 6LD | D | 36,300 | 140 | 36,440 | 35,700 | 49,200 | C | C | 0.74 | 0.73 | 0.28% | NO | NO |
| SW 96 Street to SW 104 Street | 6LD | D | 43,800 | 280 | 44,080 | 43,200 | 49,200 | D | D | 0.90 | 0.88 | 0.57% | NO | NO |
| SW 104 Street to SW 120 Street | 6LD | D | 41,300 | 140 | 41,440 | 41,400 | 49,200 | D | D | 0.84 | 0.84 | 0.28% | NO | NO |
| SW 120 Street to SW 136 Street | 6LD | D | 57,700 | 140 | 57,840 | 57,900 | 49,200 | F | F | 1.18 | 1.18 | 0.28% | NO | NO |
| **SW 147 Avenue** | | | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | EE | 35,600 | 280 | 35,880 | 34,100 | 39,480 | E | E | 0.91 | 0.86 | 0.71% | NO | NO |
| SW 56 Street to SW 72 Street | 4LD | D | 37,200 | 280 | 37,480 | 37,900 | 31,100 | F | F | 1.21 | 1.22 | 0.90% | NO | NO |
| SW 72 Street to SW 88 Street | 4LD | D | 26,400 | 0 | 26,400 | 26,500 | 31,100 | D | D | 0.85 | 0.85 | 0.00% | NO | NO |
| SW 88 Street to SW 96 Street | 4LD | D | 20,700 | 0 | 20,700 | 21,400 | 31,100 | C | C | 0.67 | 0.69 | 0.00% | NO | NO |
| SW 96 Street to SW 104 Street | 4LD | D | 23,400 | 280 | 23,680 | 23,700 | 31,100 | D | D | 0.76 | 0.76 | 0.90% | NO | NO |
| SW 104 Street to SW 120 Street | 4LD | D | 17,700 | 560 | 18,260 | 18,400 | 31,100 | C | C | 0.59 | 0.59 | 1.80% | YES | NO |
| **SW 157 Avenue** | | | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | D | 0 | 0 | 0 | 0 | 31,100 | A | A | 0.00 | 0.00 | 0.00% | NO | NO |
| SW 56 Street to SW 72 Street | 4LD | D | 0 | 140 | 140 | 0 | 31,100 | C | A | 0.00 | 0.00 | 0.45% | NO | NO |
| SW 72 Street to SW 88 Street | 4LD | EE | 12,800 | 280 | 13,080 | 13,400 | 39,480 | C | C | 0.33 | 0.34 | 0.71% | NO | NO |
| SW 88 Street to SW 96 Street | 4LD | D | 14,800 | 0 | 14,800 | 16,700 | 31,100 | C | C | 0.48 | 0.54 | 0.00% | NO | NO |
| SW 96 Street to SW 104 Street | 4LD | D | 23,500 | 2,380 | 25,880 | 23,800 | 31,100 | D | D | 0.83 | 0.77 | 7.65% | YES | NO |
| SW 104 Street to SW 120 Street | **4LD** | D | 23,400 | 1,120 | 24,520 | 23,600 | 31,100 | D | D | 0.79 | 0.76 | 3.60% | YES | NO |
| SW 120 Street to SW 136 Street | **4LD** | D | 21,800 | 840 | 22,640 | 22,100 | 31,100 | D | D | 0.73 | 0.71 | 2.70% | YES | NO |
| **SW 167 Avenue** | | | | | | | | | | | | | | |
| SW 56 Street to SW 72 Street | 2LU | D | 5,700 | 1,680 | 7,380 | 6,400 | 14,600 | C | C | 0.51 | 0.44 | 11.51% | YES | NO |
| SW 72 Street to SW 88 Street | 2LU | D | 4,100 | 1,680 | 5,780 | 4,800 | 14,600 | C | C | 0.40 | 0.33 | 11.51% | YES | NO |
| SW 88 Street to SW 96 Street | 4LD | D | 4,500 | 140 | 4,640 | 3,500 | 31,100 | C | C | 0.15 | 0.11 | 0.45% | NO | NO |
| SW 96 Street to SW 104 Street | 2LU | D | 1,400 | 140 | 1,540 | 1,500 | 14,600 | C | C | 0.11 | 0.10 | 0.96% | NO | NO |
| **SW 177 Avenue** | | | | | | | | | | | | | | |
| SW 8 Street to SW 88 Street | **4LD** | B | 29,400 | 1,960 | 31,360 | 28,700 | 29,300 | C | B | 1.07 | 0.98 | 6.69% | YES | NO |
| SW 88 Street to SW 136 Street | **4LD** | B | 20,600 | 1,540 | 22,140 | 20,800 | 29,300 | B | B | 0.76 | 0.71 | 5.26% | YES | NO |
| **SW 42 Street** | | | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 6,700 | 0 | 6,700 | 6,600 | 31,100 | C | C | 0.22 | 0.21 | 0.00% | NO | NO |
| SW 157 Avenue to SW 147 Avenue | 4LD | D | 15,200 | 140 | 15,340 | 15,300 | 31,100 | C | C | 0.49 | 0.49 | 0.45% | NO | NO |
| SW 147 Avenue to SW 137 Avenue | 4LD | EE | 34,800 | 140 | 34,940 | 36,600 | 39,480 | E | E | 0.89 | 0.93 | 0.35% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 4LD | EE | 34,200 | 140 | 34,340 | 33,600 | 39,480 | E | E | 0.87 | 0.85 | 0.35% | NO | NO |
| SW 127 Avenue to HEFT | 4LD | EE | 48,000 | 140 | 48,140 | 51,400 | 39,480 | F | F | 1.22 | 1.30 | 0.35% | NO | NO |
| **SW 56 Street** | | | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 5,500 | 1,540 | 7,040 | 6,100 | 31,100 | C | C | 0.23 | 0.20 | 4.95% | YES | NO |
| SW 157 Avenue to SW 147 Avenue | 4LD | D | 22,600 | 1,400 | 24,000 | 23,700 | 31,100 | D | D | 0.77 | 0.76 | 4.50% | YES | NO |
| SW 147 Avenue to SW 137 Avenue | 4LD | D | 32,300 | 560 | 32,860 | 32,800 | 31,100 | E | E | 1.06 | 1.05 | 1.80% | YES | **YES** |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 32,800 | 420 | 33,220 | 34,300 | 31,100 | F | F | 1.07 | 1.10 | 1.35% | YES | **YES** |
| SW 127 Avenue to SW 117 Avenue | 4LD | D | 41,100 | 280 | 41,380 | 41,300 | 31,100 | F | F | 1.33 | 1.33 | 0.90% | NO | NO |
| **SW 72 Street** | | | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 23,000 | 1,540 | 24,540 | 23,000 | 31,100 | D | D | 0.79 | 0.74 | 4.95% | YES | NO |
| SW 157 Avenue to SW 147 Avenue | **6LD** | EE | 32,700 | 1,260 | 33,960 | 34,000 | 59,160 | D | D | 0.57 | 0.57 | 2.13% | YES | NO |
| SW 147 Avenue to SW 137 Avenue | **6LD** | EE | 40,700 | 840 | 41,540 | 42,100 | 59,160 | D | D | 0.70 | 0.71 | 1.42% | YES | NO |
| SW 137 Avenue to SW 127 Avenue | **6LD** | EE | 54,300 | 700 | 55,000 | 53,200 | 59,160 | E | E | 0.93 | 0.90 | 1.18% | YES | NO |
| SW 127 Avenue to SW 117 Avenue | **6LD** | EE | 57,600 | 560 | 58,160 | 56,000 | 59,160 | E | E | 0.98 | 0.95 | 0.95% | NO | NO |
| **SW 88 Street** | | | | | | | | | | | | | | |
| SW 177 Avenue to SW 172 Avenue | **6LD** | D | 23,200 | 3,501 | 26,701 | 23,200 | 49,200 | C | C | 0.54 | 0.47 | 7.11% | YES | NO |
| SW 172 Avenue to SW 167 Avenue | **6LD** | D | 24,500 | 8,121 | 32,621 | 25,600 | 49,200 | C | C | 0.66 | 0.52 | 16.51% | YES | NO |
| SW 167 Avenue to SW 157 Avenue | **6LD** | EE | 21,400 | 6,441 | 27,841 | 22,800 | 62,160 | C | C | 0.45 | 0.37 | 10.36% | YES | NO |
| SW 157 Avenue to SW 147 Avenue | **6LD** | EE | 25,300 | 2,940 | 28,240 | 26,400 | 62,160 | C | C | 0.45 | 0.42 | 4.73% | YES | NO |
| SW 147 Avenue to SW 137 Avenue | 6LD | EE | 51,400 | 1,960 | 53,360 | 51,900 | 62,160 | E | E | 0.86 | 0.83 | 3.15% | YES | NO |
| SW 137 Avenue to SW 127 Avenue | 6LD | EE | 58,800 | 1,120 | 59,920 | 58,900 | 62,160 | E | E | 0.96 | 0.95 | 1.80% | YES | NO |
| SW 127 Avenue to SR 821/HEFT | 8LD | EE | 65,000 | 980 | 65,980 | 65,300 | 80,400 | E | E | 0.82 | 0.81 | 1.22% | YES | NO |

Table 5
Year 2015 Total Traffic Conditions
2015 Daily FSUTMS Volumes - Project at 400,000 SF of Retail Use

| ROADWAY SEGMENTS | YEAR 2015 LANES | CDMP ADOPTED LOS STANDARD | 2015 - A FUTURE + COMMITTED FSUTMS VOLUMES | Brown 400,000 sf Amendment PM Trips 14002 | 2015 - A FUTURE + COMMITTED + PROJECT VOLUMES | 2015 - B TOTAL with PROJECT FSUTMS VOLUMES | DAILY MAXIMUM SERVICE VOLUME | 2015 - A DAILY LOS | 2015 - B DAILY LOS | A V/C | B V/C | PROJECT AS A PERCENT OF MSV | PROJECT TRIPS ≥ 1% YES / NO | PROJECT ≥ 1% AND ROADWAY FAILING YES / NO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SW 96 Street** | | | | | | | | | | | | | | |
| SW 172 Avenue to SW 167 Avenue | 2LU | D | 2,700 | 2,100 | 4,800 | 4,600 | 14,600 | C | C | 0.33 | 0.32 | 14.39% | YES | NO |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 6,800 | 1,960 | 8,760 | 7,700 | 31,100 | C | C | 0.28 | 0.25 | 6.30% | YES | NO |
| SW 157 Avenue to SW 152 Avenue | 4LD | D | 13,500 | 2,520 | 16,020 | 13,500 | 31,100 | C | C | 0.52 | 0.43 | 8.10% | YES | NO |
| **SW 104 Street** | | | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 0 | 0 | 0 | 0 | 31,100 | A | A | 0.00 | 0.00 | 0.00% | NO | NO |
| SW 157 Avenue to SW 147 Avenue | 4LD | EE | 16,100 | 1,120 | 17,220 | 16,000 | 39,480 | C | C | 0.44 | 0.41 | 2.84% | YES | NO |
| SW 147 Avenue to SW 137 Avenue | **6LD** | EE | 28,100 | 420 | 28,520 | 28,000 | 59,160 | C | C | 0.48 | 0.47 | 0.71% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 6LD | EE | 46,200 | 420 | 46,620 | 46,100 | 59,160 | D | D | 0.79 | 0.78 | 0.71% | NO | NO |
| SW 127 Avenue to SW 117 Avenue | 6LD | EE | 64,000 | 280 | 64,280 | 64,100 | 59,160 | F | F | 1.09 | 1.08 | 0.47% | NO | NO |
| **SW 120 Street** | | | | | | | | | | | | | | |
| SW 157 Avenue to SW 147 Avenue | **4LD** | D | 2,500 | 0 | 2,500 | 2,600 | 31,100 | C | C | 0.08 | 0.08 | 0.00% | NO | NO |
| SW 147 Avenue to SW 137 Avenue | 4LD | D | 23,800 | 560 | 24,360 | 24,200 | 31,100 | D | D | 0.78 | 0.78 | 1.80% | YES | NO |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 51,100 | 280 | 51,380 | 51,300 | 31,100 | F | F | 1.65 | 1.65 | 0.90% | NO | NO |
| SW 127 Avenue to SW 122 Avenue | 4LD | D | 52,700 | 280 | 52,980 | 53,100 | 31,100 | F | F | 1.70 | 1.71 | 0.90% | NO | NO |
| SW 122 Avenue to SR 821/HEFT | 4LD | D | 63,300 | 280 | 63,580 | 64,200 | 31,100 | F | F | 2.04 | 2.06 | 0.90% | NO | NO |
| SR 821/HEFT to SW 117 Avenue | 4LD | D | 49,700 | 140 | 49,840 | 50,400 | 31,100 | F | F | 1.60 | 1.62 | 0.45% | NO | NO |
| **SW 136 Street** | | | | | | | | | | | | | | |
| SW 157 Avenue to SW 147 Avenue | **4LD** | D | 6,100 | 280 | 6,380 | 6,200 | 31,100 | C | C | 0.21 | 0.20 | 0.90% | NO | NO |
| SW 147 Avenue to SW 137 Avenue | **4LD** | D | 18,200 | 140 | 18,340 | 18,200 | 31,100 | C | C | 0.59 | 0.59 | 0.45% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 2,200 | 0 | 2,200 | 2,300 | 31,100 | C | C | 0.07 | 0.07 | 0.00% | NO | NO |

Table 6
Year 2015 Total Traffic Conditions
2015 Daily FSUTMS Volumes - Project at 670,834 SF of Retail Use

| ROADWAY SEGMENTS | YEAR 2015 LANES | CDMP ADOPTED LOS STANDARD | 2015 - A FUTURE + COMMITTED FSUTMS VOLUMES | Brown 670,834 sf Amendment PM Trips 20681 | 2015 - A FUTURE + COMMITTED + PROJECT VOLUMES | 2015 - B TOTAL with PROJECT FSUTMS VOLUMES | DAILY MAXIMUM SERVICE VOLUME | 2015 - A DAILY LOS | 2015 - B DAILY LOS | A V/C | B V/C | PROJECT AS A PERCENT OF MSV | PROJECT TRIPS ≥ 5% YES / NO | PROJECT ≥ 5% AND ROADWAY FAILING YES / NO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SW 127 Avenue** | | | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | D | 32,900 | 0 | 32,900 | 31,700 | 31,100 | E | E | 1.06 | 1.02 | 0.00% | NO | NO |
| SW 56 Street to SW 72 Street | 4LD | D | 41,500 | 0 | 41,500 | 41,200 | 31,100 | F | F | 1.33 | 1.32 | 0.00% | NO | NO |
| SW 72 Street to SW 88 Street | 4LD | D | 31,400 | 0 | 31,400 | 31,100 | 31,100 | E | D | 1.01 | 1.00 | 0.00% | NO | NO |
| SW 88 Street to SW 104 Street | 4LD | D | 26,100 | 0 | 26,100 | 25,200 | 31,100 | D | D | 0.84 | 0.81 | 0.00% | NO | NO |
| SW 104 Street to SW 120 Street | 4LD | D | 30,200 | 0 | 30,200 | 30,400 | 31,100 | D | D | 0.97 | 0.98 | 0.00% | NO | NO |
| **SW 137 Avenue** | | | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 6LD | D | 41,300 | 207 | 41,507 | 41,300 | 46,800 | D | D | 0.89 | 0.88 | 0.44% | NO | NO |
| SW 56 Street to SW 72 Street | 4LD | D | 37,400 | 207 | 37,607 | 38,000 | 31,100 | F | F | 1.21 | 1.22 | 0.66% | NO | NO |
| SW 72 Street to SW 88 Street | 4LD | D | 43,100 | 207 | 43,307 | 42,500 | 31,100 | F | F | 1.39 | 1.37 | 0.66% | NO | NO |
| SW 88 Street to SW 96 Street | 6LD | D | 36,300 | 207 | 36,507 | 36,600 | 49,200 | C | C | 0.74 | 0.74 | 0.42% | NO | NO |
| SW 96 Street to SW 104 Street | 6LD | D | 43,800 | 414 | 44,214 | 43,200 | 49,200 | D | D | 0.90 | 0.88 | 0.84% | NO | NO |
| SW 104 Street to SW 120 Street | 6LD | D | 41,300 | 207 | 41,507 | 41,300 | 49,200 | D | D | 0.84 | 0.84 | 0.42% | NO | NO |
| SW 120 Street to SW 136 Street | 6LD | D | 57,700 | 207 | 57,907 | 57,600 | 49,200 | F | F | 1.18 | 1.17 | 0.42% | NO | NO |
| **SW 147 Avenue** | | | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | EE | 35,600 | 414 | 36,014 | 35,700 | 39,480 | E | E | 0.91 | 0.90 | 1.05% | NO | NO |
| SW 56 Street to SW 72 Street | 4LD | D | 37,200 | 414 | 37,614 | 38,700 | 31,100 | F | F | 1.21 | 1.24 | 1.33% | NO | NO |
| SW 72 Street to SW 88 Street | 4LD | D | 26,400 | 0 | 26,400 | 26,700 | 31,100 | D | D | 0.85 | 0.86 | 0.00% | NO | NO |
| SW 88 Street to SW 96 Street | 4LD | D | 20,700 | 0 | 20,700 | 21,100 | 31,100 | C | C | 0.67 | 0.68 | 0.00% | NO | NO |
| SW 96 Street to SW 104 Street | 4LD | D | 23,400 | 414 | 23,814 | 23,800 | 31,100 | D | D | 0.77 | 0.77 | 1.33% | NO | NO |
| SW 104 Street to SW 120 Street | 4LD | D | 17,700 | 827 | 18,527 | 18,400 | 31,100 | C | C | 0.60 | 0.59 | 2.66% | NO | NO |
| **SW 157 Avenue** | | | | | | | | | | | | | | |
| SW 42 Street to SW 56 Street | 4LD | D | 0 | 0 | 0 | 0 | 31,100 | A | A | 0.00 | 0.00 | 0.00% | NO | NO |
| SW 56 Street to SW 72 Street | 4LD | D | 0 | 207 | 207 | 0 | 31,100 | C | A | 0.01 | 0.00 | 0.66% | NO | NO |
| SW 72 Street to SW 88 Street | 4LD | EE | 12,800 | 414 | 13,214 | 13,300 | 39,480 | C | C | 0.33 | 0.34 | 1.05% | NO | NO |
| SW 88 Street to SW 96 Street | 4LD | D | 14,800 | 0 | 14,800 | 16,100 | 31,100 | C | C | 0.48 | 0.52 | 0.00% | NO | NO |
| SW 96 Street to SW 104 Street | 4LD | D | 23,500 | 3,723 | 27,223 | 24,500 | 31,100 | D | D | 0.88 | 0.79 | 11.97% | YES | NO |
| SW 104 Street to SW 120 Street | **4LD** | D | 23,400 | 1,654 | 25,054 | 23,800 | 31,100 | D | D | 0.81 | 0.77 | 5.32% | YES | NO |
| SW 120 Street to SW 136 Street | **4LD** | D | 21,800 | 1,241 | 23,041 | 22,200 | 31,100 | D | D | 0.74 | 0.71 | 3.99% | NO | NO |
| **SW 167 Avenue** | | | | | | | | | | | | | | |
| SW 56 Street to SW 72 Street | 2LU | D | 5,700 | 2,482 | 8,182 | 6,800 | 14,600 | C | C | 0.56 | 0.47 | 17.00% | YES | NO |
| SW 72 Street to SW 88 Street | 2LU | D | 4,100 | 2,482 | 6,582 | 5,200 | 14,600 | C | C | 0.45 | 0.36 | 17.00% | YES | NO |
| SW 88 Street to SW 96 Street | 4LD | D | 4,500 | 207 | 4,707 | 3,500 | 31,100 | C | C | 0.15 | 0.11 | 0.66% | NO | NO |
| SW 96 Street to SW 104 Street | 2LU | D | 1,400 | 207 | 1,607 | 1,500 | 14,600 | C | C | 0.11 | 0.10 | 1.42% | NO | NO |
| **SW 177 Avenue** | | | | | | | | | | | | | | |
| SW 8 Street to SW 88 Street | **4LD** | B | 29,400 | 3,102 | 32,502 | 29,300 | 29,300 | C | B | 1.11 | 1.00 | 10.59% | YES | NO |
| SW 88 Street to SW 136 Street | **4LD** | B | 20,600 | 2,068 | 22,668 | 20,900 | 29,300 | B | B | 0.77 | 0.71 | 7.06% | YES | NO |
| **SW 42 Street** | | | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 6,700 | 0 | 6,700 | 6,700 | 31,100 | C | C | 0.22 | 0.22 | 0.00% | NO | NO |
| SW 157 Avenue to SW 147 Avenue | 4LD | D | 15,200 | 207 | 15,407 | 15,300 | 31,100 | C | C | 0.50 | 0.49 | 0.66% | NO | NO |
| SW 147 Avenue to SW 137 Avenue | 4LD | EE | 34,800 | 207 | 35,007 | 38,500 | 39,480 | E | E | 0.89 | 0.98 | 0.52% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 4LD | EE | 34,200 | 207 | 34,407 | 34,500 | 39,480 | E | E | 0.87 | 0.87 | 0.52% | NO | NO |
| SW 127 Avenue to HEFT | 4LD | EE | 48,000 | 207 | 48,207 | 48,500 | 39,480 | F | F | 1.22 | 1.23 | 0.52% | NO | NO |
| **SW 56 Street** | | | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 5,500 | 2,482 | 7,982 | 6,500 | 31,100 | C | C | 0.26 | 0.21 | 7.98% | YES | NO |
| SW 157 Avenue to SW 147 Avenue | 4LD | D | 22,600 | 2,068 | 24,668 | 24,200 | 31,100 | D | D | 0.79 | 0.78 | 6.65% | YES | NO |
| SW 147 Avenue to SW 137 Avenue | 4LD | D | 32,300 | 827 | 33,127 | 32,800 | 31,100 | F | E | 1.07 | 1.05 | 2.66% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 32,800 | 620 | 33,420 | 34,300 | 31,100 | F | F | 1.07 | 1.10 | 1.99% | NO | NO |
| SW 127 Avenue to SW 117 Avenue | 4LD | D | 41,100 | 414 | 41,514 | 41,900 | 31,100 | F | F | 1.33 | 1.35 | 1.33% | NO | NO |
| **SW 72 Street** | | | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 23,000 | 2,275 | 25,275 | 23,000 | 31,100 | D | D | 0.81 | 0.74 | 7.31% | YES | NO |
| SW 157 Avenue to SW 147 Avenue | **6LD** | EE | 32,700 | 1,861 | 34,561 | 33,900 | 59,160 | D | D | 0.58 | 0.57 | 3.15% | NO | NO |
| SW 147 Avenue to SW 137 Avenue | **6LD** | EE | 40,700 | 1,241 | 41,941 | 42,000 | 59,160 | D | D | 0.71 | 0.71 | 2.10% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | **6LD** | EE | 54,300 | 1,034 | 55,334 | 53,800 | 59,160 | E | E | 0.94 | 0.91 | 1.75% | NO | NO |
| SW 127 Avenue to SW 117 Avenue | **6LD** | EE | 57,600 | 827 | 58,427 | 57,600 | 59,160 | E | E | 0.99 | 0.97 | 1.40% | NO | NO |
| **SW 88 Street** | | | | | | | | | | | | | | |
| SW 177 Avenue to SW 172 Avenue | **6LD** | D | 23,200 | 5,170 | 28,370 | 23,200 | 49,200 | C | C | 0.58 | 0.47 | 10.51% | YES | NO |
| SW 172 Avenue to SW 167 Avenue | **6LD** | D | 24,500 | 11,168 | 35,668 | 25,600 | 49,200 | C | C | 0.72 | 0.52 | 22.70% | YES | NO |
| SW 167 Avenue to SW 157 Avenue | **6LD** | EE | 21,400 | 8,479 | 29,879 | 22,800 | 62,160 | C | C | 0.48 | 0.37 | 13.64% | YES | NO |
| SW 157 Avenue to SW 147 Avenue | **6LD** | EE | 25,300 | 4,343 | 29,643 | 26,400 | 62,160 | C | C | 0.48 | 0.42 | 6.99% | YES | NO |
| SW 147 Avenue to SW 137 Avenue | 6LD | EE | 51,400 | 2,895 | 54,295 | 51,900 | 62,160 | E | E | 0.87 | 0.83 | 4.66% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 6LD | EE | 58,800 | 1,448 | 60,248 | 58,900 | 62,160 | E | E | 0.97 | 0.95 | 2.33% | NO | NO |
| SW 127 Avenue to SR 821/HEFT | 8LD | EE | 65,000 | 1,241 | 66,241 | 65,300 | 80,400 | E | E | 0.82 | 0.81 | 1.54% | NO | NO |

Table 6
Year 2015 Total Traffic Conditions
2015 Daily FSUTMS Volumes - Project at 670,834 SF of Retail Use

| ROADWAY SEGMENTS | YEAR 2015 LANES | CDMP ADOPTED LOS STANDARD | 2015 - A FUTURE + COMMITTED FSUTMS VOLUMES | Brown 670,834 sf Amendment PM Trips 20681 | 2015 - A FUTURE + COMMITTED + PROJECT VOLUMES | 2015 - B TOTAL with PROJECT FSUTMS VOLUMES | DAILY MAXIMUM SERVICE VOLUME | 2015 - A DAILY LOS | 2015 - B DAILY LOS | A V/C | B V/C | PROJECT AS A PERCENT OF MSV | PROJECT TRIPS ≥ 5% YES / NO | PROJECT ≥ 5% AND ROADWAY FAILING YES / NO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SW 96 Street** | | | | | | | | | | | | | | |
| SW 172 Avenue to SW 167 Avenue | 2LU | D | 2,700 | 3,929 | 6,629 | 5,200 | 14,600 | C | C | 0.45 | 0.36 | 26.91% | YES | NO |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 6,800 | 3,723 | 10,523 | 8,300 | 31,100 | C | C | 0.34 | 0.27 | 11.97% | YES | NO |
| SW 157 Avenue to SW 152 Avenue | 4LD | D | 13,500 | 3,723 | 17,223 | 14,300 | 31,100 | C | C | 0.55 | 0.46 | 11.97% | YES | NO |
| **SW 104 Street** | | | | | | | | | | | | | | |
| SW 167 Avenue to SW 157 Avenue | 4LD | D | 0 | 0 | 0 | 0 | 31,100 | A | A | 0.00 | 0.00 | 0.00% | NO | NO |
| SW 157 Avenue to SW 147 Avenue | 4LD | EE | 16,100 | 1,654 | 17,754 | 15,900 | 39,480 | C | C | 0.45 | 0.40 | 4.19% | NO | NO |
| SW 147 Avenue to SW 137 Avenue | **6LD** | EE | 28,100 | 620 | 28,720 | 28,100 | 59,160 | C | C | 0.49 | 0.47 | 1.05% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 6LD | EE | 46,200 | 620 | 46,820 | 46,100 | 59,160 | E | D | 0.79 | 0.78 | 1.05% | NO | NO |
| SW 127 Avenue to SW 117 Avenue | 6LD | EE | 64,000 | 414 | 64,414 | 64,700 | 59,160 | F | F | 1.09 | 1.09 | 0.70% | NO | NO |
| **SW 120 Street** | | | | | | | | | | | | | | |
| SW 157 Avenue to SW 147 Avenue | **4LD** | D | 2,500 | 0 | 2,500 | 2,600 | 31,100 | C | C | 0.08 | 0.08 | 0.00% | NO | NO |
| SW 147 Avenue to SW 137 Avenue | 4LD | D | 23,800 | 827 | 24,627 | 24,100 | 31,100 | D | D | 0.79 | 0.77 | 2.66% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 51,100 | 414 | 51,514 | 50,700 | 31,100 | F | F | 1.66 | 1.63 | 1.33% | NO | NO |
| SW 127 Avenue to SW 122 Avenue | 4LD | D | 52,700 | 414 | 53,114 | 52,500 | 31,100 | F | F | 1.71 | 1.69 | 1.33% | NO | NO |
| SW 122 Avenue to SR 821/HEFT | 4LD | D | 63,300 | 414 | 63,714 | 63,300 | 31,100 | F | F | 2.05 | 2.04 | 1.33% | NO | NO |
| SR 821/HEFT to SW 117 Avenue | 4LD | D | 49,700 | 207 | 49,907 | 49,600 | 31,100 | F | F | 1.60 | 1.59 | 0.66% | NO | NO |
| **SW 136 Street** | | | | | | | | | | | | | | |
| SW 157 Avenue to SW 147 Avenue | **4LD** | D | 6,100 | 414 | 6,514 | 6,200 | 31,100 | C | C | 0.21 | 0.20 | 1.33% | NO | NO |
| SW 147 Avenue to SW 137 Avenue | **4LD** | D | 18,200 | 207 | 18,407 | 18,200 | 31,100 | C | C | 0.59 | 0.59 | 0.66% | NO | NO |
| SW 137 Avenue to SW 127 Avenue | 4LD | D | 2,200 | 0 | 2,200 | 2,300 | 31,100 | C | C | 0.07 | 0.07 | 0.00% | NO | NO |

**TABLE 7**
**2007 BROWN CDMP AMENDMENT**
**EMPLOYEE CALCULATIONS FOR TAZ 1251 USING ITE 7TH EDITION**

| USE | TIMEFRAME | UNITS | | ITE LUC | ITE 7TH EDITION TRIP RATE OR FORMULA | TRIPS | IN % | IN TRIPS | OUT % | OUT TRIPS |
|---|---|---|---|---|---|---|---|---|---|---|
| **Retail** | Daily | **748** | EMP | 814 | T = 22.36 (X) | **16,722** | 50% | 8,361 | 50% | 8,361 |
| Retail | AM Peak Hour | 0 | EMP | n/a | n/a | **0** | 61% | 0 | 39% | 0 |
| Retail | PM Peak Hour | 0 | EMP | n/a | n/a | **0** | 48% | 0 | 52% | 0 |
| | | | | | | | | | | |
| Retail | Daily | **400,000** | SF | 820 | Ln (T) = 0.65 Ln (X) + 5.83 | **16,722** | 50% | 8,361 | 50% | 8,361 |
| Retail | AM Peak Hour | 400,000 | SF | 820 | Ln (T) = 0.60 Ln (X) + 2.29 | **360** | 61% | 220 | 39% | 140 |
| Retail | PM Peak Hour | 400,000 | SF | 820 | Ln (T) = 0.66 Ln (X) + 3.40 | **1,563** | 48% | 750 | 52% | 813 |
| | | | | | **RETAIL EMPLOYEE RATE PER KSF** | | | | | |
| Retail | Daily | 400,000 | SF | 814 | Retail Employee Rate per KSF | **1.870** | | | | |
| Retail | AM Peak Hour | 400,000 | SF | n/a | Retail Employee Rate per KSF | **n/a** | | | | |
| Retail | PM Peak Hour | 400,000 | SF | n/a | Retail Employee Rate per KSF | **n/a** | | | | |

| USE | TIMEFRAME | UNITS | | ITE LUC | ITE 7TH EDITION TRIP RATE OR FORMULA | TRIPS | IN % | IN TRIPS | OUT % | OUT TRIPS |
|---|---|---|---|---|---|---|---|---|---|---|
| **Retail** | Daily | **1,047** | EMP | 814 | T = 22.36 (X) | **23,401** | 50% | 11,701 | 50% | 11,700 |
| Retail | AM Peak Hour | 0 | EMP | n/a | n/a | **0** | 61% | 0 | 39% | 0 |
| Retail | PM Peak Hour | 0 | EMP | n/a | n/a | **0** | 48% | 0 | 52% | 0 |
| | | | | | | | | | | |
| Retail | Daily | **670,834** | SF | 820 | Ln (T) = 0.65 Ln (X) + 5.83 | **23,401** | 50% | 11,701 | 50% | 11,700 |
| Retail | AM Peak Hour | 670,834 | SF | 820 | Ln (T) = 0.60 Ln (X) + 2.29 | **490** | 61% | 299 | 39% | 191 |
| Retail | PM Peak Hour | 670,834 | SF | 820 | Ln (T) = 0.66 Ln (X) + 3.40 | **2,199** | 48% | 1,056 | 52% | 1,143 |
| | | | | | **RETAIL EMPLOYEE RATE PER KSF** | | | | | |
| Retail | Daily | 670,834 | SF | 814 | Retail Employee Rate per KSF | **1.560** | | | | |
| Retail | AM Peak Hour | 670,834 | SF | n/a | Retail Employee Rate per KSF | **n/a** | | | | |
| Retail | PM Peak Hour | 670,834 | SF | n/a | Retail Employee Rate per KSF | **n/a** | | | | |

**TABLE 8**
**KENDALL COMMONS**
**EMPLOYEE CALCULATIONS FOR ZONE 1250 USING ITE 7TH EDITION**

| USE | TIMEFRAME | UNITS | | ITE LUC | ITE 7TH EDITION TRIP RATE OR FORMULA | TRIPS | IN | | OUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | % | TRIPS | % | TRIPS |
| **Retail** | Daily | **45** | EMP | 814 | T = 22.36 (X) | **996** | 50% | 498 | 50% | 498 |
| Retail | AM Peak Hour | 0 | EMP | n/a | n/a | **0** | 61% | 0 | 39% | 0 |
| Retail | PM Peak Hour | 0 | EMP | n/a | n/a | **0** | 48% | 0 | 52% | 0 |
| | | | | | | | | | | |
| Retail | Daily | **22,400** | SF | 814 | T = 42.78 (X) + 37.66 | **996** | 50% | 498 | 50% | 498 |
| Retail | AM Peak Hour | 22,400 | SF | 820 | Ln (T) = 0.60 Ln (X) + 2.29 | **64** | 61% | 39 | 39% | 25 |
| Retail | PM Peak Hour | 22,400 | SF | 814 | T = 2.40 (X) + 21.48 | **75** | 48% | 36 | 52% | 39 |
| | | | | | **RETAIL EMPLOYEE RATE PER KSF** | | | | | |
| Retail | Daily | 22,400 | SF | 814 | Retail Employee Rate per KSF | **1.988** | | | | |
| Retail | AM Peak Hour | 22,400 | SF | n/a | Retail Employee Rate per KSF | **n/a** | | | | |
| Retail | PM Peak Hour | 22,400 | SF | n/a | Retail Employee Rate per KSF | **n/a** | | | | |

| USE | TIMEFRAME | UNITS | | ITE LUC | ITE 7TH EDITION TRIP RATE OR FORMULA | TRIPS | IN | | OUT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | % | TRIPS | % | TRIPS |
| **Office** | Daily | **214** | EMP | 710 | T = 3.32 (X) | **710** | 50% | 355 | 50% | 355 |
| Office | AM Peak Hour | 202 | EMP | 710 | T = 0.48 (X) | **97** | 88% | 85 | 12% | 12 |
| Office | PM Peak Hour | 279 | EMP | 710 | T = 0.46 (X) | **128** | 17% | 22 | 83% | 106 |
| | | | | | | | | | | |
| Office | Daily | **44,100** | SF | 710 | Ln (T) = 0.77 Ln (X) + 3.65 | **710** | 50% | 355 | 50% | 355 |
| Office | AM Peak Hour | 44,100 | SF | 710 | Ln (T) = 0.80 Ln (X) + 1.55 | **97** | 88% | 85 | 12% | 12 |
| Office | PM Peak Hour | 44,100 | SF | 710 | T = 1.12 (X) + 78.81 | **128** | 17% | 22 | 83% | 106 |
| | | | | | **OFFICE EMPLOYEE RATE PER KSF** | | | | | |
| Office | Daily | 44,100 | SF | 710 | Office Employee Rate per KSF | **4.849** | | | | |
| Office | AM Peak Hour | 44,100 | SF | 710 | Office Employee Rate per KSF | **4.582** | | | | |
| Office | PM Peak Hour | 44,100 | SF | 710 | Office Employee Rate per KSF | **6.320** | | | | |

**Table 9A**
**2007 Brown CDMP Amendment at 400,000 sf of Retail Use**
**Miami-Dade County Year 2015 Zdata2 for the Study Area**

| Card Type | Planning Analysis District | Zone Number | Employment | | | | School Enrollment | Short Term Parking Cost | Long Term Parking Cost |
|---|---|---|---|---|---|---|---|---|---|
| | | | Industrial | Commercial | Service | Total | | | |
| 2 | 5 | 1248 | 1 | 0 | 15 | 16 | 0 | 0 | 0 |
| 2 | 5 | 1249 | 0 | 114 | 0 | 114 | 0 | 0 | 0 |
| **Without Kendall Commons** | | **1250** | 9 | 19 | 25 | 53 | 0 | 0 | 0 |
| **With Kendall Commons** | | **1250** | 9 | **64** | **239** | **312** | 0 | 0 | 0 |
| **Without Brown Site** | | **1251** | 0 | 0 | 51 | 51 | 1350 | 0 | 0 |
| **With Brown Site** | | **1251** | 0 | **748** | 51 | **799** | 1350 | 0 | 0 |
| 2 | 5 | 1252 | 7 | 0 | 2 | 9 | 0 | 0 | 0 |
| 2 | 5 | 1253 | 17 | 4 | 20 | 41 | 0 | 0 | 0 |
| 2 | 5 | 1254 | 0 | 0 | 0 | 0 | 1450 | 0 | 0 |
| 2 | 5 | 1255 | 75 | 0 | 105 | 180 | 1316 | 0 | 0 |
| 2 | 5 | 1256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 5 | 1257 | 0 | 20 | 23 | 43 | 725 | 0 | 0 |

**Table 9B**
**2007 Brown CDMP Amendment at 670,834 sf of Retail Use**
**Miami-Dade County Year 2015 Zdata2 for the Study Area**

| Card Type | Planning Analysis District | Zone Number | Employment | | | | School Enrollment | Short Term Parking Cost | Long Term Parking Cost |
|---|---|---|---|---|---|---|---|---|---|
| | | | Industrial | Commercial | Service | Total | | | |
| 2 | 5 | 1248 | 1 | 0 | 15 | 16 | 0 | 0 | 0 |
| 2 | 5 | 1249 | 0 | 114 | 0 | 114 | 0 | 0 | 0 |
| **Without Kendall Commons** | | **1250** | 9 | 19 | 25 | 53 | 0 | 0 | 0 |
| **With Kendall Commons** | | **1250** | 9 | **64** | **239** | **312** | 0 | 0 | 0 |
| **Without Brown Site** | | **1251** | 0 | 0 | 51 | 51 | 1350 | 0 | 0 |
| **With Brown Site** | | **1251** | 0 | **1047** | 51 | **1098** | 1350 | 0 | 0 |
| 2 | 5 | 1252 | 7 | 0 | 2 | 9 | 0 | 0 | 0 |
| 2 | 5 | 1253 | 17 | 4 | 20 | 41 | 0 | 0 | 0 |
| 2 | 5 | 1254 | 0 | 0 | 0 | 0 | 1450 | 0 | 0 |
| 2 | 5 | 1255 | 75 | 0 | 105 | 180 | 1316 | 0 | 0 |
| 2 | 5 | 1256 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 5 | 1257 | 0 | 20 | 23 | 43 | 725 | 0 | 0 |

**Table 10**
**2007 Brown CDMP Amendment**
**Miami-Dade County Year 2015 Zdata1 for the Study Area**

| TAZ | Reference TAZ | # Households | | Total Households | # Auto Households | | # Worker Households | | # Person Households | | Occupied Hotel/ Motel Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No Children | Children | | No Children | Children | No Children | Children | No Children | Children | |
| 1248 | 1248 | 327 | 451 | 778 | 644 | 1221 | 487 | 849 | 705 | 1917 | 0 |
| 1249 | 1249 | 230 | 325 | 555 | 452 | 881 | 343 | 613 | 495 | 1383 | 0 |
| **1250** | 1250 | **526** | **924** | **1450** | **1035** | **2502** | **783** | **1740** | **1133** | **3929** | 0 |
| **1251** | 1251 | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | 0 |
| 1252 | 1252 | 4 | 1 | 5 | 8 | 0 | 6 | 0 | 9 | 0 | 0 |
| 1253 | 1253 | 17 | 25 | 42 | 34 | 68 | 26 | 47 | 37 | 106 | 0 |
| 1254 | 1254 | 12 | 5 | 17 | 24 | 13 | 18 | 10 | 26 | 21 | 0 |
| 1255 | 1255 | 321 | 479 | 800 | 632 | 1297 | 478 | 902 | 691 | 2036 | 0 |
| 1256 | 1256 | 727 | 473 | 1200 | 1431 | 1280 | 1084 | 890 | 1567 | 2010 | 0 |
| 1257 | 1257 | 1070 | 830 | 1900 | 2107 | 2245 | 1595 | 1562 | 2307 | 3526 | 0 |

Note: No change needed to Zdata1 for Zone 1251 for the Brown Site, since no residential is proposed.
No change needed to Zdata1 for Zone 1250 for the Kendall Commons TND, since 1450 du are incorported into Zdata 1,
144 du exist today in Zone 1250 and 1256 du are approved and under construction for the Kendall Commons TND, (a total of 1400 du).

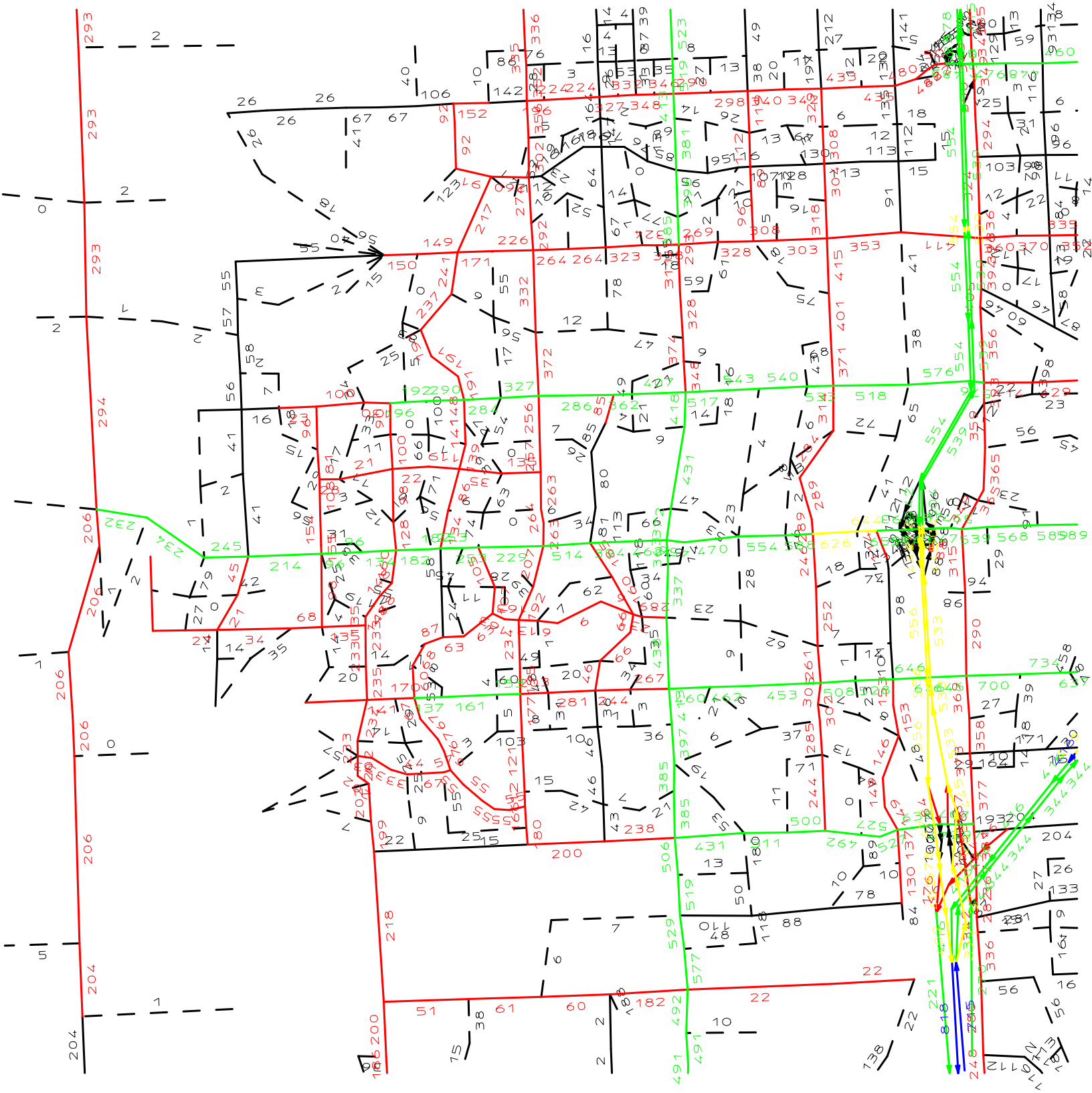


Figure 1
FSUTMS Modeling - 2015 Future Background + Committed Development
2007 Brown CDMP Amendment
August 2007


Figure 2A
FSUTMS Modeling - Select Zone Analysis for Project Zone for 400,000 SF of Retail Use
2007 Brown CDMP Amendment
August 2007

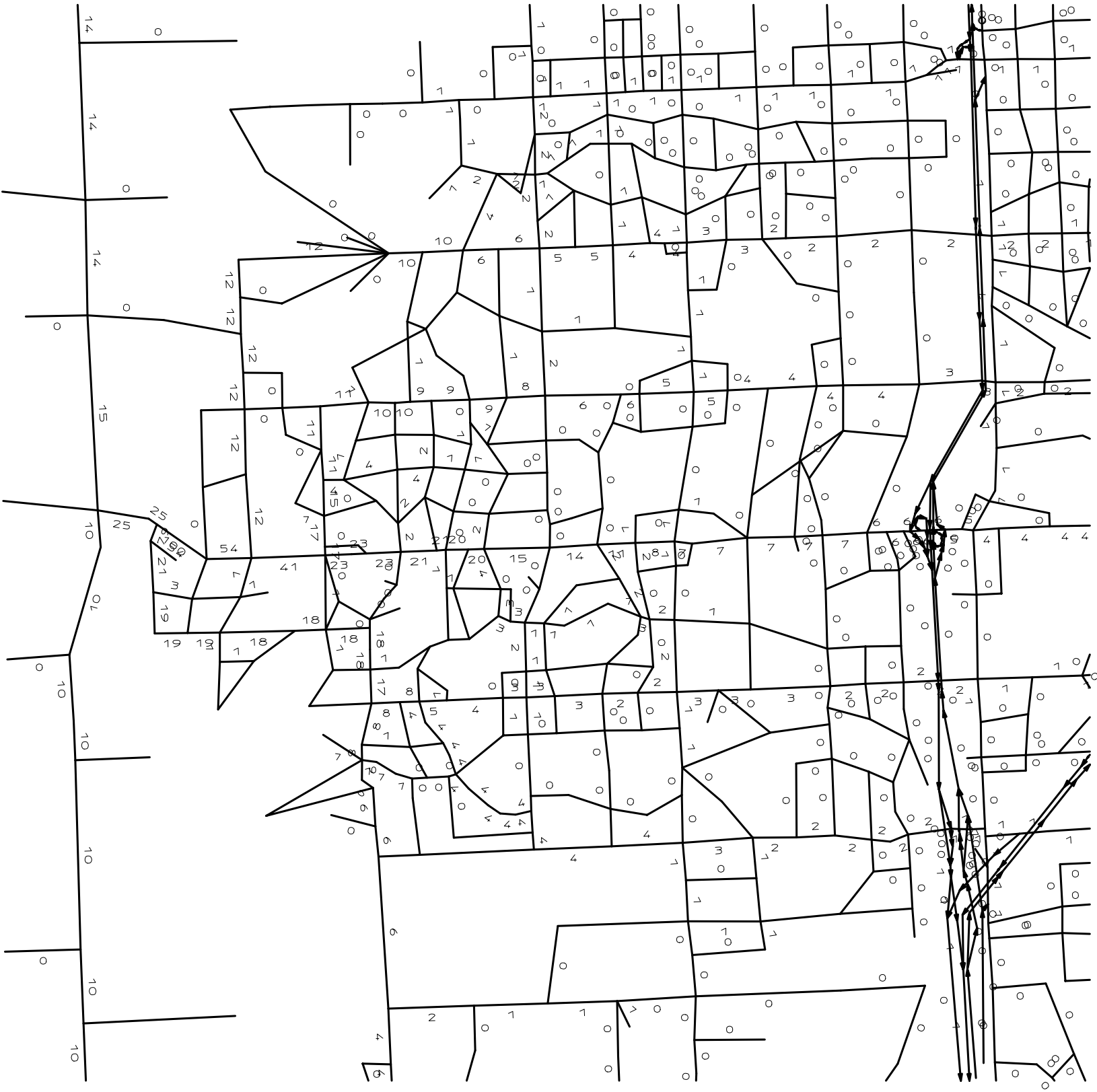


Figure 2B
FSUTMS Modeling - Select Zone Analysis for Project Zone for 670,834 SF of Retail Use
2007 Brown CDMP Amendment
August 2007

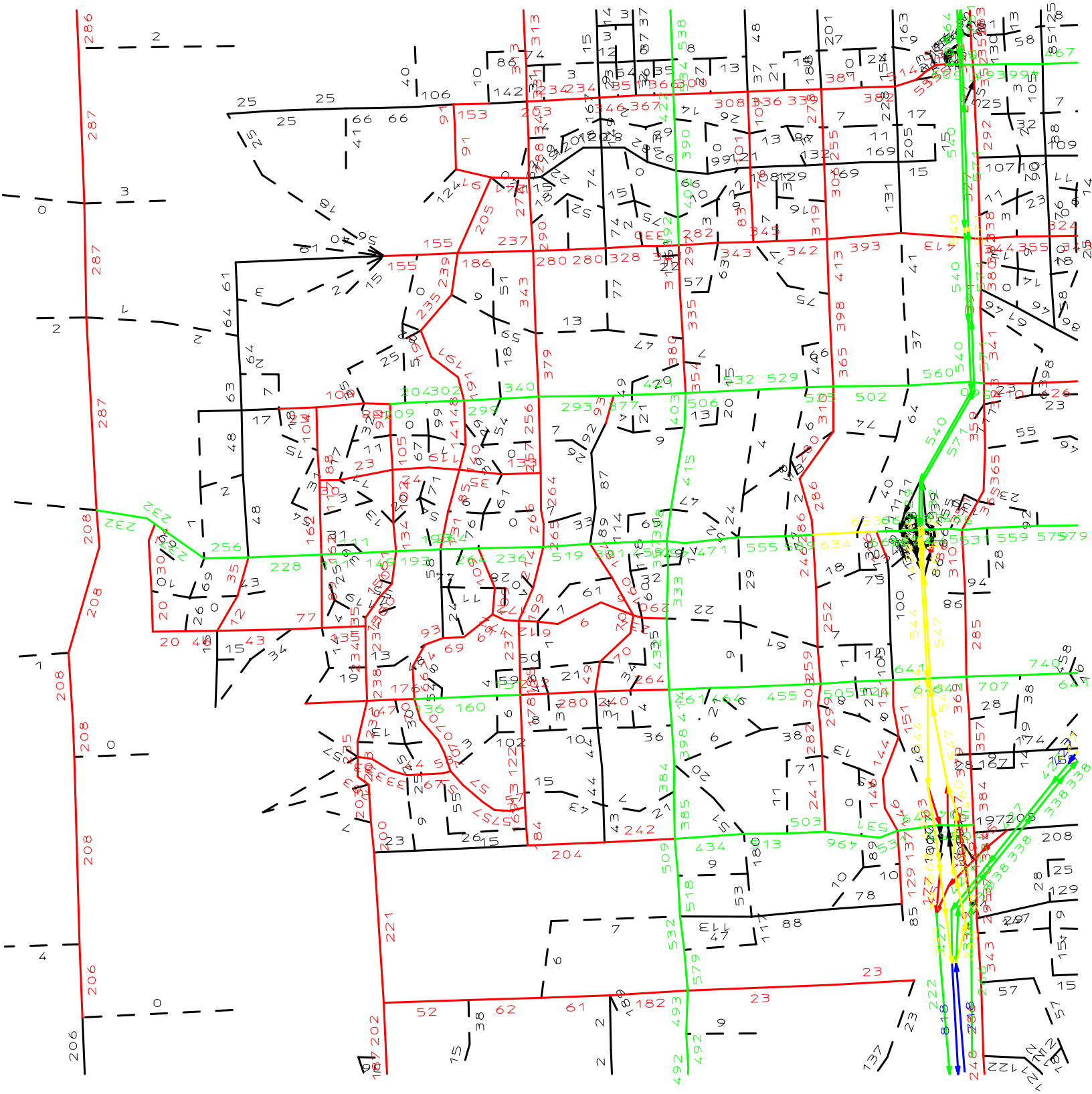


Figure 3A
FSUTMS Modeling - 2015 Total Traffic with Project at 400,000 SF of Retail Use
2007 Brown CDMP Amendment
August 2007

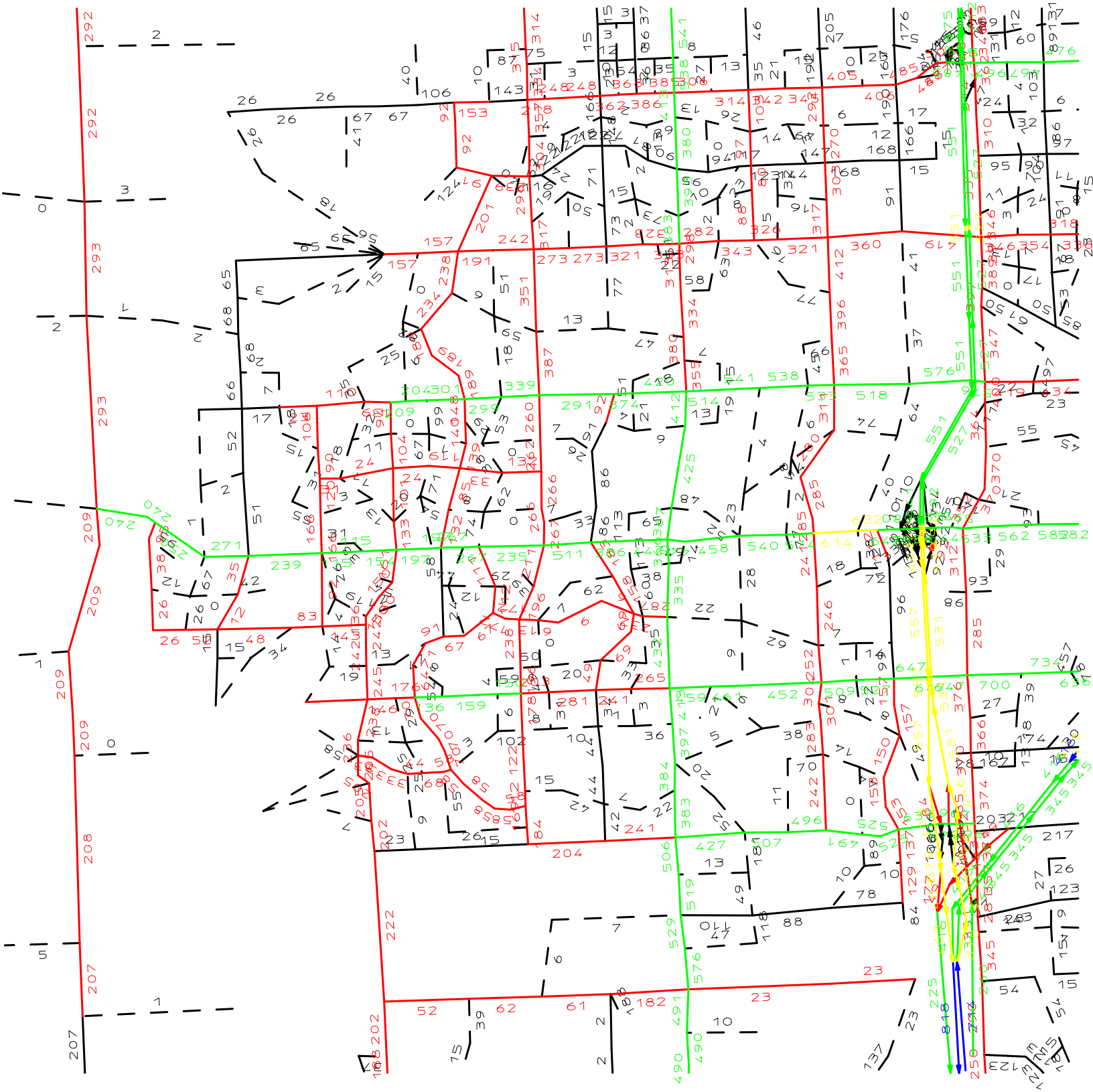


Figure 3B
FSUTMS Modeling - 2015 Total Traffic with Project at 670,834 SF of Retail Use
2007 Brown CDMP Amendment
August 2007

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# APPENDIX E

Fiscal Impact Analysis

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# Fiscal Impacts
# On Infrastructure and Services

On October 23, 2001, the Board of County Commissioners adopted Ordinance No. 01-163 requiring the review procedures for amendments to the Comprehensive Development master Plan (CDMP) to include a written evaluation of fiscal impacts for any proposed land use change. The following is a fiscal evaluation of Application No. 8 to amend the CDMP from county departments and agencies responsible for supplying and maintaining infrastructure and services relevant to the CDMP. The evaluation estimates the incremental and cumulative costs of the required infrastructure and service, and the extent to which the costs will be borne by the property owners or will require general taxpayer support and includes an estimate of that support.

The agencies use various methodologies for their calculations. The agencies rely on a variety of sources for revenue, such as, property taxes, impact fees, connection fees, user fees, gas taxes, taxing districts, general fund contribution, federal and state grants; federal funds, etc. Certain variables, such as property use, location, number of dwelling units, and type of units were considered by the service agencies in developing their cost estimates.

## Solid Waste Services

### Concurrency

Since the DSWM assesses capacity system-wide based, in part, on existing waste delivery commitments from both the private and public sectors, it is not possible to make determinations concerning the adequacy of solid waste disposal facilities relative to each individual application. Instead, the DSWM issues a periodic assessment of the County's status in terms of 'concurrency' – that is, the ability to maintain a minimum of five (5) years of waste disposal capacity system-wide. The County is committed to maintaining this level in compliance with Chapter 163, Part II F.S. and currently exceeds that standard by nearly four (4) years.

### Residential Collection and Disposal Service

The incremental cost of adding a residential unit to the DSWM Service Area, which includes the disposal cost of waste, is offset by the annual fee charges to the user. Currently, that fee is $439 per residential unit. For a residential dumpster, the current fee is $339. The average residential unit currently generates approximately 3.0 tons of waste annually, which includes garbage, trash, and recycled waste.

As reported in March 2007 to the State of Florida, Department of Environmental Protection, for the fiscal year ending September 30, 2006, the full cost per unit of

providing waste Collection Service was $437 including disposal and other Collections services such as, illegal dumping clean-up and code enforcement.

**Waste Disposal Capacity and Service**

The users pay for the incremental and cumulative cost of providing disposal capacity for DSWM Collections, private haulers, and municipalities. The DSWM charges a disposal tipping fee at a contract rate of $56.05 per ton to DSWM Collections and to those private haulers and municipalities with long term disposal agreements with the Department. For non-contract haulers, the rate is $73.90. These rates adjust annually with the Consumer Price Index. In addition, the DSWM charges a Disposal Facility Fee to private haulers equal to 15 percent of their annual gross receipts, which is targeted to ensure capacity in operations. Landfill closure is funded by a portion of the Utility Service Fee charged to all retail and wholesale customers of the County's Water and Sewer Department.

## Water and Sewer

The Miami-Dade County Water and Sewer Department provides for the majority of water and sewer service throughout the county. The cost estimates provided herein are preliminary and final project costs will vary from these estimates. The final costs for the project and resulting feasibility will depend on actual labor and material costs, competitive market conditions, final project scope implementation schedule, continuity of personnel and other variable factors. The water impact fee was calculated at a rate of $1.39 per gallon per day (gpd), and the sewer impact fee was calculated at a rate of $5.60 per gpd. The annual operations and maintenance cost was based on $1.0628 per 1,000 gallons for the water and $1.4797 per 1,000 gallons for the sewer. The connection fee was based on providing a 1-inch service line and meter. Assuming Application No. 8 is built at 670,924 sq. ft. of Commercial/Retail (maximum development allowed under the proposed re-designation of "Business and Office", which would generate the greatest water and sewer demand), the fees paid by the developer would be $93,245 for water impact fee, $375,661 for sewer impact fee, $1,300 per unit for connection fee, and $62,253 for annual operating and maintenance costs based on approved figures through September 30, 2006.

## Flood Protection

The Department of Environmental Resource Management (DERM) is restricted to the enforcement of current stormwater management and disposal regulations. These regulations require that all new development provide full on-site retention of the stormwater runoff generated by the development. The drainage systems serving new developments are not allowed to impact existing or proposed public stormwater disposal systems, or to impact adjacent properties. The County is not responsible for providing flood protection to private properties, although it is the County's responsibility to ensure and verify that said protection has been

incorporated in the plans for each proposed development. The above noted determinations are predicated upon the provisions of Chapter 46, Section 4611.1 of the South Florida Building Code; Section 24-58.3(G) of the Code of Miami-Dade County, Florida; Chapter 40E-40 Florida Administrative Code, Basis of Review South Florida Water Management District (SFWMD); and Section D4 Part 2 of the Public Works Manual of Miami-Dade County. All these legal provisions emphasize the requirement for full on-site retention of stormwater as a post development condition for all proposed commercial, industrial, and residential subdivisions.

Additionally, DERM staff notes that new development, within the urbanized area of the County, is assessed a stormwater utility fee. This fee commensurate with the percentage of impervious area of each parcel of land, and is assessed pursuant to the requirements of Section 24-61, Article IV, of the Code of Miami-Dade County. Finally, according to the same Code Section, the proceedings may only be utilized for the maintenance and improvement of public storm drainage systems.

Based upon the above noted considerations, it is the opinion of DERM that Ordinance No. 01-163 will not change, reverse, or affect these factual requirements.

**Public Schools**

Application No. 8 will result in 159 additional students. The average cost for K-12 grade students amounts to $6,549 per student. The total annual operating cost for additional students residing in this development, if approved, would total $1,041,291. Based on the State's July 2007 student station cost factors, capital costs for the estimated additional students to be generated by the proposed development are:

| School | Number of Additional Students | Capital Costs | Total |
|---|---|---|---|
| Christina M. Eve Elementary | 76 | $18,549 | $1,409,724 |
| Hammocks Middle | 35 | $20,031 | $701,085 |
| Felix Varela Senior | 48 | $26,019 | $1,248,912 |

**Total Potential Capital Cost: $3,359,721**

## Fire Rescue

The property's current "Agriculture" land designation will allow a potential development on the application area to generate a total of 2.24 alarms annually; the proposed "Business and Office" land use designation will allow a potential development that is anticipated to generate 199.23 alarms annually, thus, severely impacting existing fire rescue services. Furthermore, the application site is located outside the UDB; an increase in the number of alarms will affect not only fire rescue service delivery, but response time as well. There are no planned fire station facilities near the application site to mitigate this impact.

According to 2006 Fire Rescue data, the cost per alarm is estimated at $1,302, which translates to a fiscal impact of $259,397 to the County. Property assessment for the application site is estimated at $54,643,764; thus, Fire Rescue tax revenue is estimated at $142,566 (Based on 2006 millage of 2.609); as a result, estimated tax revenues would fall behind total fiscal impact by $116,832 annually. The required fire flow for the proposed CDMP land use designation is 2,000 gallons of water per minute (gpm) at 20 pounds per square inch (psi). Each fire hydrant requires delivering no less than 750 gpm.

# APPENDIX F

Proposed Declaration of Restrictions

The applicant submitted a Declaration of Restrictions confirming the applicant's voluntary agreement to prohibit residential development of the subject property should this CDMP land use amendment application is ultimately approved.

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**This instrument was prepared by:**

**Name: Chad Williard, Esq.**
**Address: 999 Ponce de Leon Blvd**
**Suite 1000**
**Coral Gables, Florida 33134**
**305.444.1500**

DRAFT

**(Space reserved for Clerk)**

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# DECLARATION OF RESTRICTIONS

*WHEREAS*, the undersigned Owner holds the fee simple title to the land in Miami-Dade County, Florida, described in Exhibit "A," attached hereto, and hereinafter called the "Property," which is supported by the attorney's opinion, and

*WHEREAS*, the Property is the subject of Comprehensive Development Master Plan Amendment Application No. ____ of the April 2007 Amendment Cycle, seeking a change from "Agriculture" to "Business & Office" (the "CDMP Application");

*WHEREAS*, the intent of the Applicant is to seek approval of the "Business & Office" designation for the Property and intends, subject to the terms and conditions set forth below, to develop the Property with non-residential uses (e.g., commercial/retail).

*IN ORDER TO ASSURE* the **County** that the representations made by the Owner during consideration of the Application will be abided by the Owner freely, voluntarily and without duress makes the following Declaration of Restrictions (the "Declaration") covering and running with the Property:

**Prohibition on Residential Uses.** The Owner agrees, subject to the approval of the CDMP Application, to develop the Property with non-residential uses.

**County Inspection.** As further part of this Declaration, it is hereby understood and agreed that any official inspector of Miami-Dade County, or its agents duly authorized, may have the privilege at any time during normal working hours of entering and inspecting the use of the premises to determine whether or not the requirements of the building and zoning regulations and the conditions herein agreed to are being complied with.

**Covenant Running with the Land.** This Declaration on the part of the Owner shall constitute a covenant running with the land and may be recorded, at Owner's expense, in the public records of Miami-Dade County, Florida and shall remain in full force and effect and be binding upon the undersigned Owner, and their heirs, successors and assigns until such time as the same is modified or released. These restrictions during their lifetime shall be for the benefit of, and limitation upon, all present and future owners of the real property and for the benefit of Miami-Dade County and the public welfare. Owner, and their heirs, successors and assigns, acknowledge that acceptance of this Declaration does not in any way obligate or provide a limitation on the County.

**Term.** This Declaration is to run with the land and shall be binding on all parties and all persons claiming under it for a period of thirty (30) years from the date this Declaration is recorded after which time it shall be extended automatically for successive periods of ten (10) years each, unless an instrument signed by the, then, owner(s) of the Property has been recorded agreeing to change the covenant in whole, or in part, provided that the Declaration has first been modified or released by Miami-Dade County.

**Modification, Amendment, Release.** This Declaration of Restrictions may be modified, amended or released as to the land herein described, or any portion thereof, by a written instrument executed by the, then, owner(s) of all of the Property, including joinders of all mortgagees, if any, provided that the same is also approved by the Board of County Commissioners or Community Zoning Appeals Board of Miami-Dade County, Florida, whichever by law has jurisdiction over such matters, after public hearing.

Should this Declaration of Restrictions be so modified, amended or released, the Director of the Miami-Dade County Department of Planning and Zoning, or the executive officer of the successor of such Department, or in the absence of such director or executive officer by his assistant in charge of the office in his absence, shall forthwith execute a written instrument effectuating and acknowledging such modification, amendment or release.

**Enforcement**. Enforcement shall be by action against any parties or person violating, or attempting to violate, any covenants. The prevailing party in any action or suit pertaining to or arising out of this declaration shall be entitled to recover, in addition to costs and disbursements allowed by law, such sum as the Court may adjudge to be reasonable for the services of his attorney. This enforcement provision shall be in addition to any other remedies available at law, in equity or both.

**Authorization for Miami-Dade County to Withhold Permits and Inspections**. In the event the terms of this Declaration are not being complied with, in addition to any other remedies available, the County is hereby authorized to withhold any further permits, and refuse to make any inspections or grant any approvals, until such time as this declaration is complied with.

**Election of Remedies.** All rights, remedies and privileges granted herein shall be deemed to be cumulative and the exercise of any one or more shall neither be deemed to constitute an election of remedies, nor shall it preclude the party exercising the same from exercising such other additional rights, remedies or privileges.

**Presumption of Compliance**. Where construction has occurred on the Property or any portion thereof, pursuant to a lawful permit issued by the County, and inspections made and approval of occupancy given by the County, then such construction, inspection and approval shall create a rebuttable presumption that the buildings or structures thus constructed comply with the intent and spirit of this Declaration.

**Severability**. Invalidation of any one of these covenants, by judgment of Court, shall not affect any of the other provisions which shall remain in full force and effect. However, if any material portion is invalidated, the County shall be entitled to revoke any approval predicated upon the invalidated portion

**Recording**. This Declaration shall be filed of record in the public records of Miami-Dade County, Florida at the cost of the Owners following the approval of the Application. This

Declaration shall become effective immediately upon recordation. Notwithstanding the previous sentence, if any appeal is filed, and the disposition of such appeal results in the denial of the Application, in its entirety, then this Declaration shall be null and void and of no further effect. Upon the disposition of an appeal that results in the denial of the Application, in its entirety, and upon written request, the Director of the Planning and Zoning Department or the executive officer of the successor of said department, or in the absence of such director or executive officer by his/her assistant in charge of the office in his/her absence, shall forthwith execute a written instrument, in recordable form, acknowledging that this Declaration is null and void and of no further effect.

**Acceptance of Declaration.** Acceptance of this Declaration does not obligate the County in any manner, nor does it entitle the Owner to a favorable recommendation or approval of any application, zoning or otherwise, and the Board of County Commissioners and/or any appropriate Community Zoning Appeals Board retains its full power and authority to deny each such application in whole or in part and to decline to accept any conveyance or dedication.

**Owner.** The term Owner shall include the Owner, and its heirs, successors and assigns.

[Execution Pages Follow]

Signed, witnessed, executed and acknowledged this _____ day of _____2008.

Witnesses:



_____

Print Name:_____

_____
Sam Bloom

_____

Print Name:_____

STATE OF FLORIDA
COUNTY OF MIAMI-DADE

The foregoing instrument was acknowledged before me this _____ day of _____ 2008 by Sam Bloom, who is personally known to me or produced _____ as identification.

_____
Notary Public, State of Florida
at large
My Commission Expires

Witnesses:



_____

Print Name:_____

_____
Roberta Bloom

_____

Print Name:_____

STATE OF FLORIDA
COUNTY OF MIAMI-DADE

The foregoing instrument was acknowledged before me this _____ day of _____ 2008 by Roberta Bloom, who is personally known to me or produced _____ as identification.

_____
Notary Public, State of Florida
at large
My Commission Expires

Witnesses:

NEWEST KENDALL, LLC

DRAFT

By: _____

Print Name: _____

Title: _____

_____

Print Name: _____

_____

Print Name: _____

STATE OF FLORIDA
COUNTY OF MIAMI-DADE

The foregoing instrument was acknowledged before me this _____ day of _____ 2008 by _____, as _____ of Newest Kendall, LLC, who is personally known to me or produced _____ as identification.

_____

Notary Public, State of Florida
at large
My Commission Expires

# APPENDIX G

Photos of Application and Surroundings

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STATE FARM
CHINA STAR

# MIAMI-DADE COUNTY
# COMPREHENSIVE DEVELOPMENT MASTER PLAN
# APRIL 2007-2008 AMENDMENT CYCLE

Application of
David Brown, Steven Brown and Victor Brown
for 38.5 Net Acres lying
South of North Kendall Drive and West of SW 167 Avenue

## STUDY OF COMPARATIVE WATER USES

May 23, 2007

**LUDOVICI & ORANGE CONSULTING ENGINEERS, INC.**
329 PALERMO AVENUE • CORAL GABLES • FLORIDA 33134 • 305/448-1600 • FAX 305/446-3876

# STUDY OF COMPARATIVE WATER USES

## Contents

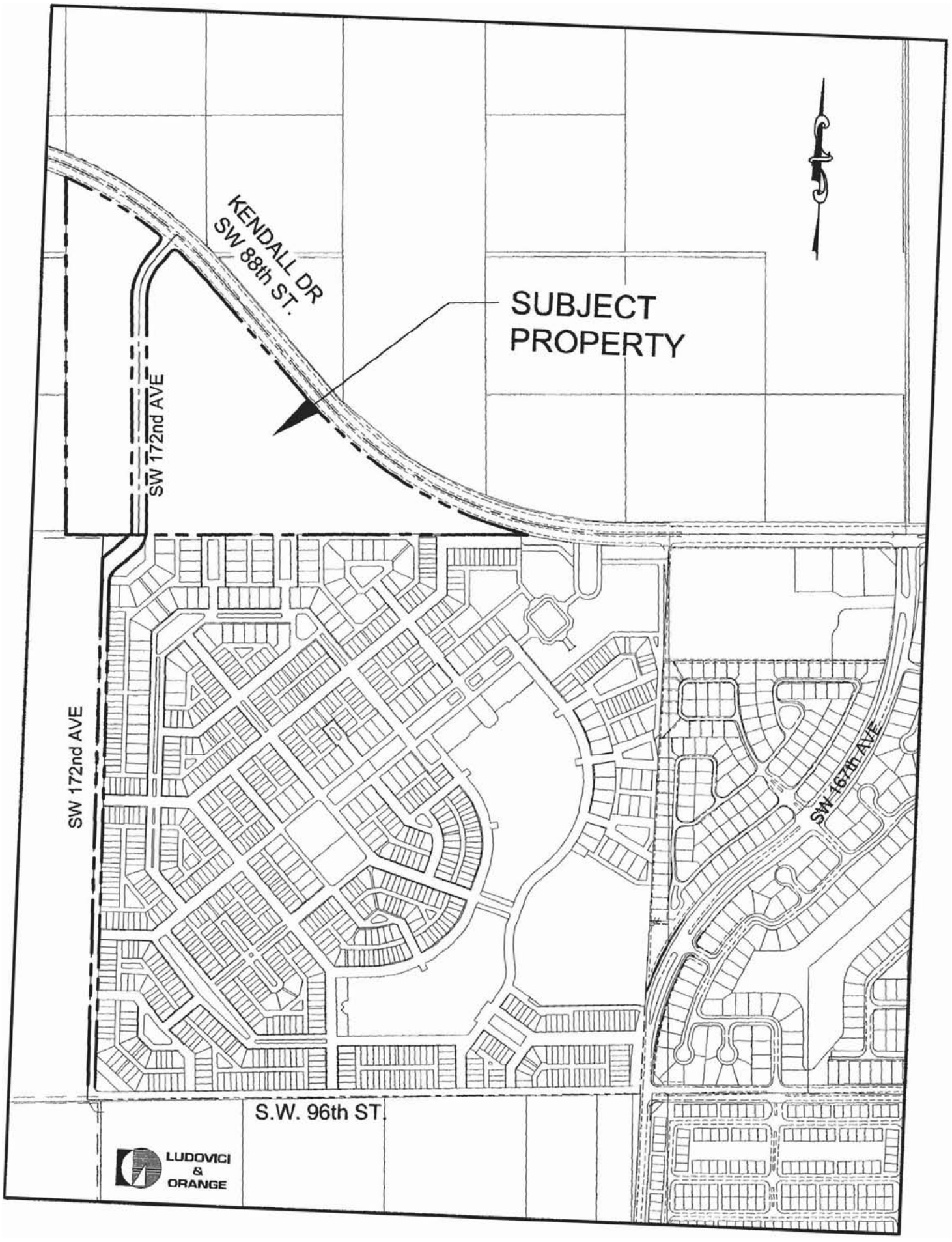
# STUDY OF COMPARATIVE WATER USES

## Description of Study

The subject application for land use plan amendment (the "Application") consists of 38.5 net acres immediately west of SW 167 Avenue and lying between Kendall Drive and the Kendall Commons TND development (aka, Vizcaya). The site is depicted in the sketch following. The Application proposes that the property be redesignated on the 2015/2025 Land Use Plan Map from "Agriculture" and "2015 Expansion Area Boundary" to "Business and Office".

Regional water managers have publicly expressed great concern regarding the South Florida's water supply. At present, the region is in a period of drought. The South Florida Water Management District has responded by imposing mandatory water use restrictions, particularly as to the frequency and duration of irrigation. Miami-Dade County is operating under "Phase II" restrictions.

The purpose of this Study is to compare historical water uses under the current land use designation with water uses anticipated in the future under the proposed land use plan amendment.


KENDALL DR
SW 88th ST.
SUBJECT
PROPERTY
SW 172nd AVE
SW 172nd AVE
SW 167th AVE
S.W. 96th ST.
LUDOVICI
&
ORANGE

# STUDY OF COMPARATIVE WATER USES

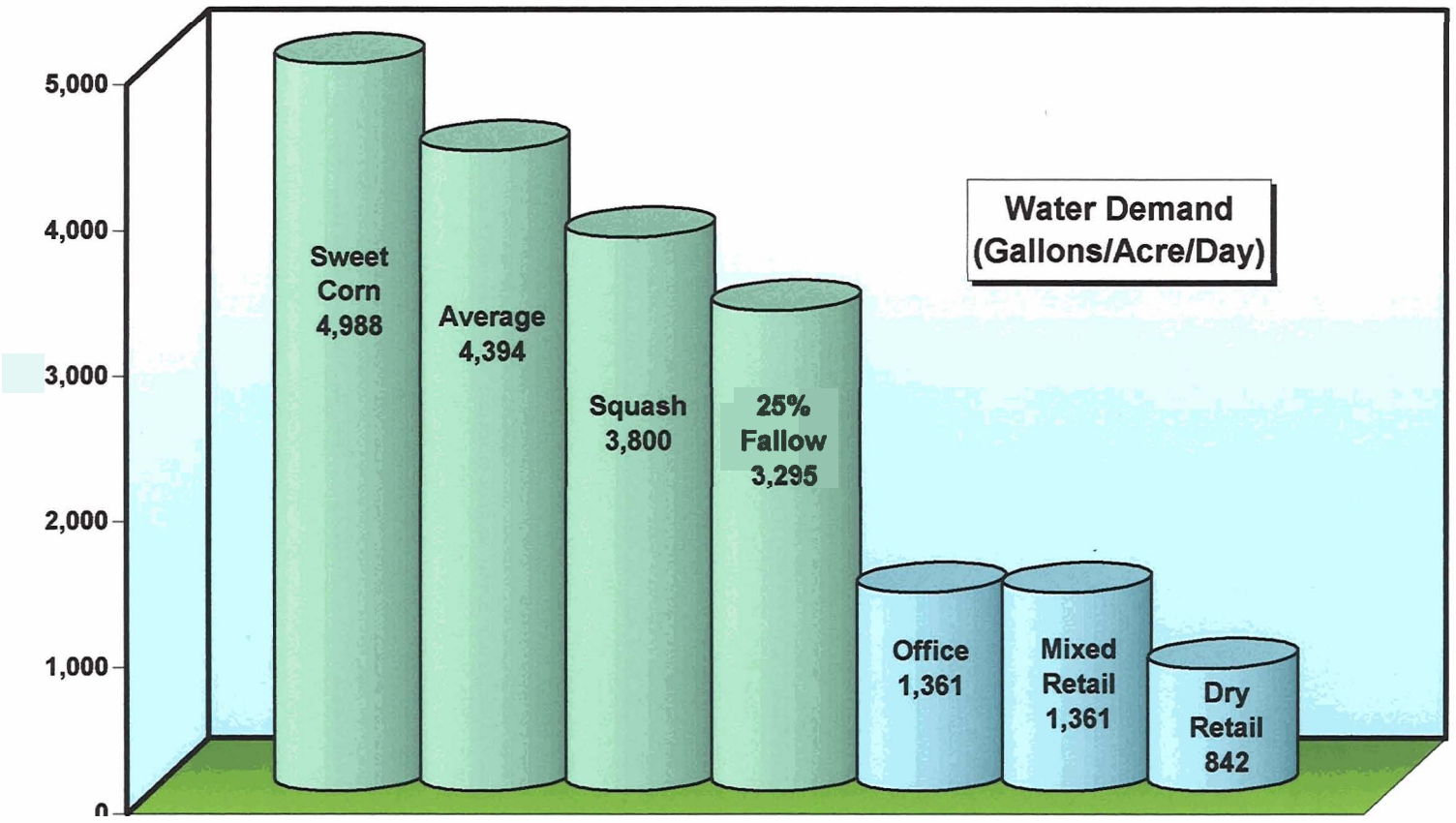
## Summary of Findings

We have analyzed historical and projected flows for the site and we conclude that the use(s) of the property under the proposed land use plan amendment will require significantly less water withdrawal from the Miami-Dade's Biscayne Aquifer than the current Master Planned use. Calculations presented in this Study show the reduction to be approximately 50%.

The site has historically been used to grow row crops, most recently sweet corn and squash. According to research conducted by the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS), these crops demand an average of 4,400 gallons per acre per day of irrigation water. If, at any given time, 25% of the land is presumed to lie fallow, the irrigation demand for the entire site drops to an average of 3,300 gallons per acre per day. This water is obtained solely by withdrawal from the Biscayne Aquifer through shallow wells.

The projected office and retail uses require only 1,361 gallons per acre per day, or less, depending on the mix of uses. This estimate includes water for irrigation of all commercial open spaces using conventional above-grade sprinkler systems.

# Miami-Dade County CDMP Amendment - April 2007 Cycle
# Application of David, Steven and Victor Brown



## APPLICATION OF DAVID, STEVEN AND VICTOR BROWN

## CHART OF WATER DEMANDS UNDER PRESENT AND FUTURE USES

Irrigation Requirement = Crop Water Requirement ÷ Application Efficiency
Application Efficiency = 60% to 80% for overhead application (use 80% to be conservative)
Crop Water Requirement = Baseline Evapotranspiration Rate (Eto) x Crop Coefficient (Kc)
Baseline Eto for Miami = 0.10 to 0.19 inches per day (2,720 to 5,160 gallons per day per acre)
(Use 0.14, or 3,800 gallons, per Dr. Yuncong Li)

| Agricultural Uses | Kc | Application Efficiency | Crop Water Requirement | Irrigation Requirement |
|---|---|---|---|---|
| Sweet Corn | 1.05 | 0.80 | 3,990 gal/ac/day | 4,988 gal/ac/day |
| Squash | 0.80 | 0.80 | 3,040 gal/ac/day | 3,800 gal/ac/day |
| Average | 0.93 | 0.80 | 3,515 gal/ac/day | 4,394 gal/ac/day |
| 25% Fallow | 0.69 | 0.80 | 2,636 gal/ac/day | 3,295 gal/ac/day |

| Commercial Uses | Potable Water Consumption Rate | Average SF per Acre | Water Supply Requirement | Water Requirement Including Irrigation |
|---|---|---|---|---|
| Office | 10 gal/day/100 sf | 10,390 sf | 1,039 gal/ac/day | 1,361 gal/ac/day |
| Mixed Retail | 10 gal/day/100 sf | 10,390 sf | 1,039 gal/ac/day | 1,361 gal/ac/day |
| Dry Retail | 5 gal/day/100 sf | 10,390 sf | 519 gal/ac/day | 842 gal/ac/day |
| Irrigation | 0.50 in/week | 7,241 sf | 322 gal/ac/day | |

**Notes:**

- Assumed Commercial square footage is the DRI threshold maximum of 400,000 sf / 38.5 acres
- Commercial open space requiring irrigation is assumed to be 20% of the developable site area, which is assumed to be the net land area, less 1.5 acres for SW 172 Avenue and 5 acres lake or preserve area.
- Mixed retail includes typical shopping center uses including grocery, restaurants and other heavy water users

**SUMMARY**

| Land Use | Water Supply Demand |
|---|---|
| Sweet Corn | 4,988 |
| Squash | 3,800 |
| Average | 4,394 |
| 25% Fallow | 3,295 |
| Office | 1,361 |
| Mixed Retail | 1,361 |
| Dry Retail | 842 |

# STUDY OF COMPARATIVE WATER USES

## Agricultural Water Uses

Recent crops

- A site investigation report by Miller-Legg dated April 2005 identified that the site contained row crops of corn and squash.
- A site inspection by John Hall of Ludovici & Orange Consulting Engineers in March 2006 confirmed the presence of both squash and corn crops.
- Don Pybas and Teresa Olczyk of the Miami-Dade County Extension office each confirmed in phone conversations with John Hall that squash and corn are typical row crops grown in the area.

Crop coverage

- The landowner has informed us that the entirety of the site customarily has been leased for farming activities.
- The 2001 County aerial photograph following clearly depicts the entirety of the site, with the exception of the area of natural vegetation in the southwest corner, under cultivation.
- Good farming practice dictates that the land lie fallow for a season, typically 25% of the year if the owner/farmer desires to maximizing production. Well managed farms plant a cover crop during the fallow season, which for row crops is usually during the summer months. Cover crops require water for preparation and establishment of the plants, and perhaps supplemental irrigation during dry periods.
- Nursery plants are grown and watered year round and use considerably more water than row crops. Hibiscus plants, for instance, are watered daily.

UF/IFAS Research on Irrigation Requirements

- The University of Florida Institute of Food and Agricultural Services (UF/IFAS) has conducted research on best management practices for water conservation in crop irrigation for over a decade.

- The purpose of the UF/IFAS research is to determine optimal water requirements so that water is applied "only when needed and only in the amount needed" (BUL249). The research has resulted in Irrigation scheduling and water budgeting recommendations.

# STUDY OF COMPARATIVE WATER USES

UF/IFAS Irrigation Formulas

***Irrigation requirement (IR) = Crop water requirement (ETc) / Application Efficiency (Ea)***

where, ***Ea*** *varies from 60% to 80% for overhead application (required for corn and standard practice for squash). We will use the highest efficiency in the range, 80%, which will result in a conservatively LOW water use rate for comparison.*

***Crop water requirement (ETc) = Crop coefficient (Kc) x Reference Evapotranspiration (ETo)***

where, ***ETo*** *for Miami varies through the year from 0.10 (January) to 0.19 (May) inches/day. Weighted annual average is 0.15. We will use 0.14 to be slightly conservative.*

**Kc** *varies based on type of crop and growth stage and varies from 0.70 to 1.10 for squash and corn. The average value for squash is 0.80. The average for corn is 1.05.*

Water Uses included in UF/IFAS Formula

- The ***Irrigation requirement*** includes only water required to maintain a healthy crop, plus water lost due to evaporation and transpiration of water through plant leaves.
- The ***Irrigation requirement*** does not include water applied in excess of that needed for crop requirements. That is, it only includes water lost to the atmosphere or used by the plant. it does not include water that would run off or seep through the soil and return to groundwater.
- The ***Irrigation requirement*** does not include water for preparation of fields, fertigation, chemigation, irrigation system maintenance, dust control, frost protection or stabilization of driving surfaces.
- As a result, the UF/IFAS Formula will underestimate the total water required for maintenance of a productive farm.

Calculation for Squash

- ***Crop water requirement (ETc)*** = ***0.80 x 0.14***
  = ***0.11 in/day***
  = ***3,040 gallons/day/acre***
- ***Irrigation requirement (IR)*** = ***3,040 / 0.80***
  = ***3,800 gallons/day/acre***

# STUDY OF COMPARATIVE WATER USES

Calculation for Sweet Corn

- ***Crop water requirement (ETc)*** = ***1.05 x 0.14***
  = ***0.15 in/day***
  = ***3,990 gallons/day/acre***
- ***Irrigation requirement (IR)*** = ***3,990 / 0.80***
  = ***4,988 gallons/day/acre***

Average for Sweet Corn and Squash

- ***Irrigation requirement (IR)*** = ***(3,800 + 4,988)/2***
  = ***4,394 gallons/day/acre***

25% Reduction for Fallow Season

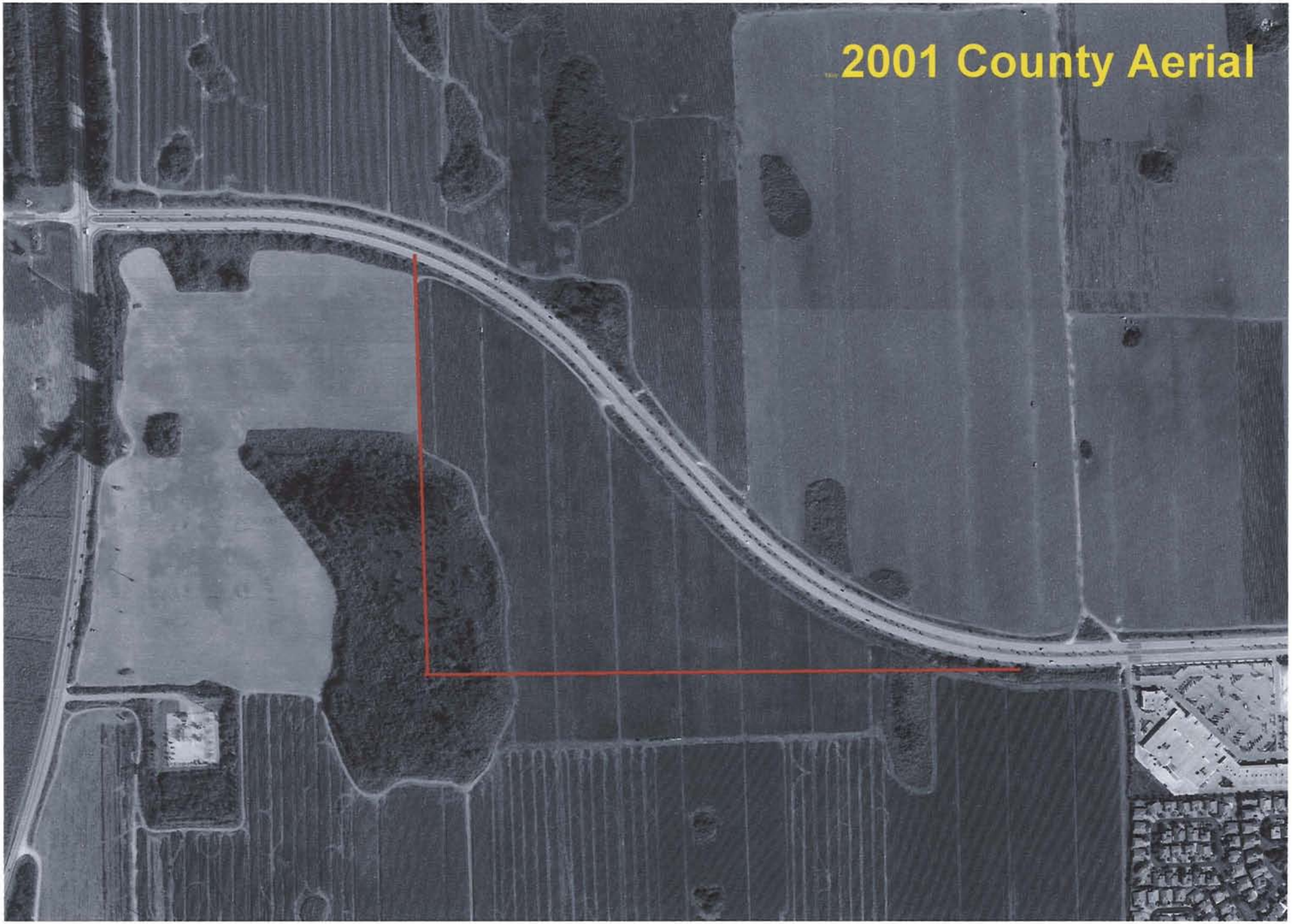
- ***Irrigation requirement (IR)*** = ***0.75 x 4,394***
  = ***3,295 gallons/day/acre***

Current Code-Allowed Residential Use

- The Miami-Dade County Zoning Code currently allows a residential use on the property of one house per 5 acres, inclusive of abutting rights-of-way. As such, the current zone would allow 8 residential units.
- Single Family Residential uses require 350 gallons per day per Miami-Dade County Code Sec 24-43.1

  ***350 gal/unit/day x 8 units*** = ***2,800 gal/day***
  = ***72.7 gal/ac/day (at 38.5 acres)***

  The remainder of the 5-acre lot is likely to be used as either lawn area, or to be farmed. In either case, irrigation will be required.
- The typical lot area, net of the roadways, preserves and lakes considered above, would 4.0 acres. If the total area of house, drive, patios, pools and walks averages 10,000 sf, the remaining lot will comprise approximately 3.75 acres.
- ***3.75 ac x 8 lots*** = ***33.0 acres to be irrigated***
- ***Irrigation requirement*** = ***33.0 ac x 0.5 in/week***
  = ***448,015 gallons/week***
  = ***64,002 gallons/day***
  = ***1,662 gal/ac/day (at 38.5 acres)***
- ***Total residential requirement*** = ***72.7 gpd/ac + 1,662 gpd/ac***
  = ***1,735 gpd/ac***


2001 County Aerial

# STUDY OF COMPARATIVE WATER USES

## Commercial Water Uses

Site Use Data

- There is no proposed site plan. The applicant anticipates retail uses, with the possibility of some office uses.
- The site area net of Kendall Drive right-of-way is 38.5 acres. The area net of the proposed alignment of SW 172 Avenue is 36.2 acres (inclusive of lakes, retention areas and the like). With a typical 20% building coverage, the total building area will be 315,000 sf.
- The threshold for a DRI for commercial uses is 400,000 sf of building area.
- To be conservative, use 400,000 sf to determine water supply demands.

Retail Use Water Supply Demand Rates

- Dry retail uses require 5 gallons per 100 sf of building area per Miami-Dade County Code Sec 24-43.1

  ***400,000 sf x 5 gpd/100 sf = 20,000 gal/day***

  ***= 520 gal/day/acre (at 38.5 ac)***

- Commercial centers may contain higher water users such as grocery stores, restaurants, bakeries, hair salons, etc. A typical commercial center will average approximately double the dry retail rate, or 10 gallons per 100 sf of building area.
- If the entire 400,000 sf is developed as a commercial center, the typical water supply demand would be:

  ***400,000 sf x 10 gpd/100 sf = 40,000 gal/day***

  ***= 1,039 gal/day/acre (at 38.5 ac)***

Office Use Water Supply Demands

- Office uses require 10 gallons/day/100 sf of building area per Miami-Dade County Code Sec 24-43.1
- If the entire 400,000 sf were office, the water supply demand would be:

  ***400,000 sf x 10 gpd/100 sf = 40,000 gal/day***

  ***= 1,039 gal/day/acre (at 38.5 ac)***

Mixed Office and Retail Use Water Supply Demand Rates

- Both Office and Retail uses average 10 gpd/100 sf of building area, therefore a mix of these uses will generate the same flow rates as either one alone. Therefore, the analysis is not sensitive to the proposed mix.

Irrigation Demands

- The minimum landscape space required under the Miami-Dade County Zoning Code, Section 33-253.4, BU-2 zone, for a site greater than 25

acres, is 12%. This amount can be reduced to 10% if the site includes a lake. We will use 20% of the net developable area to be conservative.

- Water requirements for irrigation of typical commercial center landscaping, during dry seasons, is 1 inch per week. The average annual irrigation requirement, taking into account rainfall, is approximately one-half of this amount.

  The net area for development will exclude the right-of-way proposed for SW 172 Avenue, as well as any lake or preserve areas. SW 172 Avenue is expected to be approximately 1.5 acres. The lake and/or preserve areas are unknown but are anticipated together to comprise no less than 5 acres.

- ***38.5 ac – 1.5 ac – 5.0 ac*** = ***32.0 net developable acres***
  = ***6.4 ac to be irrigated***
- ***Irrigation requirement*** = ***6.4 ac x 0.5 in/week***
  = ***86,888 gallons/week***
  = ***12,413 gallons/day***
  = ***322 gal/ac/day (at 38.5 acres)***

**Notes from Various Research Papers on the subject of**
**Agricultural Irrigation**
**from the**
**University of Florida Institute of Food and Agricultural Sciences (IFAS)**

March 1, 2006

**"Basic Irrigation Scheduling in Florida", BUL249, February 1997**

1. Water is used by
   a. Assimilation into the plant (generally 1% or so)
   b. Evaporation from soil and plant surfaces
   c. Transpiration of water vapor from the plant
   d. Leaching of salts, crop cooling, freeze protection (NOT included in this report)
2. Water is lost in delivery by
   a. Inefficiencies in the conveyance system
   b. Wind drift
   c. Evaporation
   d. Surface runoff
   e. Percolation below the root zone
3. The gross water demand must include uses and losses
4. Water budget deals with two factors
   a. When
   b. How much

**"Principles and Practices of Irrigation Management for Vegetables", Document AE260, December 2005**

1. Uses of irrigation water
   a. Field preparation – moisture to soil for tillage and bed formation. Commonly within the range of 1 to 5 inches
   b. Crop establishment – strawberries require water every day for 10-14 days after transplant
   c. Crop growth and development
   d. Losses in water application (See 2 below)
   e. Fertigation/Chemigation
   f. System Maintenance
   g. Frost protection – for strawberries, 0.25 in/hr during freeze periods
   h. Other – dust control, traction for vehicles, etc
2. Application efficiency (Ea) – Ratio of water applied by the irrigation system to the water available to the plant for use
   a. Overhead – 60-80%
   b. Seepage – 20-70%
   c. Drip – 80-95%
3. Irrigation requirement = Crop water requirement / Ea
4. Evapotranspiration
   a. The baseline amount (ETo) for Miami amount ranges from 0.10 to 0.19 inches per day, or 2720 to 5160 gallons per day per acre.
   b. The crop coefficient (Kc) is the ratio of crop water use (ETc) to ETo.
      1) A Kc under 1.0 indicates less ET than the baseline amount
      2) A Kc over 1.0 indicates more than the baseline amount
      3) Kc for selected crops
         a) Sweet corn – 1.0 to 1.1
         b) Squash – 0.7 to 0.9
         c) Potato – 0.7 to 1.1

5. Sandy soils have limited holding capacity. Excess water is lost to percolation. Irrigation times must therefore be split. In marl soils, water is better retained so splitting may not be necessary.

**"Summer Squash Production in Miami-Dade County, Florida", HS-861, April 2002**

1. Irrigation frequencies of once or twice per week are required until 3 or 4 weeks after transplanting.
2. No irrigation water rates are stated.

**"Sweet Corn Production in Miami-Dade County, Florida", HS-862, April 2002**

1. Irrigation frequencies of 5 to 7 days are normal, with more frequent watering at certain times.
2. No irrigation water rates are stated.

**"Vegetable Growers' Water Use and Conservation Practices in Miami-Dade County, Florida", FS ABE346, December 2003**

1. 85% of the agricultural land in production has irrigation systems.
2. Drip irrigation use has increased by 50% in the past 21 years
3. Corn crops cannot use drip irrigation. Overhead irrigation is required.
4. No irrigation water rates are stated.

## John Hall

**From:** Li,Yuncong [yunli@ufl.edu]
**Sent:** Wednesday, March 01, 2006 11:23 AM
**To:** John R. Hall
**Cc:** klwhite@ufl.edu
**Subject:** RE: Comparative Water Analysis

John:

I list several articles for your references regarding irrigation for squash and sweet corn.

1. Vegetable irrigation: http://edis.ifas.ufl.edu/pdffiles/CV/CV10700.pdf

2. Summer Squash Production in Miami-Dade County, Florida: http://edis.ifas.ufl.edu/TR012

3. Sweet Corn Production in Miami-Dade County, Florida: http://edis.ifas.ufl.edu/TR013

4. Vegetable Growers' Water Use and Conservation Practices in Miami-Dade County
http://edis.ifas.ufl.edu/AE258

I can not give you one number for irrigation amount for both crops because we do not have one. Each growers also doing differently. You can read first article and calculate the number you want to use. For example:

For squash in October:

ET in Miami: 0.14 inches/day or 3800 gal/ac/day
Kc for squash stage 3: 0.8

Etcrop = Kc x Et = 0.8 x 3800 = 3040 gal/ac/day

Assume application efficiency: 80%

Irrigation requirement = 3040/0.8 = 3800 gal/ac/day. ( the amount has to be drawn from a well)

You can use same way to calculate for different month, different growth stage and various irrigation system, etc.

I am copying this email to my colleague, Dr. Kati White Migliaccio, a hydrologist and water resource management. She may provide you further information.

Please let me know if you need further help.

Regards,

Yuncong

Yuncong Li, Associate Professor
Department of Soil and Water Science
Tropical Research and Education Center
Institute of Food and Agricultural Sciences, University of Florida
18905 SW 280 Street, Homestead, FL 33031
Phone 305-246-7001 ext 282; Fax 305-246-7003
Yunli@ufl.edu; http://yuncong.ifas.ufl.edu

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**From:** John R. Hall [mailto:jrhall@ludovici-orange.com]
**Sent:** Tuesday, February 28, 2006 5:41 PM
**To:** Li,Yuncong
**Subject:** Comparative Water Analysis

Dr. Li:

I have been asked to do a comparative analysis of water use on a 40-acre site in southwest Miami-Dade County. The site is currently zoned for agricultural use. An application is in process to change the use designation to commercial. I have no problem estimating demands for the proposed commercial uses. I need your assistance with the agricultural use water requirements.

As we discussed by phone, I was told that the land has historically been used for row crops, most recently sweet corn. At some time in the past, we believe that white potatoes were grown there. After we talked, I looked at an environmental report that mentions that yellow squash is a recent crop on this site. The native soil consists of a shallow layer of marl over limerock.

I understand that your research involves best water management practices, applying proper scheduling and budgeting principles to irrigation. Although those practices are the ideal, I am interested in the water use based on typical current practices in the industry. You mentioned that a typical rate for potatoes is 3000 gallons per acre per day, but potatoes are not a high water-use crop. Given that corn and squash are the most recent crops at this site, I am interested in those consumption rates.

I understand that little of the water drawn from the ground is actually retained in the plant or fruit. The vast majority of water is lost to wind, runoff, evaporation and transpiration. I am only interested in the amount that is drawn from the ground.

Thank you for your prompt response to my call. Please let me know if there is any other information that you need from me.

John

**John R. Hall, P.E., President**
Ludovici & Orange Consulting Engineers, Inc.
329 Palermo Ave. Coral Gables, FL 33134
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any source of public water supply and a septic tank without obtaining the prior written approval of the Director of the Department of Environmental Resources Management or his designee.

The Director or his designee shall issue his written approval if the only liquid waste (excluding liquid wastes associated with the processing of agricultural produce in agricultural packing houses and liquid wastes associated with agricultural vehicle or, agricultural equipment maintenance facilities, stormwater and water used within a self-contained water recycling car wash facility, provided said facility does not backwash the recycling filters) which shall be generated, disposed of, discharged, or stored on the property shall be domestic sewage discharged into a septic tank and additionally, that the property is not within a feasible distance for public water mains and public sanitary sewers, and only:

(a) After the owner of the property (excluding property upon which an agricultural vehicle or agricultural equipment maintenance facility operates) submits to the Director or his designee a covenant running with the land executed by the owner of the property in favor of Miami-Dade County which provides that the only liquid waste (excluding liquid wastes associated with the processing of agricultural produce in agricultural packing houses and liquid wastes associated with agricultural vehicle or agricultural equipment maintenance facilities, stormwater and water used within a self-contained water recycling car wash facility, provided said facility does not backwash the recycling filters) which shall be generated, disposed of, discharged, or stored on the property shall be domestic sewage discharged into a septic tank. Said covenants shall be in a form(s) prescribed by the Director and approved by the Board of County Commissioners. The covenants shall be recorded by the Department of Environmental Resources Management at the expense of the owner of the property; and

(b) If the Director or his designee determines that the proposed nonresidential land use is in accordance with the following:

(i) Where public water is used the maximum allowable sewage loading shall be one thousand five hundred (1,500) gallons per day per unsubmerged acre, or

(ii) Where public water is not used the maximum allowable sewage loading shall be seven hundred fifty (750) gallons per day per unsubmerged acre.

In calculating the square footage of lots in Sections 24-43.1(b)(i) and (ii) above, abutting easements and rights-of-way shall be considered to the center lines thereof; and

(c) If the Director or his designee determines that the existing nonresidential land use for the property or the nonresidential land use requested for the property is served or to be served by an on site domestic well system and a septic tank and is not one (1) or more of the following nonresidential land uses:

(i) Establishments primarily engaged in the handling of food and drink except factory prepackaged products and agricultural crops,

(ii) Educational institutions,

(iii) Intermediate care facilities,

(iv) Health care facilities.

Notwithstanding the above, the Director or his designee shall approve the issuance of a building permit for the repair or maintenance of existing facilities.

(5) The following table shall be utilized by the director or his designee to determine sewage flows for sanitary sewers and the maximum allowable septic tank sewage loading requirements set forth in this chapter. If the Director or his designee receives competent factual data and information such as actual on-site measured sewage flows or actual metered water bills, the director or his designee may utilize this data and information to determine sewage flows for sanitary sewers and the maximum allowable septic tank sewage loading requirements set forth in this chapter in lieu of the table below. This table

shall not be utilized for the sizing of septic tanks. Sizing of septic tanks shall be in accordance with Florida Statutes regarding septic tanks.

*Type of Land Use, Gallons Per Day (GPD)*

*Residential Land Uses:*

Single-family residence: 350 (GPD/unit)

Townhouse residence: 250 (GPD/unit)

Apartment residence: 200 (GPD/unit)

Mobile home residence: 300 (GPD/unit)

Duplex or twin home residence: 250 (GPD/unit)

*Commercial Land Uses:*

Barbershop: 10/100 (GPD/sq. ft.)

Beauty salon or hair boutique: 75 (GPD/chair)

Bowling alley: 100 (GPD/lane)

Dentist's office:

(a) Per dentist: 250 (GPD/dentist)

(b) Per wet chair: 200 (GPD/chair)

Physician's office: (250 (GPD/physician)

Full service restaurant (350 GPD minimum): 50 (GPD/seat)

Bar or cocktail lounge: 15 (GPD/seat)

Fast food restaurant (350 GPD minimum): 35 (GPD/seat)

Take-out restaurant (350 GPD minimum); 50/100 (GPD/sq. ft.)

Hotel or motel: 100 (GPD/room)

Office building: 10/100 (GPD/sq. ft.)

Motor vehicle service station: 10/100 (GPD/sq. ft.)

Shopping center (dry uses): 5/100 (GPD/sq. ft.)

Stadium, racetrack, ballpark: 3 (GPD/seat)

Store without food service: 5/100 (GPD/sq. ft.)

Theater:

(a) Indoor auditorium: 3 (GPD/seat)

(b) Outdoor drive-in: 5 (GPD/space)

Camper or trailer park: 150 (GPD/space)

Banquet halls: 25 (GPD/seat)

Car wash:

(a) Recycling-type: 750 (GPD/bay)

(b) Hand-type: 3,500 (GPD/bay)

Coin laundries: 225 (GPD/washer)

Country clubs: 25 (GPD/member)

Funeral homes: 10/100 (GPD/sq. ft.)

Gas station/mini-mart: 450 (GPD/unit)

Health spa/gyms: 35/100 (GPD/sq. ft.)

Veterinarian's office:

(a) Per veterinarian: 250 (GPD/vet)

(b) With kennels: 30 (GPD/cage)

Kennels: 30 (GPD/cage)

Marinas: 40 (GPD/slip)

Food preparation outlets (bakeries, meat markets, commissaries - 350 GPD minimum): 50 (GPD/sq. ft.)

Pet grooming:

(a) Store space: 10/100 (GPD/sq. ft.)

(b) Per tub: 75 (GPD/tub)

*Industrial Land Uses:*

Factory without showers: 10/100 (GPD/sq. ft.)

Factory with showers: 20/100 (GPD/sq. ft.)

Airport: 5 (GPD/passenger); 10 (GPD/employee)

House of worship: 3 (GPD/seat)

Hospital: 250 (GPD/bed)

# CURRICULUM VITAE


## JOHN R. HALL, P.E.

**Ludovici & Orange Consulting Engineers**
**329 Palermo Avenue**
**Coral Gables, Florida 33134**
**(305) 448-1600**


### *REGISTRATION*

Professional Engineer - State of Florida #20701
Professional Engineer - State of North Carolina #15095 (Inactive)

### *EDUCATION*

University of Miami, Florida - BSCE 1974 (Cum Laude)
FES Certificate of Continued Professional Development (1984 to 2000)
FBPE-required Continuing Education Courses (2000-Present)

### *PROFESSIONAL EXPERIENCE*

1988 to Present: Ludovici and Orange Consulting Engineers, Inc. - President. Responsible for a wide range of business management activities including administration, business development and client relations. Serves as Project Manager for numerous project assignments.

1983 to 1988: Ludovici and Orange Consulting Engineers, Inc. - Vice President/Secretary, Project Manager. Responsible for fee proposals, professional service agreements, budgeting, scheduling, supervision of engineering production and field inspections, quality control, billing, client relations and business development. The type of projects include various civil engineering works such as subdivision planning and platting, stormwater management, roadways, drainage, water and sewer systems, and construction survey.

1978 to 1983: Ludovici and Orange Consulting Engineers, Inc. - Assistant Vice President, Project Manager. Duties and responsibilities same as above.

1975 to 1978: Ludovici and Orange Consulting Engineers, Inc. - Project Manager. Responsible for engineering design and field inspections under the supervision of a registered professional engineer.

1973 to 1975: Ludovici and Orange Consulting Engineers, Inc. - Resident Engineer/Designer. Responsible for field inspections, contractor invoice review, survey party coordination, preparation of survey computations and field design modifications for a 560 acre land development project. Design and drafting of water, sewer, paving, grading, and drainage plans. Preparation of survey sketches.

## *PROFESSIONAL AFFILIATIONS*

National Society of Professional Engineers (NSPE)
Florida Engineering Foundation (FEF)
Florida Engineering Society (FES)
Florida Institute of Consulting Engineers (FICE)
American Council of Engineering Companies (ACEC)
Professional Engineers in Private Practice (PEPP)
American Society of Civil Engineers (ASCE)
American Water Works Association (AWWA)
Engineering Ministries International (EMI)

## *PROFESSIONAL SOCIETY ACTIVITIES*

Florida Engineering Society:
- Past-President (2006-2007)
- President (2005-2006)
- President-Elect (2004-2005)
- Regional Vice President (2001-2004)
- Chairman and member of various State Committees (1978 to 1995)
- Moderator State Leadership Training Conferences (1986, 1987)
- President Miami Chapter (1984)
- Officer and Chairman of various Chapter Committees (1978 to 1986)

Vice-Chairman, Florida Engineering Foundation (1989 to 2004, 2007 designate)
Founding Member Southeast Consortium for Minorities in Engineering – Dade Chapter

## *METROPOLITAN DADE COUNTY GOVERNMENT*

South Miami-Dade Watershed Plan Advisory Committee (2001-2005)
County Manager's Office Ad-hoc Industry Task Force (1987)
Northwest Wellfield Policy Advisory Committee (1984 to 1985)
Zoning Code Advisory Subcommittee (1983 to 1994)

## *BUILDERS ASSOCIATION OF SOUTH FLORIDA*

Board of Directors (1994 to 1996)
Environmental Committee Chairman and member (1983 to present)
Public Works Subcommittee Chairman (1984)
Water and Sewer Authority Standards Task Force (1981 to 1983)

## *UNIVERSITY OF MIAMI*

College of Engineering Industry Advisory Board, Civil (1999 to 2004)
Civil and Architectural Engineering Graduates Program Speaker (2001)
College of Engineering Commencement Keynote Speaker (1998)
College of Engineering Adjunct Faculty (1989-1997)
National Alumni Association Vice President (1994 to 1998)
General Alumni Board of Directors (1987 to 2000)
College of Engineering Alumni President (1988 to 1989)
College of Engineering Board of Directors (1984, 1986)

### *STANTON MEMORIAL BAPTIST CHURCH*

Ordained Deacon (1979 to present)
Preschool Division Director & Teacher (1975 to present)
Foreman of Dominican Republic Missionary Construction Team (1997)
Church Training Director (1979 to 1981)
Chairman and member of various committees (1975 to present)

### *PUBLIC INTEREST AFFILIATIONS*

Historical Museum of South Florida (1990 to present)
National Trust for Historic Preservation (1996 to present)
National Parks and Conservation Association (1994 to present)
Tropical Audubon and National Audubon Societies (1986 to 2004)
The Nature Conservancy (1989 to present)
National Wildlife Association (1995 to present)
Fairchild Tropical Garden (2006 to present)

### *HONORS AND AWARDS*

FES State of Florida Outstanding Service to the Profession Award (1998)
University of Miami National Alumni Outstanding Service Award (1997)
FES State of Florida Fellow Award (1996)
Builders Association Member of the Month (1995)
University of Miami College of Engineering Distinguished Alumni Award (1993)
South Florida Interprofessional Council's Inaugural Professionalism Award (1990)
"Up and Comers Award" Finalist - Dade County/Engineering (1989, 1990)
FES State of Florida Engineer of the Year (1989)
FES Miami Chapter Engineer of the Year (1989)
University of Miami Iron Arrow Honor Society (1988)
FES Young Engineer of the Year - State of Florida (1986)
FES Young Engineer of the Year - Miami Chapter (1981)
Tau Beta Pi National Engineering Honor Society
NSPE and FES membership recruitment awards (1977 to 1992)
Various scholarship and scholastic awards (1970 to 1974)

### *PERSONAL*

Miami native, graduate of North Miami High School, 1970
Wife Susan is an Elementary School Teacher for Miami-Dade County Public Schools
Two grown children who are teachers

- End -

UNIVERSITY OF FLORIDA
IFAS EXTENSION

BUL249

# Basic Irrigation Scheduling in Florida [1]

A.G. Smajstrla, B.J. Boman, D.Z. Haman, F.T. Izuno, D.J. Pitts and F.S. Zazueta[2]

Proper irrigation scheduling is the application of water to crops only when needed and only in the amounts needed; that is, determining when to irrigate and how much water to apply. With proper irrigation scheduling, crop yields will not be limited by water stress from droughts, and the waste of water and energy used in pumping will be minimized. Other benefits include reduced loss of nutrients from leaching as a result of excess water applications, and reduced pollution of groundwater or surface waters from the leaching of nutrients.

Irrigation is practiced to provide water when rainfall is not sufficient or timely to meet water needs of a crop. For most agricultural crops, yield or quality reductions result from water stress. Therefore, if water is available and if it is relatively low in cost, as is the case in Florida, irrigations are normally scheduled to avoid plant water stress.

Despite Florida's large average rainfall of 5260 inches per year, irrigation is practiced extensively. Irrigation is necessary because of the nonuniform distribution of rainfall, the very limited water-holding capacities of typical sandy soils, and the extreme sensitivity of many specialty crops to water stress. These factors and the economic losses from under-or-over-irrigation require that irrigations be scheduled as efficiently as possible.

This publication discusses irrigation scheduling for crops grown on typical Florida deep sandy soils so that shallow water tables do not contribute to crop water use. Thus, irrigation events must periodically occur to replenish water in the crop root zone. Water budgeting for water table management on poorly drained soils, called subirrigation or seepage irrigation, is discussed in IFAS Extension Circular 769, "Water Budgeting for High Water Table Soils", available from IFAS County Extension Offices. In seepage irrigation, water is applied to maintain a high water table just below the crop root zone.

## DETERMINING WHEN TO IRRIGATE

Because the objective of irrigation is to maintain a favorable plant water environment for crop growth, the plants themselves are the best indicators of the need for irrigation. Instrumentation exists which could allow an irrigator to measure plant water status and to anticipate water stress. However, such instrumentation is expensive, requires special

1. This document is BUL249, one of a series of the Agricultural and Biological Engineering Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date February, 1997. Reviewed July, 2002. Visit the EDIS Web Site at http://edis.ifas.ufl.edu.

2. Water Mgt. Specialist, Ag. & Biol. Eng. Dept., Univ. Fla, Gainesville; Citrus Irr. Specialist, Ag. Res. & Educ. Center, Ft. Pierce; Water Mgt. Specialist, Ag. & Biol. Eng. Dept., Univ. Fla., Gainesville; Water Mgt. Specialist, Everglades Res. & Educ. Center, Belle Glade; Water Mgt. Specialist, Southwest Fla. Res. & Educ. Center, Immokalee, and Water Mgt. Specialist, Ag. & Biol. Eng. Dept., Univ. Fla., Gainesville, respectively. Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

training for use, and is primarily used only for research purposes. Commercial field scale use of such instruments is generally not practical.

Another indicator of plant water stress is the visual appearance of the plant. Unfortunately, however, yield reduction has already occurred by the time most agricultural crops show wilt symptoms. Growth ceases in many crops before visual wilting occurs, and yield reduction may have occurred for some time before wilting is seen.

Finally, there are time lags associated with applying irrigation water. Because several zones might be irrigated from a single pump, many irrigation systems cannot quickly replenish water in the crop root zone. Many hours or days may be required. Therefore, the need to irrigate must be anticipated because of limitations of the irrigation system. This problem is compounded in Florida by the low water-holding capacities of most agricultural soils and by the shallow root zones of many crops.

When to irrigate can also be determined by calendar methods (for example every 5 days), by crop growth stage (for example, every 5 days during early vegetative growth stage, and every 3 days during peak growth stage), or by similar methods based on long-term average irrigation requirements. However, these methods fail to consider the effects of climatic variability on daily crop water use. Therefore, the use of long-term average values may not be adequate during periods of hot, dry days, while over-irrigation may occur during periods of cool, overcast days, especially if rainfall is not considered. Day-to-day climatic conditions are highly variable during much of the year in Florida because of cloud cover and the random nature of rainfall.

Because of the limitations of scheduling irrigations based on plant indicators, irrigations are most often scheduled based on the soil water status. Three procedures may be used: 1) a water balance procedure based on the estimated crop water use rate and soil water storage, 2) a direct measurement procedure based on instrumentation to measure the soil water status, and 3) a combination of the above two methods in which soil water status instrumentation is used with a water balance procedure. These procedures require a knowledge of the crop water requirements, effective root-zone, soil water-holding capacity, and irrigation system capabilities in order to schedule irrigations effectively.

## CROP WATER REQUIREMENTS

Water is used in a cropped field in several ways: 1) assimilation into the plant and plant fruit, 2) direct evaporation from the soil or other surfaces, 3) transpiration, which is the loss of water vapor from plant leaves, and 4) other beneficial uses such as leaching of salts, crop cooling, and freeze protection. Usually less than 1% of the water used in crop production is assimilated into the plants. Other beneficial uses (category 4 above) may be significant, but they depend on factors other than maintaining adequate soil water content, and they will not be considered in this publication.

Most of the water applied to meet the water requirements of a crop is used in evaporation and transpiration. Evaporation and transpiration are important for cooling a crop in order to maintain temperatures in the range that permits photosynthetic activity and crop growth to occur. Transpiration also helps transport nutrients into and through plants.

The combination of evaporation and transpiration is called evapotranspiration (ET). Because the amount of water assimilated by a plant is very small as compared to ET, ET is often considered to be the crop water requirement -- the amount of water required by a growing crop to avoid water stress.

Delivering water to a crop in the field results in losses which increase the amount of water that must be pumped to supply the crop water requirement. Losses may occur because of inefficiencies in the conveyance system, evaporation and wind drift (especially if water is sprayed through the air), surface runoff, or percolation below the root zone. These losses can be minimized through good management practices, but they are impossible to completely eliminate. They must be considered when determining the total (or gross) irrigation water requirement.

In humid areas such as Florida, a large part of the crop water requirement can be provided by rainfall. Effective rainfall, rainfall that is stored in the root zone and available for crop use, directly reduces the amount of water which must be pumped for irrigation.

## FIELD WATER BALANCE

The water balance of a field during and after irrigation is shown in Figure 1 . In Florida, runoff losses are normally negligible for properly designed irrigation systems because of the high infiltration rates of the sandy soils. Conveyance losses can be eliminated by delivering water to the field in pipes rather than open channels.

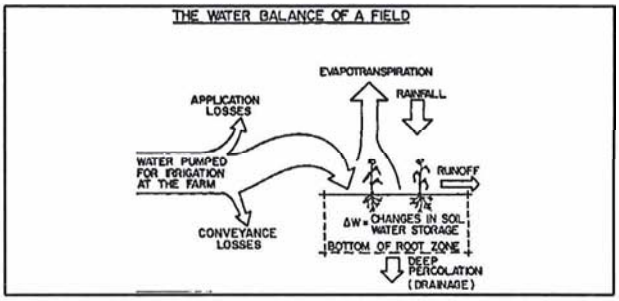



**Figure 1 .**

[redacted]including evaporation and wind drift, can occur during irrigation, especially from sprinkler irrigation systems. These losses are, however, relatively small during periods of low radiation, low wind velocities, and high humidities. Also, water which evaporates during application, or which is intercepted and later evaporates from soil, plant, or other surfaces is not entirely lost. Rather, some evaporation during application compensates for ET by reducing ET that would have occurred if the intercepted water had not evaporated.

Evaporation and wind drift [redacted] be minimized by irrigation at night, early mornings, and late afternoons when climatic conditions are not severe. However, cultural conditions such as disease must be considered for crops in which wet foliage may promote mold, fungus, bacteria, or other growths which could reduce yields. Deep percolation losses from well-designed irrigation systems can be minimized by good irrigation management. If water is applied uniformly and the water-holding capacity of a soil is not exceeded, water losses to deep percolation will be minimized. If saline water is used for irrigation, it may be necessary to leach excess salts from the crop root zone by adding water in excess of the soil water-holding capacity. However, water for leaching should be required only during extended dry periods in Florida because rainfall normally leaches salts.

If the losses shown in Figure 1 are kept to a minimum, most of the irrigation water applied will evaporate or transpire in response to the climatic demand. Unfortunately, rainfall is relatively unpredictable, and rain which immediately follows an irrigation is not very effective. Irrigation can be minimized by anticipating rainfall and providing soil storage capacity (that is, irrigating to less than field capacity to leave room for rainfall storage when the probability of rainfall is high) to increase rainfall effectiveness.

## WATER BUDGET IRRIGATION SCHEDULING

Two questions must be answered in order to schedule irrigations: 1) When to irrigate?, and 2) How much water to apply? A water budget procedure can be used to answer both questions.

From Fig. 1, the crop root zone can be visualized as a reservoir where water is temporarily stored for use by the crop. Inputs to that reservoir occur from both rainfall and irrigation. If the capacity of the soil-water reservoir (the volume of water stored in the crop root zone) and the daily rates of ET extraction from that reservoir are known, the date of the next irrigation and the amount of water to be applied can be determined. Thus, ET and soil-water storage capacity in the plant root zone are the basic information needed to use the water-budget method for irrigation scheduling.

### Understanding Evapotranspiration

Evaporation is the change of water from liquid to vapor form. Energy is required for evaporation to occur. If field surfaces, such as the leaves of well-watered plants or wet soils, are moist, the amount of water vaporizing and moving into the atmosphere in a humid region such as Florida is mainly determined by the energy available from solar

radiation. Thus, the solar radiation level is the main climatic factor that determines the ET rate, although air temperature, humidity, and wind also affect ET rates. For these reasons, ET rates are higher in summer when daily solar radiation levels and temperatures are high.

Exceptionally low relative humidity and high winds will increase ET rates above normal. Hot dry winds may raise the ET rates of isolated irrigated fields by 25 percent or more above the normal, although such periods are usually brief.

The most significant crop factors that affect ET from a well- watered crop are the crop species, the stage of growth, and the plant size or leaf area on which radiation is incident. Methods of expressing plant size and leaf area include the degree of ground cover or percent canopy coverage. ET rates are greatest when the entire soil surface is covered by the crop canopy.

Many crops do not totally shade the ground, especially during their early stages of growth, and evaporation from the dry soil surface between plants is normally low. This is especially true for sandy soils which act as a mulch to greatly reduce evaporation when the surface dries.

When the crop canopy is not complete, the ET rate is strongly influenced by the area of leaf surface that intercepts sunlight, that is, the percent of soil surface shaded by the crop. For this reason, ET for row crops during early growth stages and that of many orchards and vineyards is less than the ET that would occur from a complete canopy. As growth increases, ET reaches its maximum at nearly complete ground cover. ET measurements indicate that when the percent of ground covered by the canopy is above 60-70 percent, full ground cover and full ET rates can be assumed.

Immediately after an irrigation, evaporation from the wet soil occurs at approximately the same rate as full cover ET, but as the soil dries, rates of evaporation are quickly reduced. Thus, frequency of irrigation is important in determining evaporation losses from the soil, especially when the entire soil surface is wetted. There are both positive and negative aspects to evaporation from sandy soils-the soils are self-mulching and evaporation rates are quickly reduced when the soil surfaces dry, but, because of their low water-holding capacities, the surfaces must be wetted more frequently than those of finer-textured (heavier) soils because more frequent irrigations are required.

## Estimating Evapotranspiration

Because climatic conditions largely determine ET, various methods based on meteorological factors have been developed to estimate ET rates. A summary and discussion of several ET equations and their modifications for Florida conditions were presented by a committee of IFAS researchers (Jones et al., 1984). The ET estimation equations which can be applied on a daily basis for irrigation scheduling require inputs of measured or estimated solar radiation. The Penman equation, which is believed to be the most accurate for Florida conditions, is also mathematically complex and difficult to use manually. For this reason, computer software (Zazueta, 1990) which calculates ET from climatic and crop factors is the approach often used to solve the Penman equation.

One of the simpler methods of estimating daily ET in the field is by measuring evaporation from a free-water surface, since a correlation exists between crop ET and evaporation from free water. The standard water surface commonly used is the National Weather Service Class A evaporation pan surrounded by a well-watered short grass. The ratio between potential ET (ET for a well-watered short green grass crop) and evaporation from a well-maintained evaporation pan is typically assumed to be about 0.8 in a humid area such as Florida. Crop ET is estimated by multiplying potential ET by water use coefficients (Kc) for specific crops, growth stages, and management factors. Kc values for many crops that are grown in Florida have been published by Doorenbos and Pruitt (1977), Jones et al. (1984), and SCS (1993).

When a complete crop canopy exists, the daily ET can be estimated by multiplying the measured pan evaporation by 0.8. This procedure can be used as a "rule of thumb" if more specific crop coefficient data are not available.

## Soil-Water Storage

During irrigation, water infiltrates (penetrates) the soil surface. It is then distributed in the soil by gravity and soil capillary forces (attraction of water molecules to soil particles). As the soil becomes wetter, gravitational forces dominate and water drains downward through the soil. Drainage is rapid at first, but after one to two or three days (depending on soil type, layering, etc.) it decreases to a very small rate so that, for practical purposes, it may be neglected. At this time, soil moisture in the root zone may be considered to be in storage; it can be depleted primarily by plant transpiration or evaporation from the soil surface. This upper limit of water storage in the soil is called "field capacity" (FC). Field capacity in typical Florida sandy soils commonly occurs within one or two days after a large rainfall or irrigation because of the rapid movement of water in sandy soils.

A practical lower limit of soil water may be defined as the soil-water content below which severe crop water stress and permanent wilting occurs. This lower limit has been defined as the permanent wilting point (PWP). While plants may remove some water below this level, such extraction has little or no significance in irrigated agriculture, although it may be crucial for plant survival. In fact, yield reduction typically occurs long before PWP is reached.

The difference between FC and PWP is called the available water capacity (AWC). Table 1 presents typical values of AWC for various soil types. Most of the major irrigated soils in Florida are in the top category (sands and fine sands) in Table 1 . Local soil surveys and irrigation guides available from the Natural Resources Conservation Service, NRCS, (formerly Soil Conservation Service, SCS) provide information on specific Florida soil types. Available water capacity may also be estimated in the field by applying a known amount of water to the soil when the profile water content is near PWP, observing the volume of soil wetted, and calculating the volume of water stored per unit volume of soil.

Once AWC is known, the total depth of water available (AW), and thus the capacity of the soil-water reservoir, can be obtained by multiplying AWC by the crop effective root zone depth. For layered soils, AW is calculated by adding the multiples of AWC and depths of all soil layers contained in the crop root zone.

The effective root depths of Florida agricultural crops can be estimated from crop production guides or the SCS Florida Irrigation Guide (1982), but site specific conditions will also affect root depths. The best way to determine effective root zone depths is by digging and observing where most of the roots are located. The effective root zone is that zone where most of the roots actively involved in water uptake are located -- this is normally the upper 1 to 3 ft of the soil profile, depending on the crop being grown. In a humid area such as Florida, irrigations should be concentrated in this upper portion of the crop root zone where the great majority of the crop roots are located.

## Allowable Soil Water Depletion

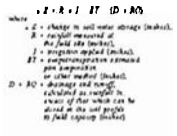
The allowable soil water depletion is the fraction of the available soil water that will be used to meet ET demands. As ET occurs, the soil water reservoir begins to be depleted. As the soil dries, the remaining water is held more tightly by capillary forces in the soil, making it more difficult for the plant to extract it. For this reason ET will start to decrease long before the PWP is reached. Since the lower ET will generally reduce yields, growers should irrigate before the root zone water content reaches a level that restricts ET.

The critical soil water depletion level depends on several factors: crop factors (rooting density and developmental stage), soil factors (AWC and effective root depth), and atmospheric factors (current ET rate). Therefore, no single level can be recommended for all situations, however, allowable depletions of 1/3 to 2/3 of the available soil water are commonly used to schedule irrigations. The smaller allowable depletions are required for sensitive crops and at critical stages of growth. The greater depletions are allowed for less sensitive crops and at less-critical growth stages. As a "Rule of Thumb", an allowable water depletion of 1/2 of AWC should be used if more specific data are not available.

## The Water Budget

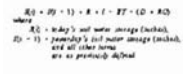
The water-budget procedure is also called a water balance or bookkeeping procedure. It is similar to keeping a bank account balance. If the balance on a starting date and the dates and amounts of deposits and withdrawals are known, the balance can be calculated at any time. Most importantly, the time when all funds (or water) would be withdrawn can be determined so that a deposit can be made to avoid an overdraft (or an irrigation can be scheduled to avoid water stress).

The water budget equation for irrigation scheduling on a daily basis can be written as shown in Equation 1 .



**Equation 1 .**

The soil water storage on any day (I) can be calculated from the soil water on the previous day (I-1), plus the rain and irrigation, and minus the ET, drainage, and runoff that occurred since the previous day as shown in Equation 2 .



**Equation 2 .**

The starting point for irrigation scheduling is often after a thorough wetting of the soil by irrigation or rainfall. This brings the soil reservoir to full capacity so that S(I) is equal to AW. If a large rain or irrigation does not occur, the initial available soil water storage must be measured or estimated.

Daily measurements or estimates of ET are subtracted from the available soil water until the soil water storage has been reduced to the allowable depletion level. At that point an irrigation should be applied with a net amount equivalent to the accumulated ET losses since the last irrigation. The soil reservoir is thus recharged to fullcapacity, and the depletion cycle begins again.

Figure 2 shows a sample of a water budget for a Florida sandy soil with a total available water depth of 1.5 inches in the plant root zone. It was assumed that a management decision was made to irrigate when 2/3 of the available soil water (1.0 inch) was depleted. In this example, that level of depletion occurred after 4 days. At that time, an irrigation should be scheduled to replenish the 1.0 inch of soil water storage that was depleted.

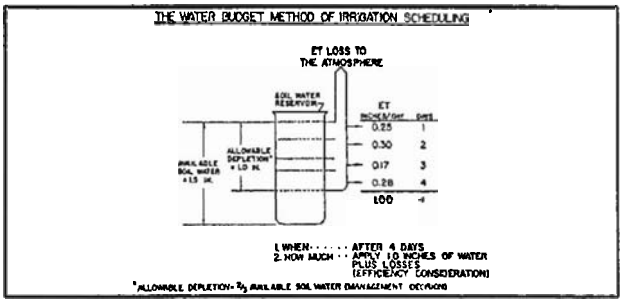



**Figure 2 .**

The water budget procedure also accounts for rainfall. Rainfall is entered into Fig. 2 in the same way as an irrigation application. That is, it refills the soil profile and raises the soil water content. If large rainfalls occur, only that portion required to restore the soil water content to field capacity will be effective. Greater amounts of rain will either run off of the soil surface or drain below the plant root zone. The management decision concerning the level of allowable water depletion (AWD) is one that must be made by each irrigation manager. The AWD will vary depending upon soil, crop, and climatic factors. Commonly it will vary during the growing season. For example, AWD may be set at 2/3 during non-critical crop growth stages, but it may be decreased to 1/3 during critical growth stages such as during fruit set. Decreasing AWD increases the frequency of irrigation (but decreases the amount per irrigation) to provide a more favorable crop root environment and reduce water stress during critical growth stages. Decreasing AWD will require larger irrigation requirements because the soil will be maintained wetter and thus rainfall will be less effective. More frequent irrigations will also increase evaporation from the soil surface.

The capacity of the root zone reservoir and allowable depletion levels can be estimated before the start of a growing season. For annual crops the capacity will change as the season progresses and as crop root zones expand. For mature perennial crops

such as citrus, the root zone may be considered to be a constant for the given soil conditions.

The soil depth to be managed for irrigation must be refined by field experience. For example, experience in many parts of the world has shown that the citrus root zone to be irrigated should be much less than the 5 to 8 ft depths to which a portion of the plant roots penetrate. Rather, the irrigated zone should be the upper 2 to 3 ft of the root zone where the majority of the roots actively involved in water uptake are located. This practice also has the advantage of allowing some soil water storage capacity for rain.

Daily ET values for specific water use periods should be estimated from pan evaporation or ET equations. If current daily ET estimates are not available, soil moisture sensors or evaporation pans can be used. The use of long-term average ET data (Smajstrla et al., 1984) will result in scheduling errors because day-to-day ET rates are highly variable. Long-term average ET data can be used as a guide for daily ET estimates, but they will need to be modified for climatic variabilities. That is, they will need to be increased during hot, dry periods, and decreased during periods of mild weather.

## SOIL-MOISTURE INDICATORS FOR IRRIGATION SCHEDULING

Devices for monitoring soil moisture have been available for many years. Among them, tensiometers are the instruments most commonly used for scheduling irrigations. Gypsum blocks are also used on a limited basis, but they are not very effective in the range required for irrigation scheduling on typical Florida sandy soils. Both of these instruments register the status of water in the soil, in terms of soil-water tension, at the depth at which the device is placed. They have the advantage of providing a direct measurement of the soil water status rather than relying upon estimates of ET to calculate the soil water content. When placed in the plant root zone, they indicate the soil water status that the plants are experiencing. Disadvantages of soil moisture sensors include their cost, labor requirements for reading and servicing, and the need for periodic calibration. They also measure soil water status at a point rather than for the whole field, thus many instruments may need to be installed to accurately represent a given field.

Details of the use, cost, advantages and disadvantages of soil moisture sensors are given in IFAS Extension Circular 532, "Measurement of Soil Water for Irrigation Management".

Details of the use of tensiometers are given in IFAS Extension Circular 487, "Tensiometers for Soil Moisture Measurement and Irrigation Scheduling", available from IFAS County Extension Offices.

When using tensiometers, no single soil-water tension level can be recommended as indicating the need for irrigation in every situation. For the same reasons that allowable soil water depletion is not constant for all crops and conditions, critical soil water tension also varies with soil and crop conditions and management objectives. The level also varies with depth of placement of the tensiometer. However, in typical Florida sandy soils, crop water stress is normally avoided when irrigations are scheduled in the range of 10-20 centibars (cb) in the upper portion of the crop root zone where most of the roots actively involved in soil water extraction are located. Lower readings should be used for crops that are more sensitive to water stress. Field experience is required to refine the interpretation of instrument readings for a given crop and management system.

Tensiometers or other soil-moisture monitoring instruments are most effectively used in combination with ET data. The instruments are read to determine when to irrigate, and the ET data are used to calculate the volume of water lost since the last irrigation. From this, the volume to be replaced can be determined.

## IRRIGATION WATER MANAGEMENT

Good on-farm water management practices include not only precise irrigation scheduling, but also knowing (or being able to accurately measure) the volume of water applied to each field. For example, if the field associated with the irrigation scheduling example in Fig. 2 was 40 acres of citrus which is irrigated with an overhead sprinkler system in 4 sets of 10 acres each, and if the application efficiency for

the overhead system was 75% (25% of the water applied is assumed to be lost to evaporation, wind drift, and nonuniform application during sprinkling), the depth of water to be pumped at each irrigation would be 1.0 inches/0.75 = 1.33 inches. The volume of water required for each 10 acre set would be 1.33 inches times 10 acres = 13.3 acre-inches or approximately 362,000 gal.

Flow meters can accurately measure irrigation water to verify that the correct amount was applied. Meters are available with registers in units of either gallons or acre-inches. Flow meters can easily pay for themselves with savings in fuel costs for irrigation pumping. More information on irrigation flow measurement is available in IFAS Extension Bulletin 207, "Agricultural Water Measurement", available through IFAS County Extension Offices.

Good farm irrigation management requires that an irrigation system be capable of applying water in sufficient quantities to meet the crop's water requirements and with high uniformity to minimize waste. Nonuniform irrigation will cause excess water to be applied in some areas while

other areas will not get enough.

Irrigation systems are more expensive if they are designed to provide a high degree of uniformity. Thus, there is a temptation to sacrifice uniformity when systems are purchased on the basis of competitive bids. The system manager should recognize that operating costs will be greater or yield losses will result when systems which apply water and chemicals nonuniformly are operated. A lower initial system cost which sacrifices uniformity of water application may be false economy. Techniques for field evaluation of the uniformity of water application by irrigation systems are available as IFAS Extension Bulletins 265 and 266, "Field Evaluation of Microirrigation Water Application Uniformity" and "Field Evaluation of Irrigation Systems: Solid Set or Portable Sprinkler Systems", respectively, available from county extension offices.

## SUMMARY

Proper irrigation scheduling will help to assure efficient use of water and energy in crop production. Irrigation scheduling methods that are currently applicable in Florida are 1) a water budget method requiring estimation of daily ET and soil water content, and 2) the use of soil moisture measurement instrumentation. Techniques for estimating ET, determining soil water storage, determining allowable water depletions, and water budgeting were described. When properly used and combined with efficient methods of water application, these techniques should also result in increased production and profits.

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**Table 1.**

**Table 1.** Available water capacity for various soil types.

| | Available Water Capacity (AWC) | |
|---|---|---|
| Type of soil | range (inches/ft)[1] | average (inches/ft) |
| Sands and fine sands | 0.4 to 1.00 | 0.75 |
| Moderately course--textured sandy loams to fine sandy loams | 1.00 to 1.50 | 1.25 |
| Medium texture--very fine sandy loams to silty clay loam | 1.25 to 1.75 | 1.50 |
| Fine and very fine texture--silty clay to clay | 1.50 to 2.50 | 2.00 |
| Peats and mucks | 2.00 to 3.00 | 2.50 |

1. Inches of water per foot of soil depth.

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# Chapter 8.

# Principles and Practices of Irrigation Management for Vegetables

E. H. Simonne, M. D. Dukes, and D. Z. Haman

This section contains basic information on vegetable water use and irrigation management, along with some references on irrigation systems. Proper water management planning must consider all uses of water, from the source of irrigation water to plant water use. Therefore, it is very important to differentiate between crop water requirements and irrigation or production system water requirements. Crop water requirements refer to the actual evapotranspiration (ET) and plant growth, and primarily depend on crop development and climatic factors which are closely related to climatic demands. Irrigation requirements are primarily determined by crop water requirements, but also depend on the characteristics of the irrigation system, management practices and the soil characteristics in the irrigated area (Figs. 8- 1, 8-2).

## USES OF IRRIGATION WATER

Irrigation systems have several uses in addition to water delivery for crop ET. Water is required for a preseason operational test of the irrigation system to check for leaks and to ensure proper performance of the pump and power plant. Irrigation water is also required for field preparation, crop establishment, crop growth and development, within-season system maintenance, delivery of chemicals, frost protection, and other uses such as dust control.

### Field Preparation

Field preparation water is used to provide moisture to the field soil for tillage and bed formation. The water used for field preparation depends on specific field cultural practices, initial soil moisture conditions, the depth to the natural water table, and the type of irrigation system. Drip-irrigated fields on sandy soils often require an additional irrigation system for field preparation because the drip tubes are not installed until after the beds have been formed. Thus, many drip irrigated vegetable fields may also require a sprinkler or subirrigation system for field preparation. For example, many strawberry production fields have sprinkler irrigation systems already installed for frost protection. These systems are also used for field preparation and may apply one or more inches of water for this purpose. Subirrigated fields will use the same system for field preparation as well as for crop establishment and plant growth needs. Subirrigation water management requirements depend on the soil characteristics within the irrigated field and surrounding areas. Sufficient water must be provided to raise the water table level as high as 18 to 24 inches below the soil surface. Water is required to fill the pores of the soil and also satisfy evaporation and subsurface runoff requirements. As a rough guide, 2 to 2.5 inches of water are required for each foot of water table rise. For example, a field with a pre-irrigation water table 30 inches deep may need about 2 inches of water to raise the water table to 18 inches, while a pre-irrigation water table at 48 inches may require 5 inches of water for the same result.

### Crop Establishment

Vegetables that are set as transplants, rather than direct seeded, require irrigation for crop establishment in excess of crop ET. Establishment irrigations are used to either keep plant foliage wet by overhead sprinkler irrigation (to avoid desiccation of leaves) or to maintain high soil moisture levels until the root systems increase in size and plants start to actively grow and develop. Establishment irrigation practices vary among crops and irrigation systems. Strawberry plants set as bare-root transplants may require 10 to 14 days of frequent intermittent overhead irrigation for establishment prior to irrigation with drip system. The amount of water required for crop establishment can range widely depending on crop, irrigation system, and climate demand.

### Crop Growth and Development

Irrigation requirements necessary to meet the ET needs of a crop depend on the type of crop, field soil characteristics, irrigation system type and capacity, and stage of crop development. Different crops have growth characteristics that result in different relative water use rates. Soils vary in texture and hydraulic characteristics such as available water-holding capacity (AWHC) and capillary movement. Because sands generally have very low AWHC values (3% to 6% is common), a 1% change in AWHC affects irrigation practices.

### Water application (irrigation requirement)

Irrigation systems are generally rated with respect to application efficiency (Ea), which is the fraction of the water that has been applied by the irrigation system and that is available to the plant for use (Table 1). Applied water that is not available to the plant may have been lost from the crop root zone through evaporation or wind drifts of spray droplets, leaks in the pipe system, surface runoff, sub-



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**Table 1.** Application efficiency for water delivery systems used in Florida

| Irrigation system | Application efficiency (Ea) |
|---|---|
| Overhead[1] | 60-80% |
| Seepage | 20-70% |
| Drip[2] | 80-95% |

[1] much lower values are expected with plastic mulch
[2] with or without plastic mulch

surface runoff, or deep percolation within the irrigated area. Irrigation requirements (IR) are determined by dividing the desired amount of water to provide to the plant (ETc), by Ea as a decimal fraction (Eq. [1]). For example, if it is desired to apply 0.5 inches to the crop with a 75% efficient system, then the system should apply 0.5/0.75=0.67 inches. For more information, consult IFAS bulletin 247 'Efficiencies of Florida agricultural irrigation systems' (http://edis.ifas.ufl.edu/AE110) and bulletin 265 'Field evaluation of microirrigation water application uniformity' (http://edis.ifas.ufl.edu/AE094). Catch cans can be used in the field to determine the actual amount of water applied

**Eq. [1] Irrigation requirement = Crop water requirement / Application efficiency**
**IR = ETc/Ea**

### Fertigation/Chemigation

Irrigation systems are often used for delivery of chemicals such as fertilizers, soil fumigants, or insecticides. The crop may require nutrients when irrigation is not required, e.g. after heavy rainfall. Fertilizer injection schedules based on soil tests results are provided in each crop production chapter of this production guide. Fertigation should not begin until the system is pressurized. It is recommended to always end a fertigation/chemigation event with an short irrigation with clear water to avoid the accumulation of fertilizer or chemical deposits in the irrigation system, and/or rinse crop foliage. The length of the flushing cycle should be 10 minutes longer than the travel time of the fertilizer from the irrigation point to the farthest point of the system.

### System Maintenance

Irrigation systems require periodic maintenance throughout the growing season. These activities may require system operation during rainy periods to ensure that the system is ready when needed. In addition, drip irrigation systems may require high levels of maintenance to prevent clogging and system failure. Typically, cleaning agents are injected weekly, but in some instances more frequent injections are needed.

### Frost Protection

For some crops, irrigation is used for frost protection during winter growing seasons. For strawberry production, sprinkler irrigation is primarily used with application rates of about 0.25 inches per hour during freeze events. Water freezes at 32°F, while most plant tissue freeze at lower temperatures. Overhead freeze protection is efficient for air temperature as low as 26-28°F, but seldom below. For vegetable fields with subirrigation systems, the heat properties of groundwater can be used for cold protection. Growers may also irrigate to raise the water table throughout the field. Frost protection water requirements vary and depend on the severity and duration of freeze events, the depth to the existing water table level, and field hydraulic characteristics.

### Other Uses

Other irrigation uses vary according to the type of crop, system characteristics, and field location. Some examples include: periodic overhead irrigation for dust control; wetting of dry row middles to settle dust and prevent sand from blowing during windy conditions; and, wetting of roadways and drive aisles to provide traction of farm vehicles.

## IRRIGATION SCHEDULING

Irrigation scheduling is used to apply the proper amount of water to a crop at the proper time. The characteristics of the irrigation system, crop needs, soil properties, and atmospheric conditions must all be considered to properly schedule irrigations. Poor timing or insufficient water application can result in crop stress and reduced yields from inappropriate amounts of available water and/or nutrients. Excessive water applications may reduce yield and quality, are a waste of water, and increase the risk of nutrient leaching

A wide range of irrigation scheduling methods is used in Florida, with corresponding levels of water managements (Table 2). The recommend method to schedule irri-

**Table 2.** Levels of water management and corresponding irrigation scheduling method

| Water Mgt. Level | Irrigation scheduling method |
|---|---|
| 0 | Guessing (irrigate whenever) |
| 1 | Using the 'feel and see' method |
| 2 | Using systematic irrigation (example: 3/4 in. every 4th day) |
| 3 | Using a soil water tension measuring tool to start irrigation |
| 4 | Using a soil water tension measuring tool to schedule irrigation and apply amounts based on a budgeting procedure |
| 5[1] | Adjusting irrigation to plant water use, and using a dynamic water balance based on a budgeting procedure and plant stage of growth, together with using a soil water tension measuring tool |

[1] recommended method

gation for vegetable crops is to use together, (1) the crop water requirement method that takes into account plant stage of growth (water management level 5 in Table 2), (2) a measurement of soil water status, and (3) guidelines for splitting irrigation.

### Soil water status and soil water tension

Soil water tension (SWT) represents the magnitude of the suction (negative pressure) the plant roots have to create to free soil water from the attraction of the soil, and move it into the root cells. The dryer the soil, the higher the suction needed, hence, the higher SWT. SWT is commonly expressed in centibars (cb) or kiloPascals (kPa; 1cb = 1kPa; 7kPa = 1psi). For most vegetable crops grown on the sandy soils of Florida, SWT in the rooting zone should be maintained between 6 (field capacity) and 15 cb. Because of the low AWHC of Florida soils, most full- grown vegetable crops will need to be irrigated daily. During early growth, irrigation may be needed only two to three times weekly. SWT can be measured in the field with moisture sensors or tensiometers. For more information on SWT measuring devices, consult IFAS circular 487 'Tensiometers for soil moisture measurement and irrigation scheduling' available at http://edis.ifas.ufl.edu/AE146 and bulletin 319 'Tensiometer service, testing and calibration' available at http://edis.ifas.ufl.edu/AE086.

### Crop water requirement (ET)

Crop water requirements depend on crop type, stage of growth, and evaporative demand. Evaporative demand is termed evapotranspiration (ET) and may be estimated using historical or current weather data. Generally, reference evapotranspiration (ETo) is determined for use as a base level. By definition, ETo represents the water use from a uniform green cover surface, actively growing, and well watered (such as a turf or grass covered area).

Historical daily averages of Penman-method ETo values are available for four Florida locations expressed in units of acre-inches and gallons per acre (Table 3). While these values are provided as guidelines for management purposes, actual values may vary above and below these values, requiring individual site adjustments. Actual daily values may be as much as 25% higher on days that are hotter and drier than normal or as much as 25% lower on days that are cooler or more overcast than normal. As a result, SWT or soil moisture should be monitored in the field.

**Table 3.** Historical Penman method reference ET (ETo) for four Florida locations expressed in (A) inches per day and (B) gallons per acre per day.

| Month | Tallahassee | Tampa | West Palm Beach | Miami |
|---|---|---|---|---|
| | (A) inches per day | | | |
| JAN | 0.06 | 0.09 | 0.10 | 0.10 |
| FEB | 0.09 | 0.12 | 0.13 | 0.13 |
| MAR | 0.12 | 0.14 | 0.16 | 0.16 |
| APR | 0.16 | 0.19 | 0.19 | 0.19 |
| MAY | 0.18 | 0.20 | 0.19 | 0.19 |
| JUN | 0.18 | 0.20 | 0.18 | 0.18 |
| JUL | 0.17 | 0.18 | 0.18 | 0.18 |
| AUG | 0.16 | 0.17 | 0.18 | 0.17 |
| SEP | 0.14 | 0.16 | 0.16 | 0.15 |
| OCT | 0.11 | 0.14 | 0.14 | 0.14 |
| NOV | 0.08 | 0.11 | 0.12 | 0.11 |
| DEC | 0.06 | 0.08 | 0.10 | 0.10 |
| | (B) gallons per acre per day[1] | | | |
| JAN | 1630 | 2440 | 2720 | 2720 |
| FEB | 2440 | 3260 | 3530 | 3530 |
| MAR | 3260 | 3800 | 4340 | 4340 |
| APR | 4340 | 5160 | 5160 | 5160 |
| MAY | 4890 | 5430 | 5160 | 5160 |
| JUN | 4890 | 5430 | 4890 | 4890 |
| JUL | 4620 | 4890 | 4890 | 4890 |
| AUG | 4340 | 4620 | 4890 | 4620 |
| SEP | 3800 | 4340 | 4340 | 4070 |
| OCT | 2990 | 3800 | 3800 | 3800 |
| NOV | 2170 | 2990 | 3260 | 2990 |
| DEC | 1630 | 2170 | 2720 | 2720 |

[1] assuming water application over the entire area, i.e., sprinkler or seepage irrigation with 100% efficiency

Crop water use (ETc) is related to ETo by a crop coefficient (Kc) which is the ratio of ETc to the reference value ETo (Eq. [2]). Because different methods exist for estimating ETo, it is very important to use Kc coefficients which were derived using the same ETo estimation method as will be used to determine the crop water requirements. Also, Kc values for the appropriate stage of growth (Table 4; Fig. 8-3) and production system (Tables 5 and 6) must be used.

With drip irrigation where the wetting area is limited and plastic mulch is often used, Kc values are lower to reflect changes in row spacing and mulch use. Plastic mulches substantially reduce the evaporation of water from the soil surface. Associated with the reduction of evaporation is a general increase in transpiration. Even though the transpiration rates under mulch may increase by an average of 10-30% over the season as compared to no-mulched system, overall water use values decrease by an average of 10-30% due to the reduction in soil evaporation.

**Table 4.** Description of stages of growth (plant appearance and estimated number of weeks) for most vegetable crops in Florida[1]

| Crop | Stage 1 | Stage 2 | Stage 3 | Stage 4 | Stage 5 | Expected growing season (weeks) |
|---|---|---|---|---|---|---|
| Bean | Small plants | Growing plants | Pod enlargement | Pod maturation | | |
| | 2-3 | 3-4 | 2-3 | 2-3 | | 9-10 |
| Cabbage, | Small plants | Growing plants | Head development | | | |
| Cauliflower, | 2-3 | 5-6 | 3-4 | | | 10-12 |
| Chinese cabbage | | | | | | |
| Cantaloupe | 6-in vine | 12-in vine | First flower | Main fruit production | Late fruit production | |
| (muskmelon) | 1-2 | 3-4 | 3-4 | 2-3 | 2-3 | 11-12 |
| Carrot | Small plants | Growing plants | Root development | Final growth | | |
| | 1-2 | 3-4 | 5-7 | 1-2 | | 10-13 |
| Cucumber | 6-in vine | 12-in vine | Fruit production | Late season | | |
| | 1-2 | 2-3 | 6-7 | 1-2 | | 10-12 |
| Eggpant | Small plants | Growing plants | Fruit production | Late season | | |
| | 2-3 | 2-3 | 6-7 | 2-3 | | 12-13 |
| Potato | Small plants (after hilling) | Large plants (vegetative growth) | First flower (tube initiation and bulking) | Maturation (top dies) | | |
| | 2-4 | 4-6 | 3-5 | 2-4 | | 12-14 |
| Okra | Small plants | Growing plants | Pod production | Late season | | |
| | 2-3 | 2-3 | 7-8 | 1-2 | | 12-13 |
| Onion | Small plants | Growing plants | Bulb development | Maturation (top falls) | | |
| | 2-4 | 4-5 | 6-8 | 1-2 | | 13-16 |
| Pepper | Small plants | Growing plants | Pod production | Last bloom | Last harvest | |
| | 2-3 | 2-3 | 6-7 | 1-2 | 1 | 13-15 |
| Pumpkin (bush) | Small plants | First flower | Fruit enlargement | Harvest | | |
| | 2-3 | 2-3 | 5-6 | 1-2 | | 9-11 |
| Pumpkin (vining) | 6-in vines | 12-in vines | Small fruit | Large fruit | Harvest | |
| | 2-3 | 2-3 | 3-4 | 2-3 | 1-2 | 13-15 |
| Radish | Small plants | Rapid growth | | | | |
| | 1-2 | 2-4 | | | | 3-5 |
| Strawberry | Young plants | Growing plants | Early harvest | Main harvest period | Late harvest | |
| | October | November | December- January | February- March | April | 23-30 |
| Summer Squash (crookneck, straightneck, zucchini) | Small plants | Growing plants | Fruit production | Late fruit production | | |
| | 1-2 | 2-3 | 3-4 | 1 | | 7-9 |
| Sweet corn | Small plants | Large plants | Ear development | | | |
| | 3-4 | 5-8 | 2-3 | | | 10-15 |
| Sweetpotato | Early vine growth | Expanding vines | Storage root enlargement | | Late season | |
| | 2-3 | 5-6 | 6-10 | 1 | | 13-17 |
| Tomato | Small plants | 1st bloom | 2nd - 3rd bloom | Harvest | Last harvest | |
| | 2-3 | 2-3 | 6-7 | 1-2 | 1-2 | 12-14 |
| Watermelon | 6-in vines | 12-in vines | Small fruit | Large fruit | Harvest | |
| | 2-3 | 2-3 | 3-4 | 2-3 | 1-2 | 13-15 |

[1] Same growth stages used for irrigation and fertilizer schedules

**Table 5.** Crop coefficient estimates for use with the ETo values in Table 3 and growth stages in Table 4 for unmulched crops. (Actual values will vary with time of planting, soil conditions, cultural conditions, length of growing season and other site-specific factors)

| Crop | Growth Stage | Crop Coefficient |
|---|---|---|
| All field-grown vegetables | 1 | 0.20[1] to 0.40[2] |
| | 2 | Stage 1[3] value to Stage 3 value (See Figure 8-3) |
| Legumes: snapbean, lima bean and | 3 | 0.95[4] |
| southernpea | 4 | 0.85[4] |
| Beet | 3 | 1.00 |
| | 4 | 0.90 |
| Cole crops: | 3 | 1.00 |
| broccoli, brussels sprouts | 4 | 0.85 |
| cabbage, cauliflower | 3 | 0.95[4] |
| collards, kale | 4 | 0.90[4] |
| mustard | 3 | 1.00[4] |
| turnip | 4 | 0.90[4] |
| Carrot | 3 | 1.05 |
| | 4 | 0.75 |
| Celery | 3 | 1.05 |
| | 4 | 0.95 |
| Cucurbits: cucumber, cantaloupe, pumpkin | 3 | 0.90 |
| squash, watermelon | 4 | 0.70 |
| Eggplant | 3 | 1.00 |
| | 4 | 0.85 |
| Lettuce: endive, | 3 | 0.95 |
| escarole | 4 | 0.90 |
| Okra | 3 | 1.00[4] |
| | 4 | 0.90[4] |
| Onion (dry) | 3 | 0.95 |
| | 4 | 0.75 |
| Onion (green) | 3 | 0.95 |
| Parsley | 3 | 1.00[4] |
| Pepper | 3 | 1.00 |
| | 4 | 0.85 |
| Potato | 3 | 1.10 |
| | 4 | 0.70 |
| Radish | 3 | 0.80 |
| | 4 | 0.75 |
| Spinach | 3 | 0.95 |
| | 4 | 0.90 |
| Sweet corn | 3 | 1.10 |
| | 4 | 1.00 |
| Sweetpotato | 3 | 1.10[4] |
| | 4 | 0.70[4] |
| Tomato (wet or moist row middle conditions) | 3 | 1.15 |
| | 4 | 1.00 |
| Strawberry (overhead irrigated) | 3 | 0.70 |
| | 4 | 0.85 |

[1] low plant population; wide row spacing

[2] high plant population; close row spacing

[3] 0.20 or Kc value from Stage 1

[4] values estimated from similar crops

**Eq. [2] Crop water requirement = Crop coefficient x Reference evapotranspiration**

**ETc = Kc x ETo**

## SOIL WATER HOLDING CAPACITY AND THE NEED TO SPLIT IRRIGATIONS

In Florida sandy soils, the amount of water that can be stored in the root zone and be available to the plants is limited. Usually, it is [illegible] that approximately 0.75 inches of water can be sto[illegible]ery foot of t[illegible]ot zone. Only half of that should be used before next irrigation to a[illegible]d plant stress and yield reduction (this will help maintain SWT below 15cb). Any additional water will be lost by deep percolation below the root zone.

Table 7 gives approximate amount of [illegible]ter that [illegible] applied at each event in Florida sandy soil for different production systems. When the calculated volume of water to be applied in one day exceeds the values in Table 7, then it is necessary to split applications. The number of split irrigations can be determined by dividing the irrigation requirement (eq. [1]) by the numbers in Table 7, and rounding up the result to the nearest whole number. Splitting irrigation reduces both risks of water loss through deep percolation and nutrient leaching. Sandy soil with the with the available water holding capacity of 0.75 in/ ft was assumed in these calculations. [illegible] matter the [illegible] of water [illegible] during one irrigation event and stored in the root zone can be increas[illegible]. It is recommended to check the depth of wetting after irrigation to assure that the water is not lost from the roots by digging out a perpendicular profile to the drip line and observing the wetted pattern.

*Example*

As an example, consider drip irrigated tomatoes on 6- ft center beds, grown under plastic mulch production system in the Tampa Bay area (sandy soils). For plants in growth Stage 4 the crop coefficient is 0.90 (Table 6). If this period of growth occurred in April, the corresponding ETo value is 5160 gal/ac/day (Table 3). Daily crop water use would be estimated as:

**ETcrop = (0.90) x (5,160 gal/ac/day)**
**= 4,644 gal/ac/day**

**Table 6.** Crop coefficient estimates (Kc) for use with ETo values in Table 3 and growth stages in Table 4 for selected crops grown in a plasticulture system.[1]

| Crop | Growth Stage | Crop Coefficient (Kc) |
|---|---|---|
| Cantaloupe | 1 | 0.35 |
| | 2 | 0.6 |
| | 3 | 0.85 |
| | 4 | 0.85 |
| | 5 | 0.85 |
| Cucumber | 1 | 0.25 |
| | 2 | 0.5 |
| | 3 | 0.75 |
| | 4 | 0.75 |
| Summer squash | 1 | 0.3 |
| | 2 | 0.55 |
| | 3 | 0.8 |
| | 4 | 0.8 |
| Strawberry (4-ft bed centers) | 1 | 0.4 |
| | 2 | 0.5 |
| | 3 | 0.6 |
| Tomato (6-ft bed centers) | 1 | 0.3 |
| | 2 | 0.4 |
| | 3 | 0.9 |
| | 4 | 0.9 |
| | 5 | 0.75 |
| Watermelon (8-ft bed center) | 1 | 0.3 |
| | 2 | 0.5 |
| | 3 | 0.7 |
| | 4 | 0.75 |
| | 5 | 0.8 |

[1] Adapted from Table 25, FAO Paper 56

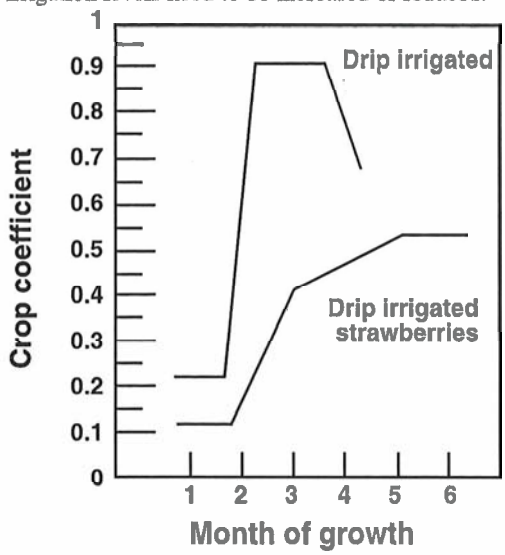
If the drip irrigation system can apply water to the root zone of the crop with an application efficiency of 85%, the irrigation requirement would be

**Irrigation Requirement = (4,640 gal/ac/day)/(0.85)**
**= 5,459 gal/ac/day**

If the maximum water application in one irrigation event for this type of soil is 1,700 gal/ac/irrigation, then the irrigation will have to be split:

**Number**
**of events = (5,459 gal/acre/day) /**
**(1,700 gal/acre/day/irrigation event)**
**= 3.2, rounded up to 4 irrigation events**

Therefore in this example, four irrigations of 1,365 gal/ac each will be needed to replace ETc, not exceed the soil water holding capacity. This amount of water would be a good estimate for scheduling purposes under average growth and average April climatic conditions. However, field moisture plant status should be also monitored to determine if irrigation levels need to be increased or reduced. While




deficit irrigation will reduce fruit size and plant growth, excessive irrigation may leach nutrients from the active root system. This may also reduce plant growth.

**Table 7.** Maximum water application (in gallons per acre and in gallons/100lfb) in one irrigation event for various production systems on sandy soil (available water holding capacity 0.75 in/ ft and 50% soil water depletion). Split irrigations may be required during peak water requirement.

| Wetting width (ft) | Gal/100ft to wet depth of 1 ft | Gal/100ft to wet depth of 1.5 ft | Gal/100ft to wet depth of 2 ft | Bed spacing (ft) | Vegetable crop | Bed length (100 lbf/a) | Gal/acre to wet depth of 1 ft | Gal/acre to wet depth of 1.5 ft | Gal/acre to wet depth of 2 ft |
|---|---|---|---|---|---|---|---|---|---|
| 1.0 | 24 | 36 | 48 | 4 | Lettuce, Strawberry | 109 | 2,600 | 3,800 | 5,100 |
| | | | | 5 | Cantaloupe | 87 | 2,100 | 3,100 | 4,100 |
| | | | | 6 | Broccoli, Okra, Cabbage, Pepper, Cauliflower, Summer squash, Pumpkin (bush) Eggplant, Tomato | 73 | 1.700 | 2,600 | 3,500 |
| | | | | 8 | Watermelon, Pumpkin (vining) | 55 | 1,300 | 1,900 | 2,600 |
| 1.5 | 36 | 54 | 72 | 4 | Lettuce, Strawberry | 109 | | | |
| | | | | 5 | Muskmelon | 87 | 3,800 | 5,800 | 7,600 |
| | | | | 6 | Broccoli, Okra, Cabbage, Pepper, Cauliflower, Summer squash, Pumpkin (bush) Eggplant, Tomato | 73 | 3.100 | 4,700 | 6,200 |
| | | | | 8 | Watermelon, Pumpkin (vining) | 55 | 2,600 | 3,900 | 5,200 |
| | | | | | | | 1,900 | 3,000 | 3,900 |

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# Summer Squash Production in Miami-Dade County, Florida[1]

Y. C. Li, H. H. Bryan, W. Klassen, M. Lamberts and T. Olczyk[2]

## Situation

Summer squash is a very important traditional vegetable crop in Miami-Dade County grown annually on 3,000 to 6, 000 acres, and sold nationwide during the winter in the fresh market. The production cost in 1999-2000 was approximately $13.64 per bushel or $4,093/acre for an acceptable yield of 300 42-pound bushels/acre.

## Varieties

Refer to the Vegetable Production Guide for Florida (SP170) for variety selection. The major varieties currently grown in the Miami-Dade County are as follows:

Yellow crookneck type: Medallion, Sunglo, Horn of Plenty, and Dixie.

Straightneck type: Enterprise, Lemondrop L, Fortune, and Goldbar.

Zucchini type: Senator, Seneca, Cashflow, Caiman, RSQ5058, and Dividend.

## Soils, Land Preparation, and Transplanting

Squash in Miami-Dade County is grown on gravelly soils, but occasionally on marl soils. Also, sandy soils in the west Kendall area are suitable for squash. Gravelly soils must be a minimum of 6 inches deep above the bedrock. Periodic rock-plowing increases soil depth. Squash can be planted on flat ground or on plastic mulched raised beds following crops of tomato, eggplant, or pepper. Squash is relatively sensitive to flooding. There is a high risk of losing the squash crop by flooding of marl soils with high water tables.

The planting season extends from September into February. When squash is planted on flat ground, rows are spaced 36 inches apart; plants within the row are spaced 10-15 inches apart. Typically squash beds are 36-40 inches wide, 6-8 inches high and spaced 6 feet between the centers of adjacent beds. Transplanted seedlings should be spaced 10-15 inches apart, and set 2-3 inches deep. Usually double rows are used.

# Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Tissue analysis is recommended to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation, and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the Miami-Dade County Cooperative Extension Service. Information on plant tissue analysis for squash is provided in the Vegetable Production Guide for Florida (SP170). The total amount of fertilizer required in Miami-Dade County depends on the variety, soil fertility, and other environmental factors. Preplanting fertilizer formulas of 6-6-6, 6-3-6, 10-10-10, or similar formulas are satisfactory. Generally 150-200 lb N per acre has been used satisfactorily for squash production. For squash as the first crop on plastic mulch, less than one-half of the fertilizer should be applied to the beds prior to planting. Fertigation should be initiated with a 4-0-8 or similar formula 3-4 weeks after transplanting to provide the remaining fertilizer. For squash as second crop on plastic mulch, only inject N and K through fertigation. For squash on flat land, all of the phosphorus fertilizer and 30-40% of N and K should be applied at planting, and the remainder should be side-dressed in 1 or 2 applications before the vines begin to spread. Magnesium nitrate or sulfate and EDDHA-chelated iron should be applied if deficiency symptoms appear.

# Irrigation and Freeze Protection

For squash on plastic mulch, a drip irrigation system with one drip irrigation tubing per bed provides adequate water, although a second is beneficial especially while the plants' root systems are small. Water requirements for young plants are very low. Irrigation frequencies of once or twice per week suffice for most plastic mulched young plants until 3-4 weeks after transplanting. A tensiometer installed at 6" depth can be used for irrigation scheduling. Optimal plant growth and yields are achieved when the soil moisture is maintained at tensiometer readings between 10 to 15 cbars. The Miami-Dade County Cooperative Extension Service provides relevant information and calibrates tensiometers.

Squash sustains chilling injury when temperatures drop about 2 °F below freezing. Because of the cost of solid set overhead sprinklers, many squash growers in Miami-Dade County do not provide freeze protection for squash.

# Insect Management

Refer to the Vegetable Production Guide for Florida (SP170) for extensive information

on insect control. Major insects include aphids, whiteflies, melon and pickelworm, thrips Palmi, spidermites, armyworm, and looper.

## Disease Management

Refer to the Vegetable Production Guide for Florida (SP170).

## Weed Management

Refer to the Vegetable Production Guide for Florida (SP170).

## Harvest

The harvest season extends from October into April. Squash is hand picked.

## Multiple Cropping/Rotation

Squash is often used as second crop after tomato and eggplant on plastic mulch and can rotated with bean or okra on flat ground. There is risk in rotating cucurbits with solanaceous crops because of Phytophthora blight. This disease is caused by *Phytophthora capsici*, which develops explosively in moist conditions and produces large numbers of infective sporangia. The disease is very damaging and difficult to control.

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### Footnotes

1. This document is HS-861, one of a series of the Horticultural Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Publication Date: April 2002. Please visit the EDIS Web site at http://edis.ifas.ufl.edu/. This document is written specifically for growers in Miami-Dade County as a supplement to Vegetable Production Guide for Florida (SP170) (http://edis.ifas.ufl.edu/MENU_CV:VEGPROD). We thank many colleagues, growers and representatives from seed and chemical companies and grower services for reviewing the document.

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# Sweet Corn Production in Miami-Dade County, Florida[1]

Y. C. Li, H. H. Bryan, W. Klassen, M. Lamberts and T. Olczyk[2]

## Situation

In 1995-96, gross sales from approximately 14,300 acres of sweet corn in Miami-Dade County were at $9.8 million, with an average yield of roughly 300-450 42-lb craters per acre. The production cost was approximately $12.91 per crate or $3,874/acre for an acceptable yield of 300 42-pound crates per acre in 1999-2000. Sweet corn produced in Miami-Dade County is sold for the fresh market nationwide during winter and spring.

## Varieties

Refer to the Vegetable Production Guide for Florida (SP170) for variety selection. Currently the major varieties grown in Miami-Dade County are Primetime, Summersweet9730, and Sunvolt. Bt-corn hybrids are not grown because they cannot be exported to Europe.

## Soils, Land Preparation, and Planting

Sweet corn in Miami-Dade County is grown on both gravelly and marl soils. Sandy soils (west Kendall area) also are suitable for sweet corn. To be suitable, gravelly soils must be a minimum of 6 inches deep above the bedrock. Sweet corn is relatively tolerant to flooding. Nevertheless both, yield and quality are reduced under prolonged flooding.

The planting season for sweet corn extends from early October to January and occasionally February. Typically seed is spaced 6-8 inches within the row and rows are spaced 28-32 inches apart. Seeding rates of 20,000 to 22,000 seeds per acre are used.

## Fertilizer

Calibrated soil tests for the calcareous soils of Miami-Dade County are not available at present. Tissue analysis is recommended to determine the composition and rates of fertilizers to be applied. Instructions for tissue sample collection, preparation, and submission are provided in Plant Tissue Information Sheet (SL-131), which is available from the Miami-Dade County Cooperative Extension Service. Information on plant tissue analysis for sweet corn is provided in the Vegetable Production Guide for Florida. The total amount of fertilizer required in Miami-Dade County depends on the variety, soil fertility, and other environmental factors. Preplant fertilizer formulas of 6-6-6, 6-3-6, 10-10-10, or similar formulas are satisfactory. Generally 150-200 lb N per acre has been satisfactory for sweet corn production though some varieties may require more. All of the phosphorus and two thirds of the N and K fertilizer should be applied as dry fertilizer prior to planting. The remainder should be side dressed 2 to 4 times during the season.

## Irrigation and Freeze Protection

Center pivot, in line low volume sprinklers, or traveling guns can be used for irrigation. Irrigation frequencies depend on plant growth stages, soil type, and weather conditions. Normally corn is irrigated once every 5-7days though more frequent irrigation may be required at certain growth stages during drought period.

Sweet corn has little resistance to frost. Indeed chilling injury occurs when temperatures drop 2 °F below freezing. Because of the cost of solid set overhead sprinklers, most sweet corn growers in Miami-Dade County do not provide freeze protection for sweet corn.

## Insect Management

Refer to the Vegetable Production Guide for Florida (SP170) for extensive information on insect control. The major pests are the fall armyworm and the corn silk fly, lesser cornstalk borer, cutworm, and wireworm.

## Disease Management

Refer to the Vegetable Production Guide for Florida (SP170) Major diseases include maydis, turcicum, rust, and viruses.

## Weed Management

Refer to the Vegetable Production Guide for Florida (SP170).

## Harvest

Harvesting season extends from January through April. The harvest date depends on the variety. When hand harvested, sweet corn usually is packed in the field.

# Multiple Cropping/Rotation

Because of the long residual action of certain herbicides commonly used in corn production, few crops can be grown in rotation with sweet corn.

## Footnotes

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# Vegetable Growers' Water Use and Conservation Practices in Miami-Dade County[1]

Rafael Muñoz-Carpena, Jonathan H. Crane, Glenn D. Israel, and Teresa Olczyk[2]

## Introduction and background

The Miami-Dade County vegetable crops industry employs over 6,000 people, and has a $491 million impact on the state economy (Degner et al., 2002a; Degner et al., 2002b). There are about 40,411 acres of vegetable production and an estimated 80 to 100 commercial vegetable producers depending upon the criteria and sources used to estimate it (Degner et al., 2002b; T. Olczyk and H. Bryan, personal communication). The reported vegetable acreage is somewhat misleading as some acreage is annually double and triple cropped (Degner et al., 2002a). The major vegetable crops grown include bush and pole beans, tomatoes, yellow and zucchini squash, potatoes, sweet corn, bell peppers, boniato, and malanga. Others include cucumbers, eggplant, strawberries, cabbage, hot peppers, okra, calabaza, basil, winter melon, bitter melon, lemongrass, yuca, Thai/Chinese eggplant, long beans and others. Overall 82% of the farms in Miami-Dade County have irrigation systems, representing about 85% of the agricultural land in production (Degner et al., 2002b).

The major issues facing the vegetable crop industry in Florida include marketing and foreign competition, land use planning, water and fertilizer management, natural disaster avoidance and mitigation, pest and disease pressure, loss of methyl bromide for soil fumigation, and sustainable cultural practices. Due to the on-going Everglades and Biscayne National Park restoration projects and Florida Bay, water and fertilizer management practices for the vegetable crop industry have become critical components of its sustainability.

Water use, management, and quality are major issues in Florida's Miami-Dade County where periods of excessive rainfall (flooding) and extended dry spells (drought) are experienced occasionally. Agricultural practices (e.g., irrigation and fertilizer

management) potentially affect the water quality of the Biscayne Aquifer and Biscayne Bay. However, water conservation practices by the Miami-Dade County vegetable crops industry are largely undocumented.

This fact sheet reports water conservation trends for vegetable producers based on a recent extensive survey carried out in Miami-Dade County.

# Survey and analysis methodology

The survey involved a random sample of 69 commercial vegetable producers that were selected from the mailing lists obtained from the Miami-Dade County/IFAS Cooperative Extension Service and other growers' organizations in Miami-Dade County. The survey recipients were selected according to the size of their operation to obtain a maximum of 53 surveys which roughly represented 69% to 86% of the commercial vegetable producers (depending on the source used for the total number of growers).

The survey instrument contained questions concerning current water consumption and irrigation practices, motivations for their adoption by growers, issues affecting water use, drought and flooding experience, and water management. Questions related to when the grower first started farming, and the size of the farm were added to gain a perspective of changes in the area with time.

The survey procedures were tailored to maximize growers' participation (Dillman, 2000). Each potential respondent received a letter informing him or her of the purpose of the survey. Two weeks later the surveys were sent out, and telephone follow up was done 4 and 8 weeks later. The survey protocol adopted was designed to collect enough responses for statistical analysis of the influence of the economic, technical, and sociological factors on water conservation practices in the area. The survey data were analyzed using SAS software FREQ and MEANS statistical procedures (SAS, 1999).

# Survey results

## Background

Although an initial random sample of 69 surveys was sent out, some could not be contacted or were no longer in business. Of the 53 growers who were in the reachable sample, 6 returned usable surveys. The survey response was 11%, representing 21% of the vegetable acreage, and less than a tenth of the estimated 80 to 100 commercial vegetable producers. Mail-back survey response rates of 10 to 50% are common, and typically may be as low as 20% (Donan et al., 2000; Nachmias and Nachmias, 1976; Neuman, 1997). The mean time producers were in vegetable farming was 21 years.

The average vegetable land area for respondents was 1,050 acres, much greater than the average of 54 acres reported previously (Degner et al., 2002a). This is because a disproportionate number of vegetable survey respondents had large operations, and

many small producers did not return their survey. Sixty-one percent of the vegetable producers responding owned their own land, and 39% leased land.

There are three major irrigation methods employed in vegetable production in Miami-Dade County, high volume, mobile irrigation units called big guns or water cannons, mobile linear water irrigation systems (called linear systems), and drip systems. High volume overhead irrigation is occasionally used, and high volume solid-set irrigation is commonly used on some crops (e.g., tomato). High volume overhead systems consist of high impact sprinkler heads on 5 ft to 20 ft risers spaced 40 ft to 60 ft apart. High volume solid set irrigation systems are primarily used for freeze protection, and are composed of lightweight detachable aluminum tubes with high impact sprinkler heads that can be taken apart and moved and reassembled easily. Sixty-two percent of the vegetable land was reported to be irrigated, although actual irrigated land may be much higher due to the extensive use of mobile high volume big gun irrigation systems.

## Changes in irrigation technology

There have been dramatic changes in irrigation system technology, and soil water content monitoring during the past 21 years, which corresponds to the average time survey respondents have been in the agricultural business. Generally, irrigation efficiencies have improved in vegetable crop operations by more direct water delivery systems that limit the application rate and land surface area irrigated (e.g., drip), and by the use of soil water content monitoring devices (e.g., tensiometers) that enable producers to reduce leaching, and apply water based solely on crop needs.

The use of high volume over head irrigation has declined to zero; however, the use of high volume solid set systems has not changed, and remains at 18% (Fig. 1). The disappearance of high volume overhead irrigation systems is mostly due to establishment of fruit orchards on land used temporarily for vegetable crops during the last 3 years (J. Crane, personal communication). The use of high volume big gun irrigation has not changed (66.7%). This is due to the fact much of the vegetable land is leased on an annual basis, making installation of permanent irrigation systems uneconomical. Secondly, this is a reflection of the sharp increase in snap bean acreage where the cost of establishing drip and non-mobile irrigation systems is usually not economical. In contrast, the use of drip irrigation has increased by 50%. This reflects its utility in bedded vegetable production systems with such crops as tomato, peppers, and eggplant.

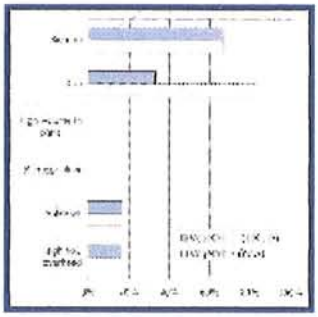

Figure 1. Changes in irrigation systems used by vegetable producers with time. The term "before" denotes the irrigation system used when the grower first started farming and "after" denotes the current irrigation system used.

## Water resources

The use of open, uncased wells has declined by 16.7% for vegetable crop operations ( Fig. 2 ). The percentage of capped, cased wells utilized in the vegetable industry for the past 21 years has remained about the same (about 33%). This is probably due to the annual change in the location of most farmed vegetable land and that changes in production practices for different crops on the same land makes establishment of permanent wells uneconomical and often impractical.

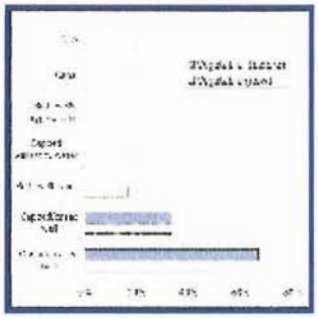

Figure 2. Changes in water sources used by vegetable producers with time. The term "before" denotes the source of water used when the grower first started farming and the "after" denotes the current water source used for irrigation.

## Flooding and drought frequency

Thirty-five percent of the vegetable operations experienced flooding within the last five years and of those operations reporting flooding, nearly 67% reported a yield and/or a reduction in commodity quality as a result of flooding. Drought was reported by about 33% of the responding vegetable producers, and they sustained about a 50% reduction in yield and commodity quality.

## Water conservation practices, and the motivations for adopting them

The survey included questions on the adoption of water conservation practices and motivations for adopting them. Over 83% of the responding vegetable producers utilized drip irrigation or some other highly efficient irrigation system (e.g., microsprinkler) in at least part of their operations. One third of the producers used the linear irrigation systems. This is somewhat confusing in that many producers farm multiple crops some of which are irrigated by low volume irrigation systems (e.g., tomato, eggplant), and others by big guns or linear irrigation systems (e.g., bush beans). In addition, most vegetable growers farm several separate parcels of land simultaneously (i.e., they use different irrigation systems for different crops and land areas).

The water use efficiency of the drip and other low volume systems along with their capability for delivering liquid fertilizers is attractive from a management and economic standpoint. They are also recommended for the extremely coarse (gravelly-loam) "rock-plowed" soils in the area that have a limited water holding capacity and high permeability. However, use of drip irrigation for some crops (e.g., beans and corn) is not economic or practical. Nearly 17% and 25% of the vegetable producers indicated they utilize or plan to utilize water meters to monitor water use, respectively. Fifty percent of the growers employed some type of conservation tillage, and another 20% plan to do so in the future.

All of the respondents indicated that they monitor the local weather (i.e., National Weather Service, Florida Agricultural Weather Network) and keep track of rainfall (mostly with rain gauges at each major parcel of land). About 83% of the vegetable producers indicated they monitor soil water content. Roughly half utilize a soil inspection (visual appearance and feeling for moisture) method, and half utilize soil moisture monitoring devices (e.g., tensiometer). About 33% of those surveyed use the accounting method to schedule irrigation. Two-thirds (67%) of those surveyed irrigate at night, or early morning, or late evening to reduce evaporative losses and wind distortion of the high volume big gun irrigation pattern.

About 17% of the vegetable producers reported they utilize somewhat drought tolerant vegetable cultivars and another 12% indicate they plan to do so in the future. Two-thirds of the vegetable producers surveyed utilize black or white plastic mulch. Plastic mulch decreases soil evaporation, the need for herbicide applications, and increases water and nutrient efficiency.

At present none of the vegetable producers are utilizing urban recycled water for irrigation, however, 67% indicated an interest in doing so. For this to occur would require an extensive state and local government commitment to establish and maintain suitable water recycling facilities in the south Florida region.

Fifty percent of the vegetable producers reported keeping irrigation records and utilizing the Mobile Irrigation Lab (MIL). Another 20% plan on utilizing the MIL. This service is designed to assess the water and energy use efficiency of irrigation systems at no charge to producers. The MIL provides recommendations for repairs and/or upgrades in an effort to increase irrigation efficiency, and conserve water.

The three most common motivations for utilizing water conservation practices are water, time, and money savings. The primary motivation for vegetable producers varied with the conservation practice. For example, money savings was the primary reason given for utilizing plastic mulch, whereas time was the major motivation for conservation tillage practices. In contrast, equal weight was given to water conservation and money and time savings for irrigating during the night or evening or early morning, monitoring soil water content, measuring rainfall, and using a linear irrigation system. Time was given as the primary motivation for utilizing conservation tillage and keeping irrigation records. This makes sense since the acreage farmed tended to be large and in several parcels.

## Conclusions and challenges ahead

Our results generally show an increase in the adoption of water conservation practices for these large vegetable operations in the last 21 years. The past and present status of smaller vegetable operations was not determined due to a lack of response by this group of growers. The 50% increase in the use of drip irrigation and nearly 17% drop in the use of open, uncased wells indicates a positive trend in water use efficiency and ground water protection by vegetable producers. Time was given as the main reason for adoption of water conservation practices by vegetable producers, with cost being a close second.

Thirty-five percent of the vegetable operations have experienced flooding within the last five years and a significant reduction (67%) in crop yield and quality resulted. Drought was reported by about 33% of the vegetable crops acreage surveyed and was associated with about a 50% reduction in yield and commodity quality.

In spite of these positive findings, there remain important educational challenges to optimize water use while protecting the environment (Muñoz-Carpena et al., 2003). Improvements are needed in four major areas:

1. The possible reduction in the use of high volume big gun irrigation systems.

2. Improvements in water management practices including record keeping, equipment maintenance, use of soil water content monitoring devices, and periodic irrigation evaluation by the Mobile Irrigation Lab.

3. Protection of water sources by increased use of capped and cased wells.

4. Generalized adoption (and adaptation to the particular soils and climatic conditions of the area) of the new state "Vegetable BMP Manual" integrating improved water management with nutrient and IPM.

Realizing an improvement in water conservation practices for smaller producers may be more difficult because of more limited manpower and financial resources available to them.

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## Footnotes

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