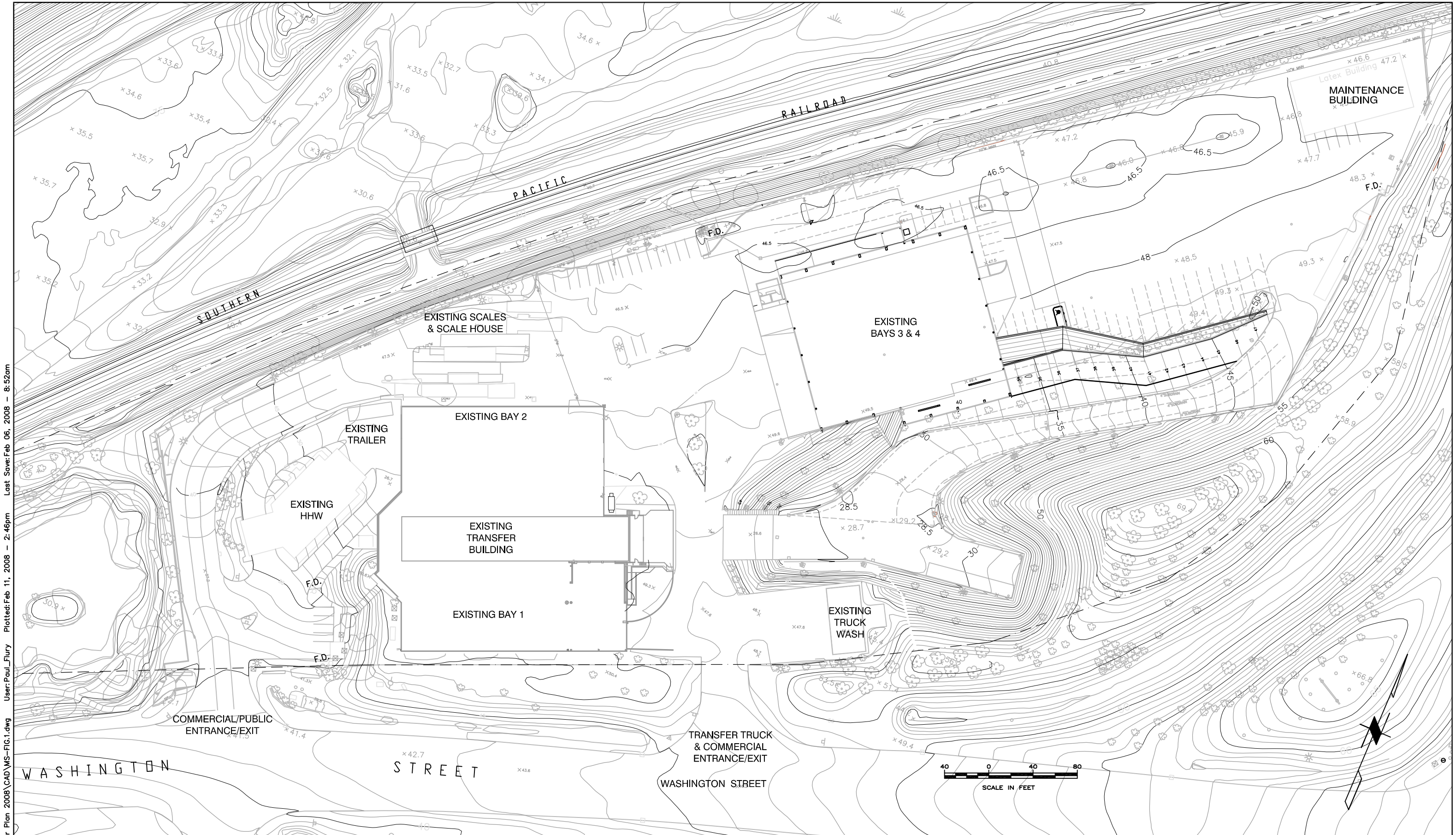

No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/07	PCF	FOR REVIEW

JOB No. 25696523	DESIGNED:	PROJ. ENGINEER: RWC
SCALE: AS NOTED	DRAWN BY: PCF	APPROVED BY:
	CHECKED BY:	DATE: FEB. 2008

WARNING
0 1/2 1
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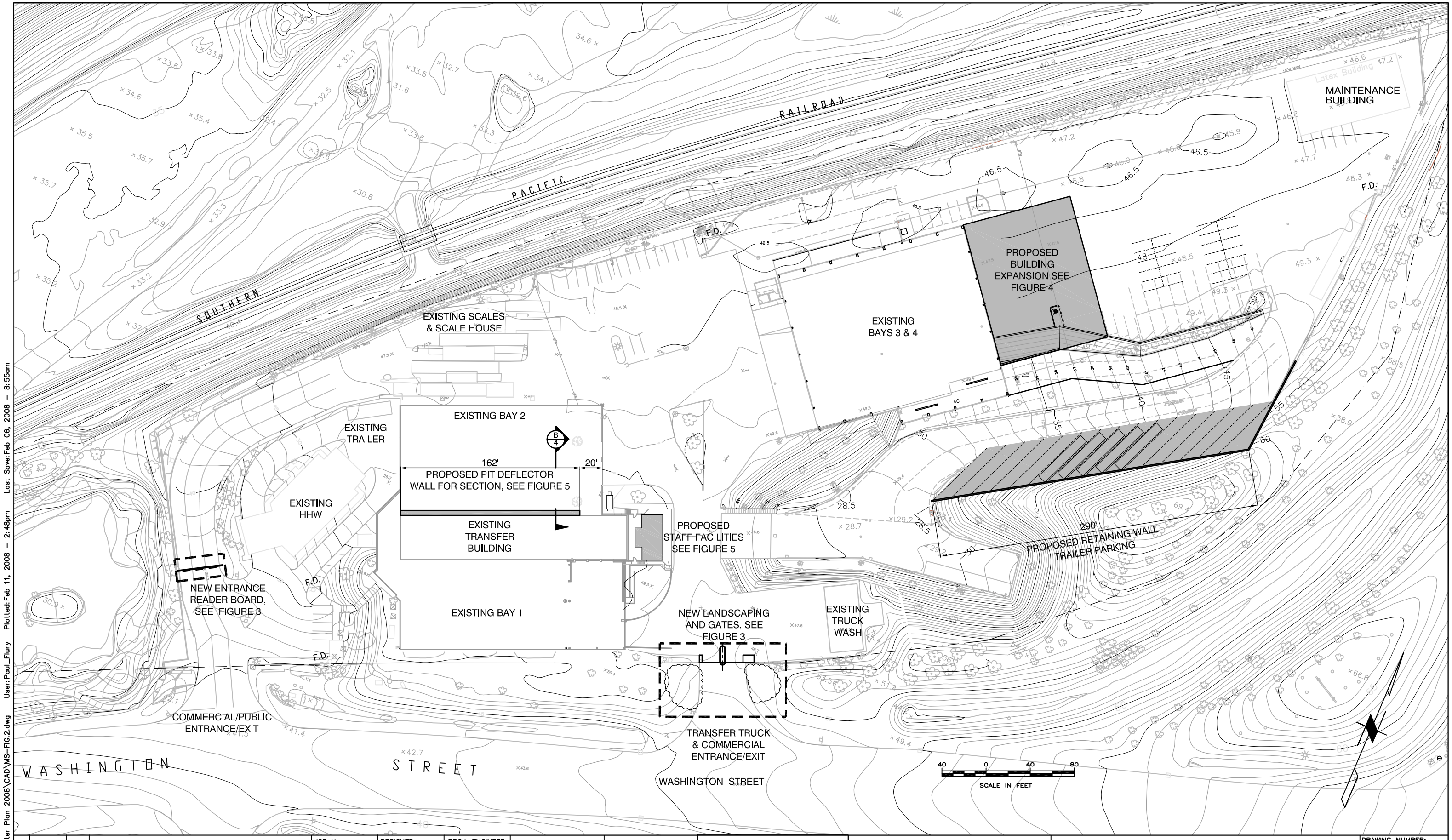
METRO SOUTH - MASTER PLAN 2008

SITE PLAN

DRAWING NUMBER: FIGURE 1
CAD FILE NUMBER:
SHEET: OF
REV. B



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No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/07	PCF	FOR REVIEW

JOB No. 25696523	DESIGNED:	PROJ. ENGINEER: RWC	WARNING 0 1/2 1 IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.
SCALE: AS NOTED	DRAWN BY: PCF	APPROVED BY:	
	CHECKED BY:	DATE: FEB. 2008	

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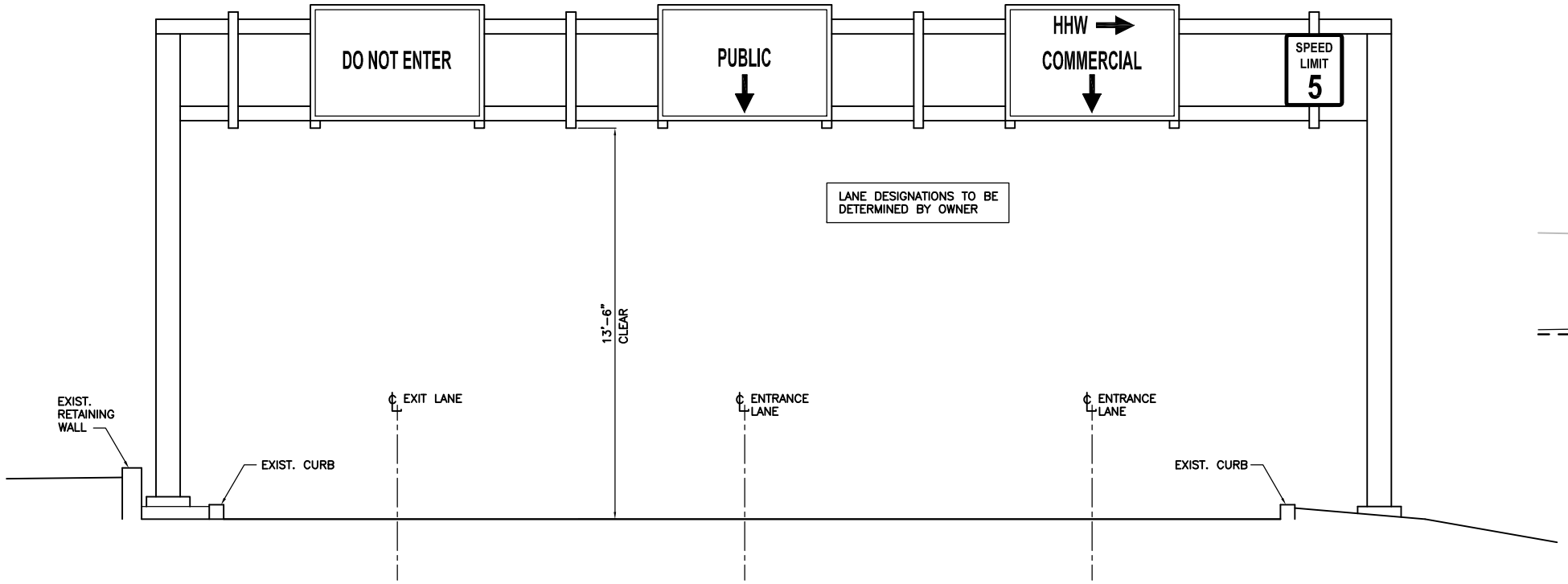
SITE PLAN

DRAWING NUMBER: FIGURE 2

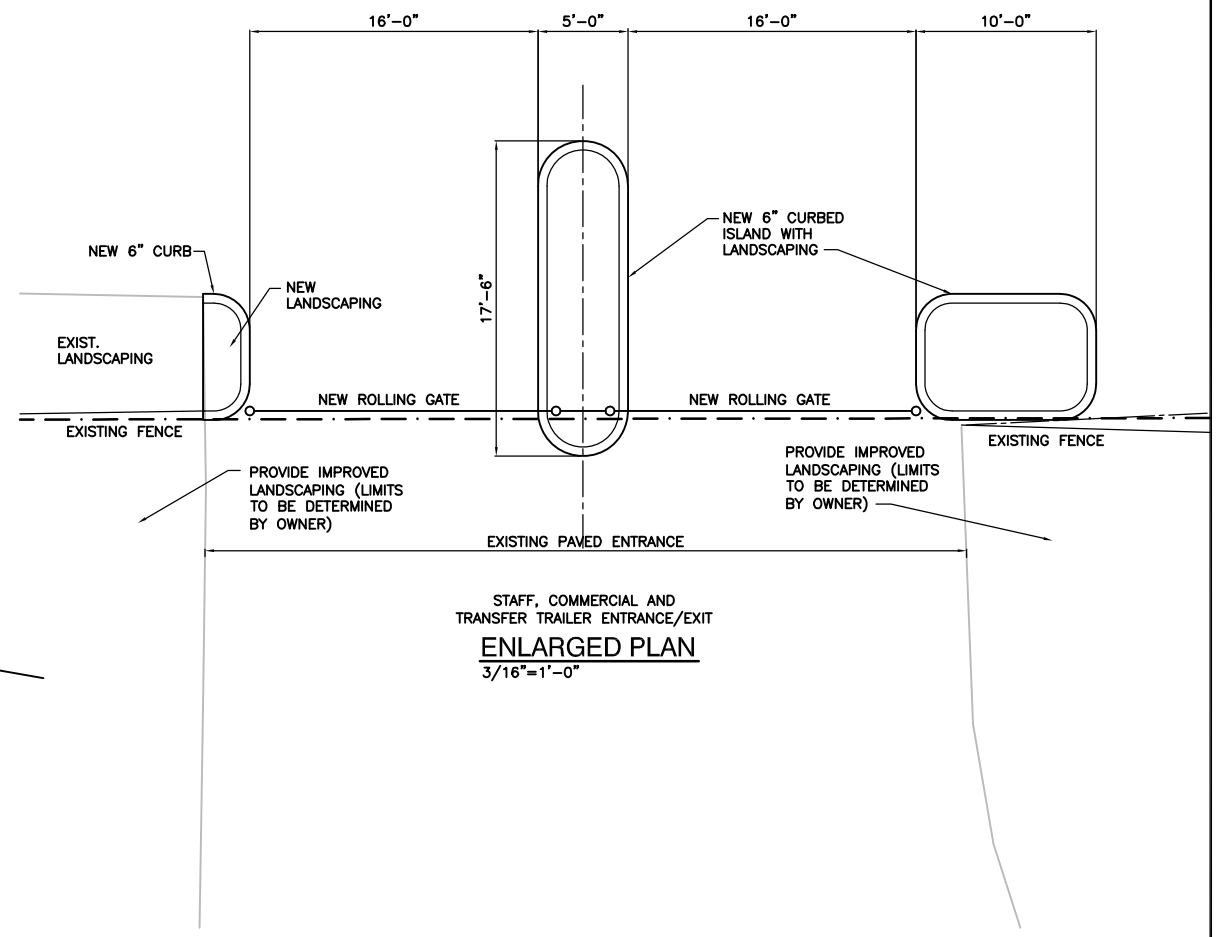
CAD FILE NUMBER:

SHEET: OF

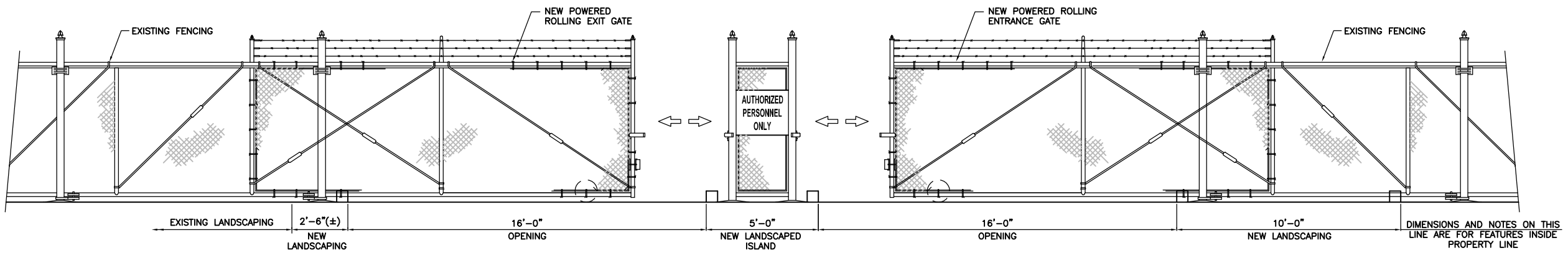
REV. B



ELECTRONIC ENTRANCE READER BOARD ELEVATION
3/8"=1'-0"



ENLARGED PLAN
3/16"=1'-0"



STAFF, COMMERCIAL AND TRANSFER TRAILER ENTRANCE/EXIT ELEVATION
3/8"=1'-0"

No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/07	PCF	FOR REVIEW

JOB No. 25696523 | SCALE: AS NOTED | DESIGNED: | DRAWN BY: PCF | CHECKED BY: | PROJ. ENGINEER: | APPROVED BY: | DATE: FEB. 2008

WARNING
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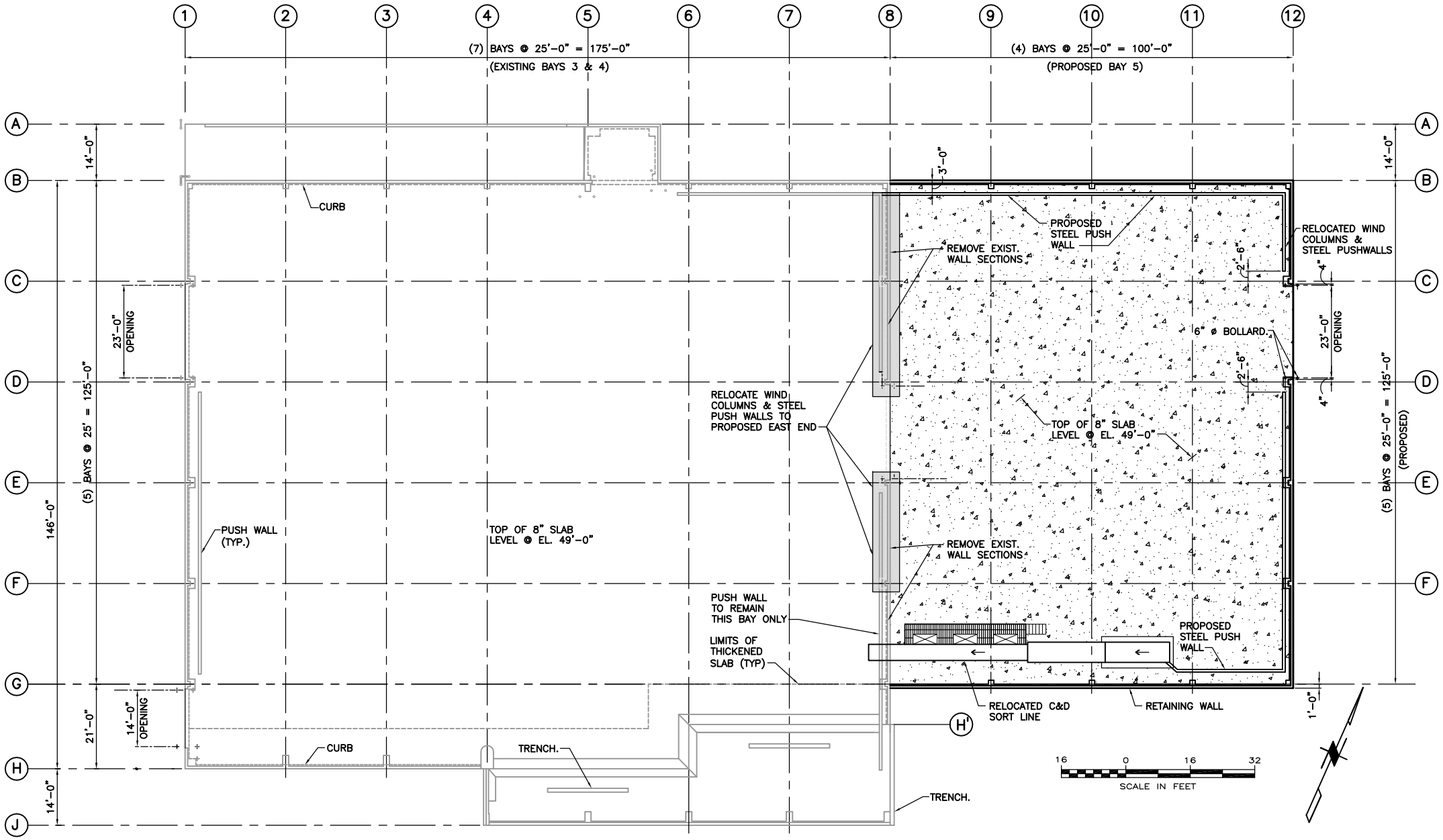
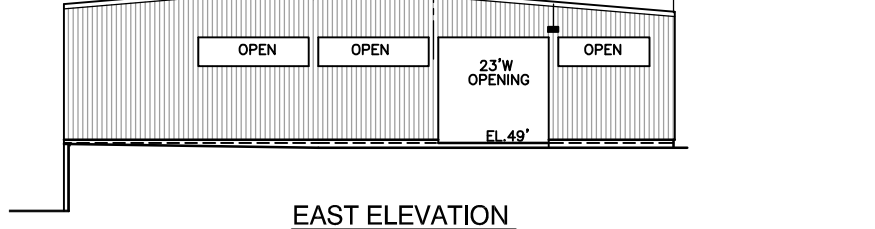
ENTRANCES
PLAN AND ELEVATIONS

DRAWING NUMBER: FIGURE 3
CAD FILE NUMBER:
SHEET: OF
REV. B

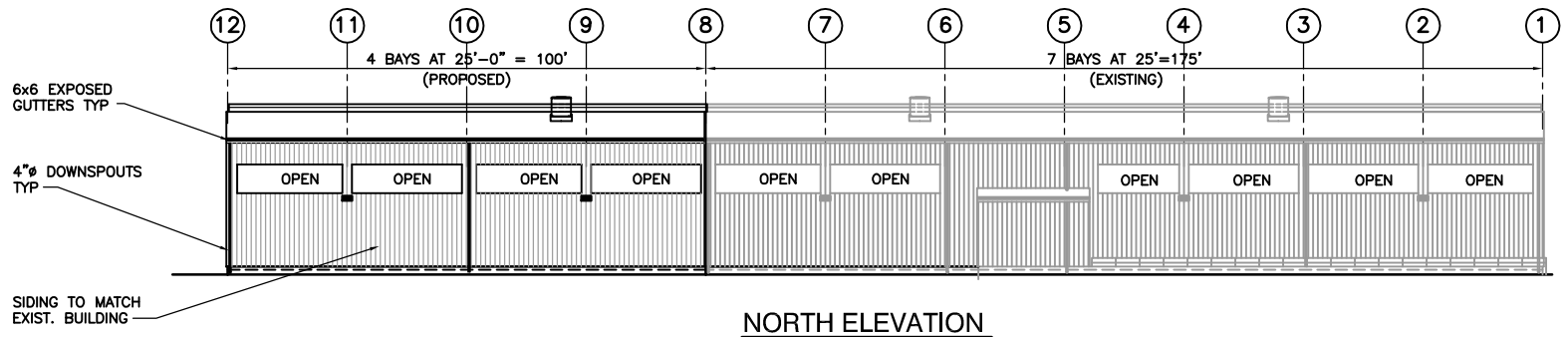
I:\Metro Projects\Master Plan 2008\CAD\MS-FIG.3.dwg User:Paul_Flury Plotted:Feb 11, 2008 - 2:49pm Last Saved:Feb 06, 2008 - 8:55am



PLAN



EAST ELEVATION



NORTH ELEVATION

20 0 20 40
SCALE IN FEET

No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/07	PCF	FOR REVIEW

JOB No. 25696523 | DESIGNED: | PROJ. ENGINEER: RWC
SCALE: AS NOTED | DRAWN BY: PCF | APPROVED BY:
CHECKED BY: | DATE: FEB. 2008

WARNING
0 1/2 1
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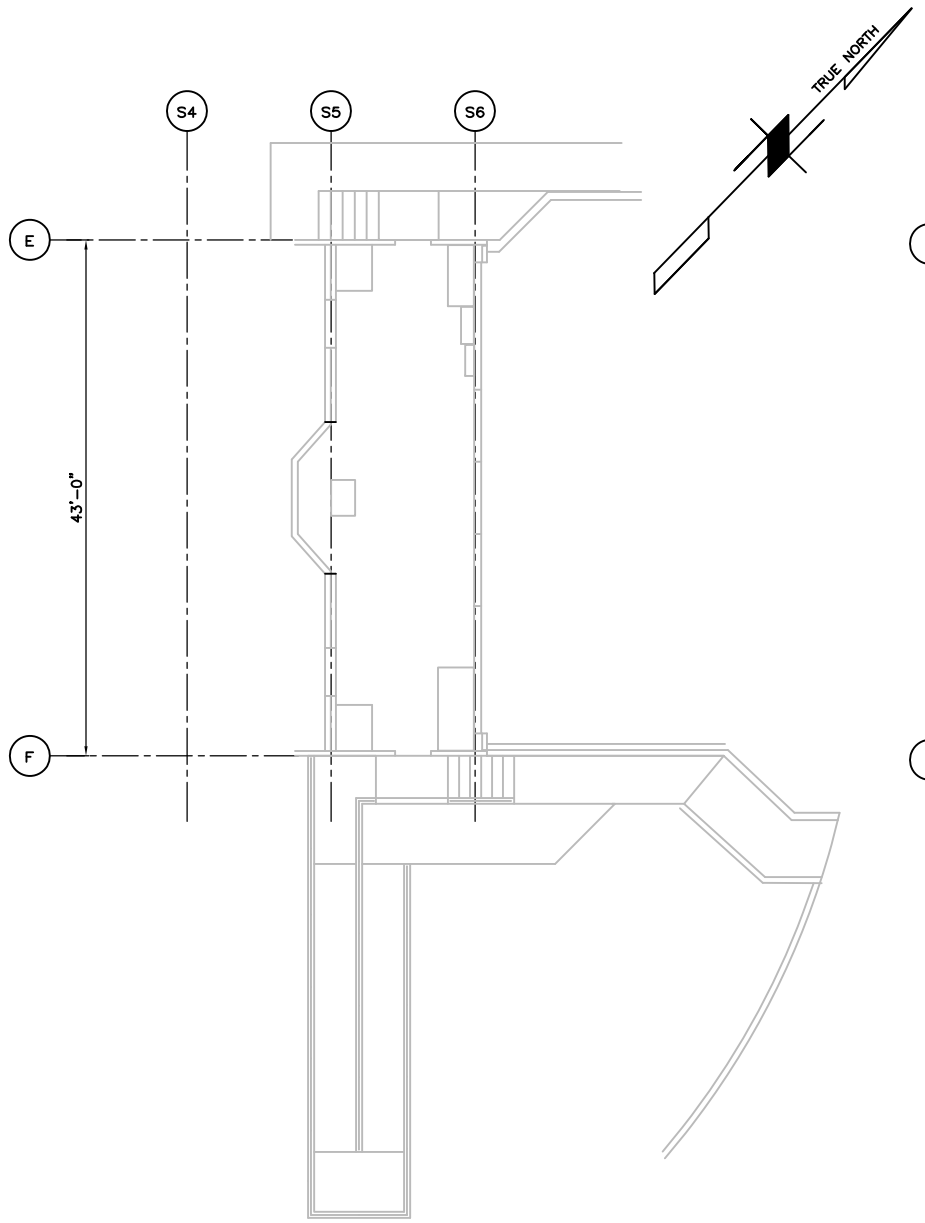
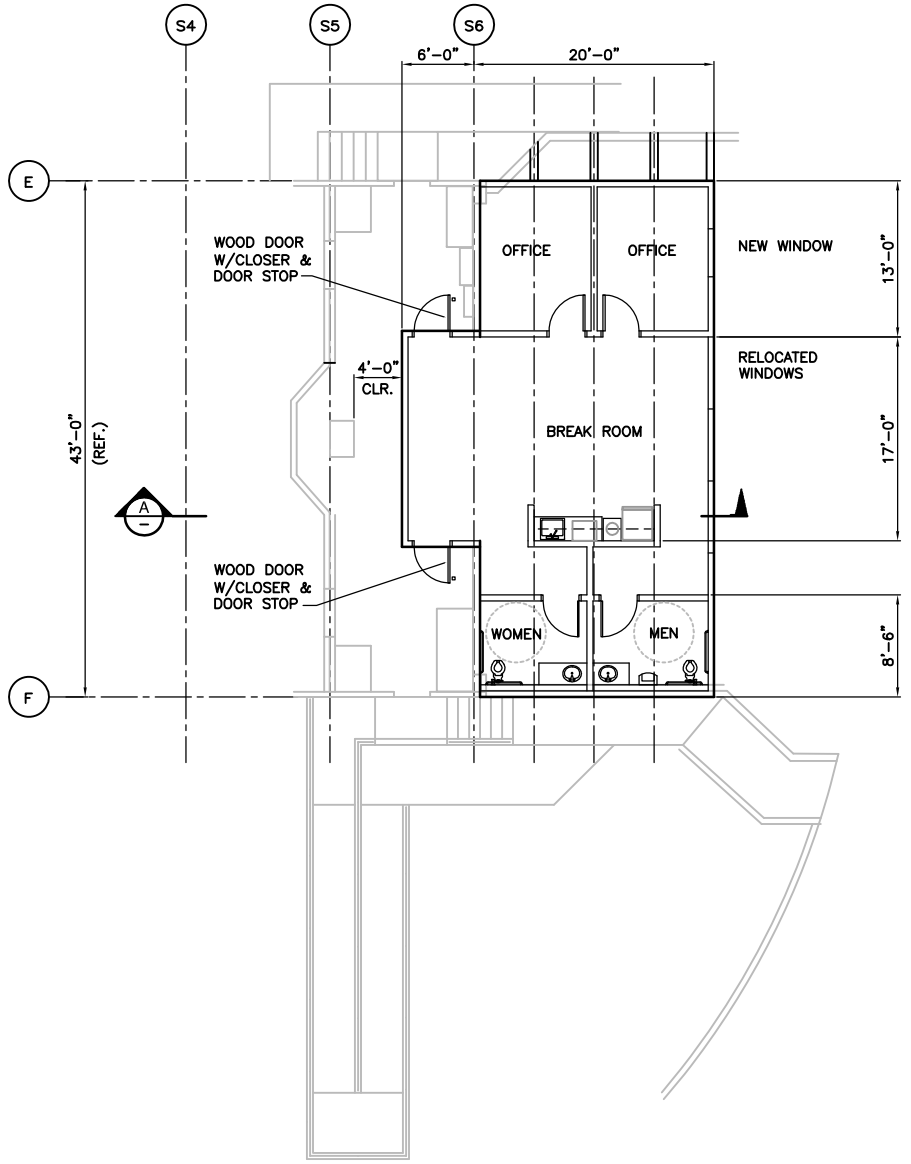
BAY 3 & 4 EXPANSION
PLAN AND ELEVATIONS

DRAWING NUMBER: FIGURE 4
CAD FILE NUMBER:
SHEET: OF | REV. B

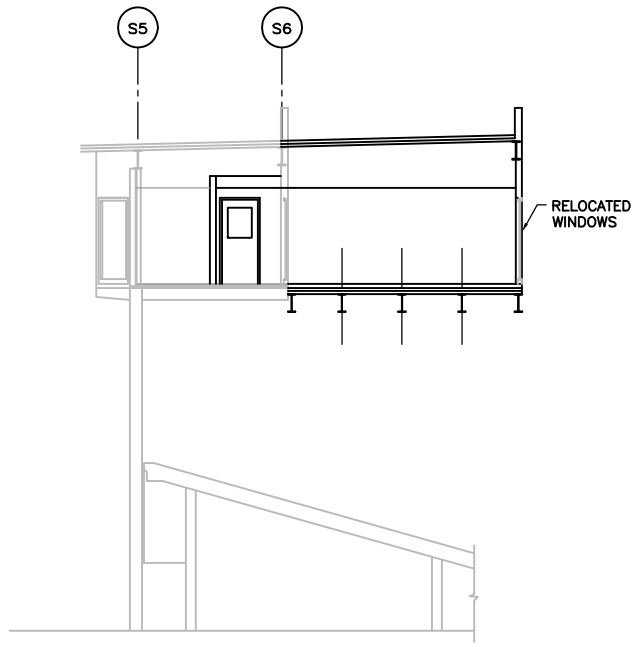


EXISTING CONTROL ROOM FLOOR PLAN
1/8"=1'-0"

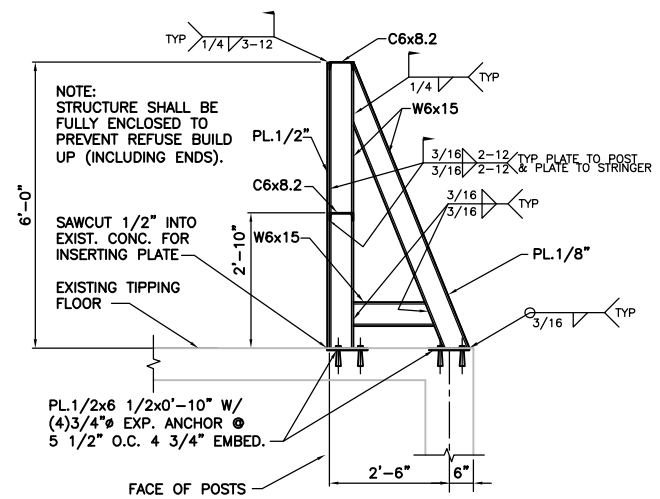


EXISTING CONTROL ROOM FLOOR PLAN
1/8"=1'-0"

8 0 8 16
SCALE IN FEET



SECTION A
1/8"=1'-0"



BAY 2 - TYPICAL SECTION
PIT DEFLECTOR/STORAGE WALL
1/2"=1'-0"

No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/07	PCF	FOR REVIEW

JOB No. 25696523
SCALE: AS NOTED
DESIGNED:
DRAWN BY: PCF
CHECKED BY:
PROJ. ENGINEER:
APPROVED BY:
DATE: FEB. 2008

WARNING
0 1/2 1
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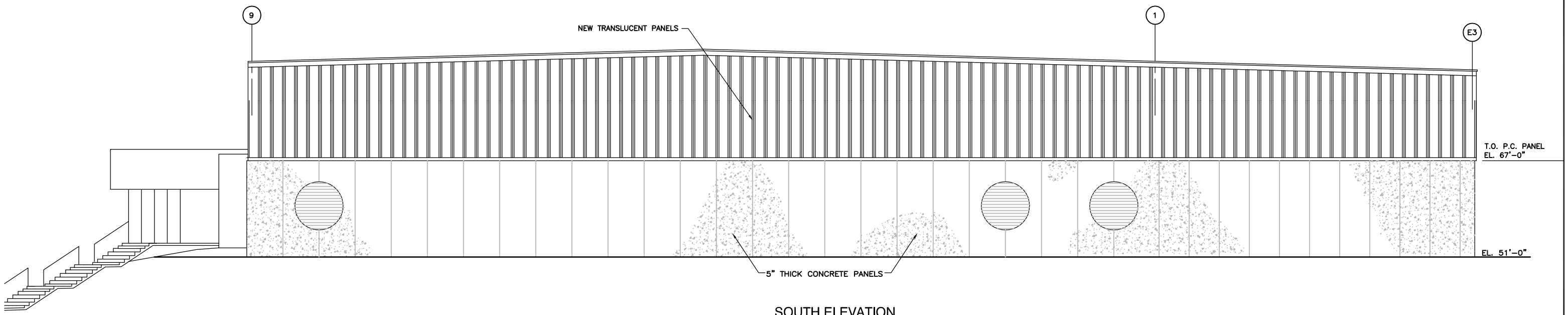
STAFF FACILITIES
PLANS AND SECTION

DRAWING NUMBER: FIGURE 5
CAD FILE NUMBER:
SHEET: OF
REV. B



SOUTH ELEVATION
1/8"=1'-0"

I:\Metro Projects\Master Plan 2008\CAD\MS-FIG.6.dwg User:Paul_Flury Plotted:Aug 08, 2008 - 11:29am Last Save:Jul 30, 2008 - 1:34pm

No.	DATE	BY	REVISION
A	08/01/07	PCF	FOR REVIEW

JOB No. 25696523 | DESIGNED: | PROJ. ENGINEER: RWC
SCALE: AS NOTED | DRAWN BY: PCF | APPROVED BY:
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WARNING
0 1/2 1
IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.

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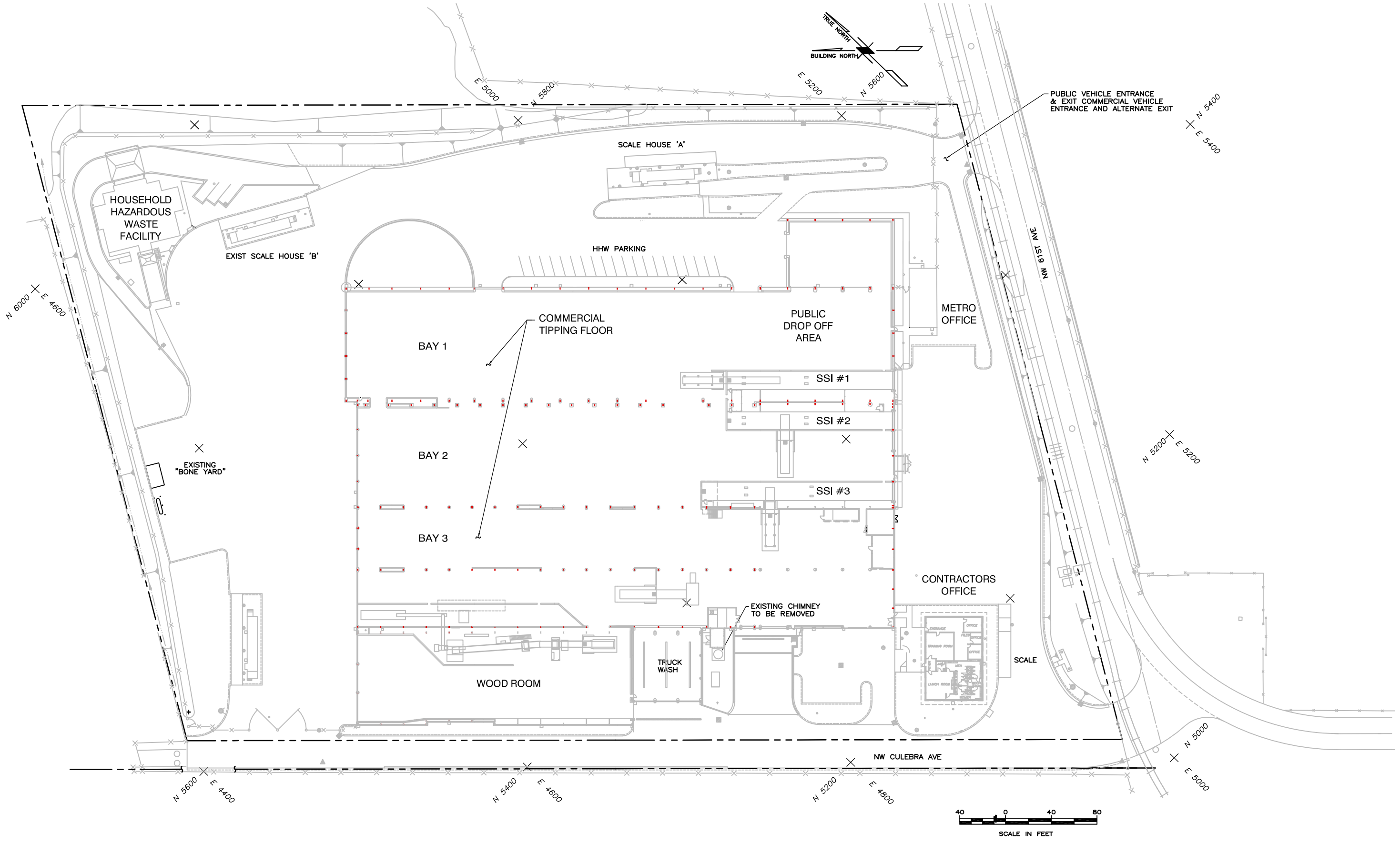
METRO SOUTH - MASTER PLAN 2008
MAIN BUILDING
SOUTH ELEVATION

DRAWING NUMBER: FIGURE 6
CAD FILE NUMBER:
SHEET: OF | REV. A



No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/08	BJR	FOR REVIEW

JOB No. 25696523	DESIGNED:	PROJ. ENGINEER: RWC	WARNING 0 1/2 1 IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.
SCALE: 1=40'-0"	DRAWN BY: BJR	APPROVED BY:	
	CHECKED BY: RWC	DATE: FEB. 2008	

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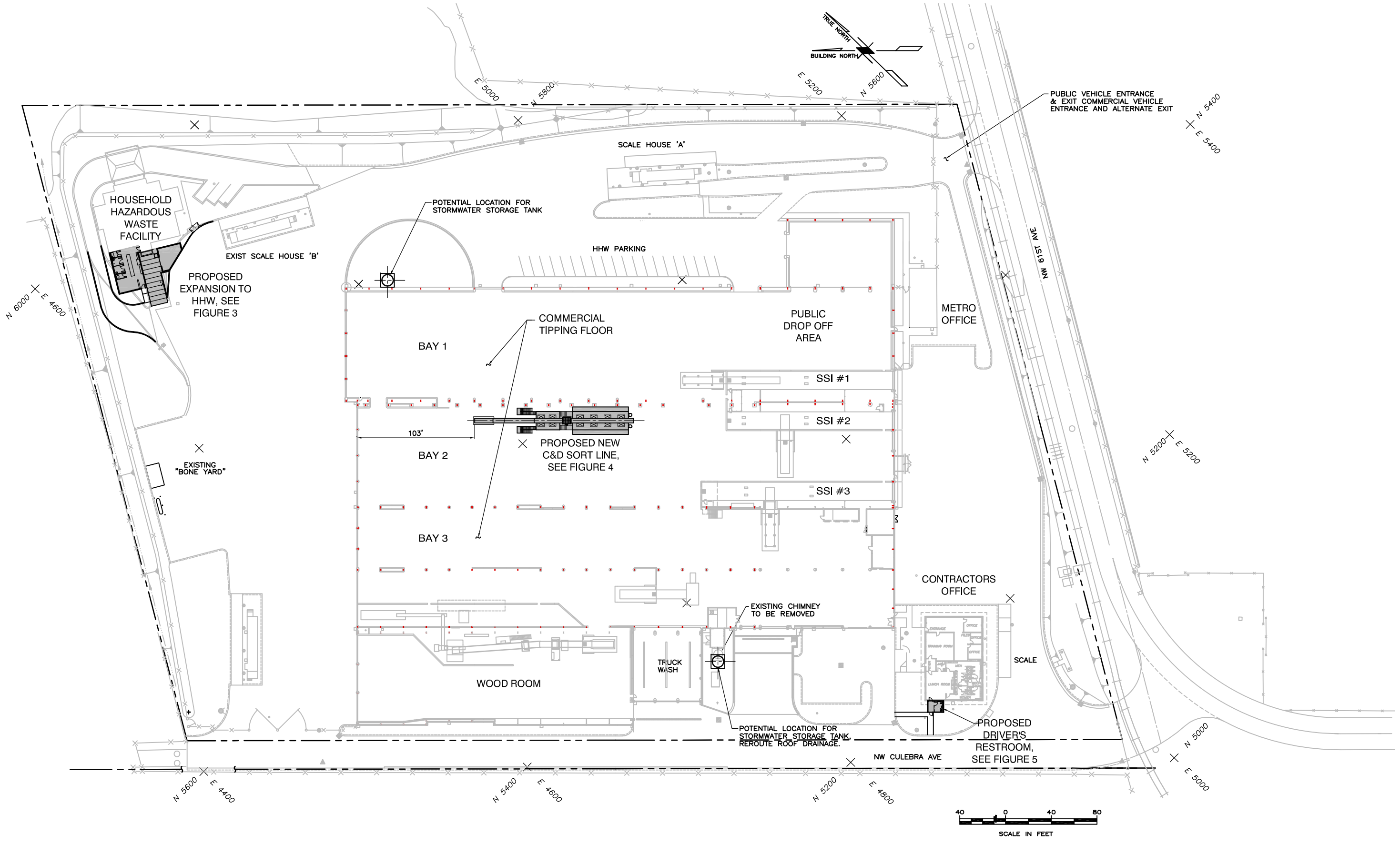
METRO CENTRAL - MASTER PLAN 2008

SITE PLAN

DRAWING NUMBER: FIGURE 1
CAD FILE NUMBER: MC-FIG-1
SHEET: OF
REV. B

I:\Metro Projects\Master Plan 2008\CAD\MC-FIG-1.dwg Feb 11, 2008 - 2:38pm



No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/08	BJR	FOR REVIEW

JOB No. 25696523	DESIGNED:	PROJ. ENGINEER: RWC	WARNING 0 1/2 1 IF BAR DOES NOT MEASURE 1" AT FULL SIZE, THEN SCALES ON DRAWING NOT TO SCALE.
SCALE: 1=40'-0"	DRAWN BY: BJR	APPROVED BY:	
	CHECKED BY: RWC	DATE: FEB. 2008	

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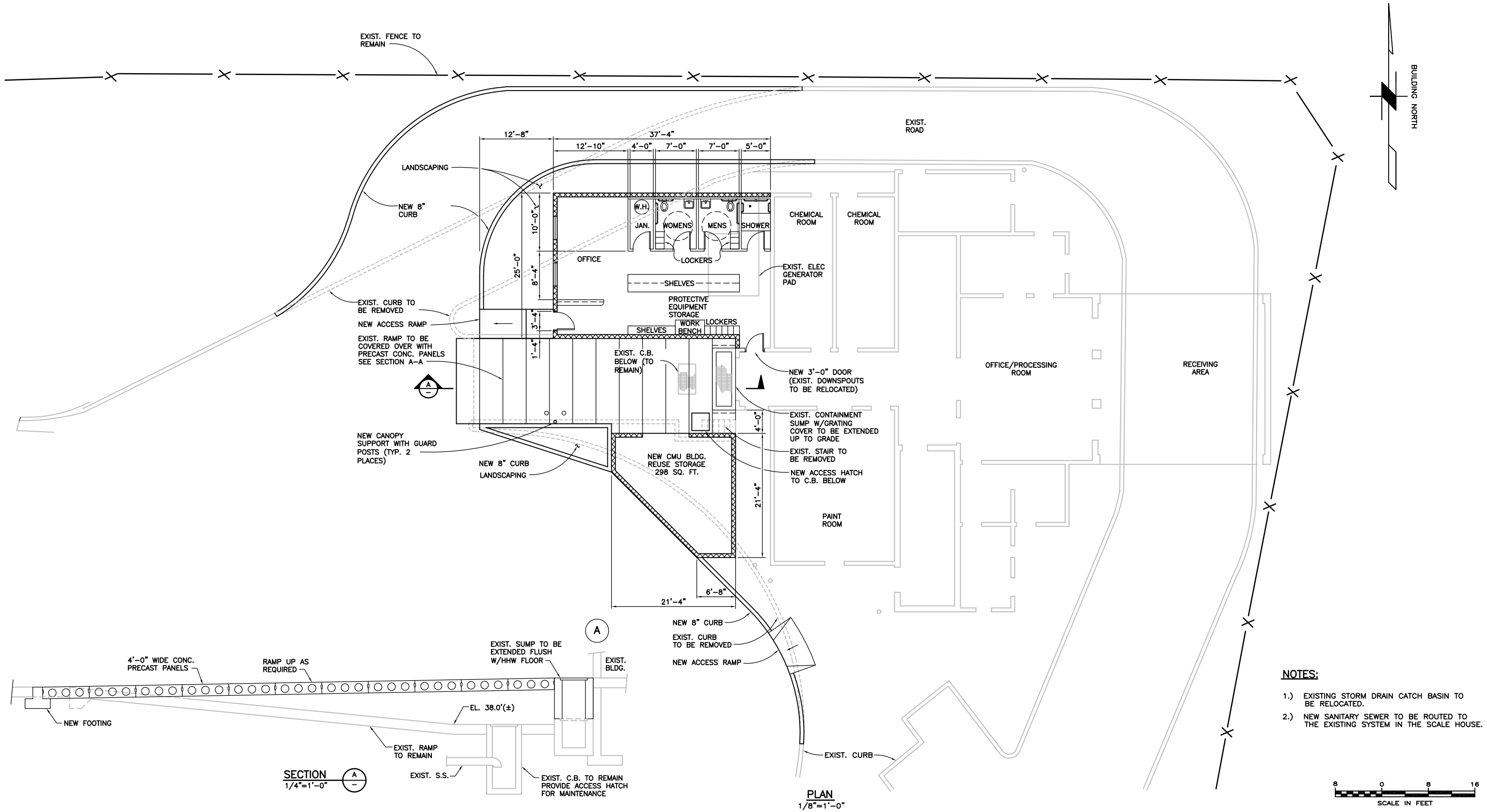
MASTER PLAN
SITE LAYOUT

DRAWING NUMBER: FIGURE 2
CAD FILE NUMBER: MC-FIG-2
SHEET: OF
REV. B

I:\Metro Projects\Master Plan 2008\CAD\MC-FIG-2.dwg Feb 11, 2008 - 2:39pm



No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/08	PCF	FOR REVIEW

JOB No. 25696523
SCALE: AS NOTED
DESIGNED:
DRAWN BY: PCF
CHECKED BY:
PROJ. ENGINEER:
APPROVED BY:
DATE: FEB. 2008

WARNING
0 1/2 1
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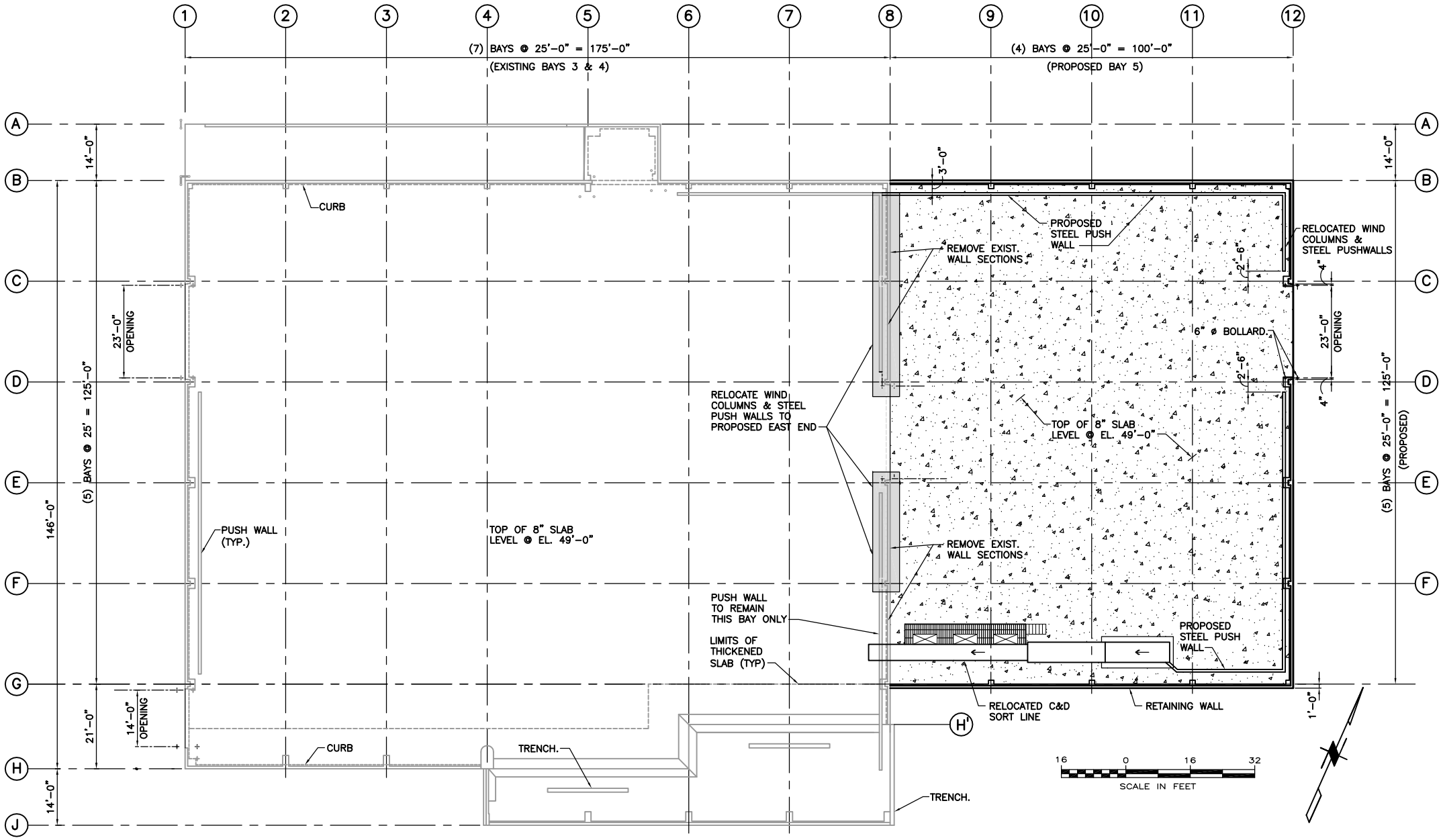
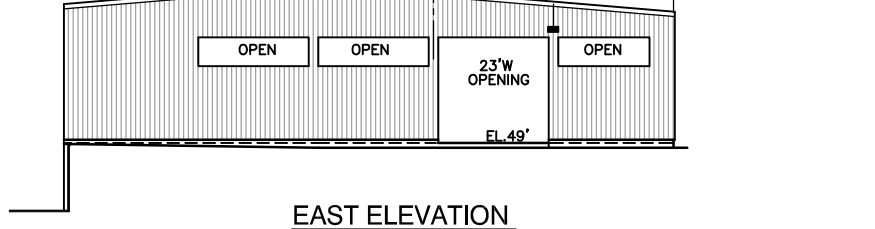
METRO CENTRAL - MASTER PLAN 2008
HHW EXPANSION
PLAN & SECTION

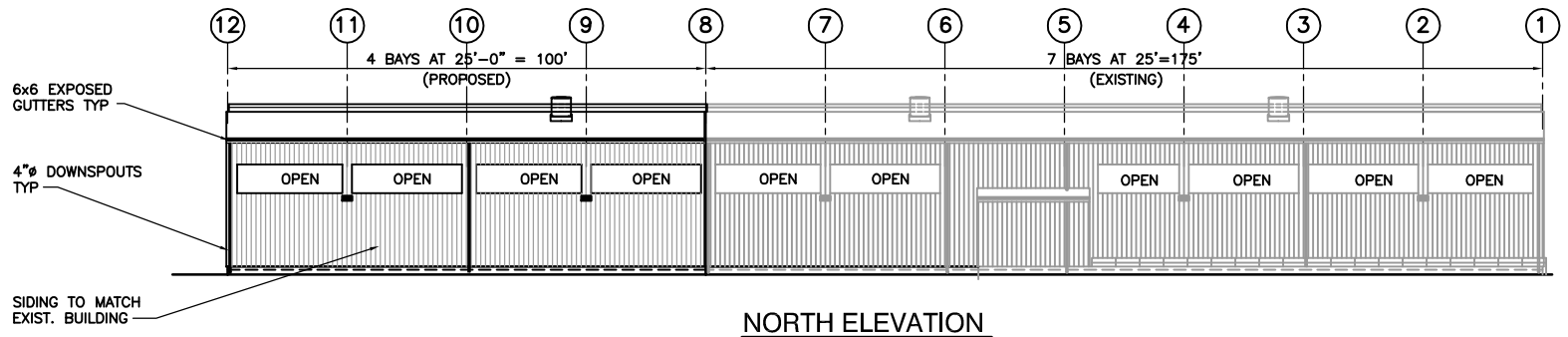
DRAWING NUMBER: FIGURE 3
CAD FILE NUMBER: MC-FIG-3
SHEET: OF
REV. B



PLAN



EAST ELEVATION



NORTH ELEVATION

20 0 20 40
SCALE IN FEET

No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/07	PCF	FOR REVIEW

JOB No. 25696523 | DESIGNED: | PROJ. ENGINEER: RWC
SCALE: AS NOTED | DRAWN BY: PCF | APPROVED BY:
CHECKED BY: | DATE: FEB. 2008

WARNING
0 1/2 1
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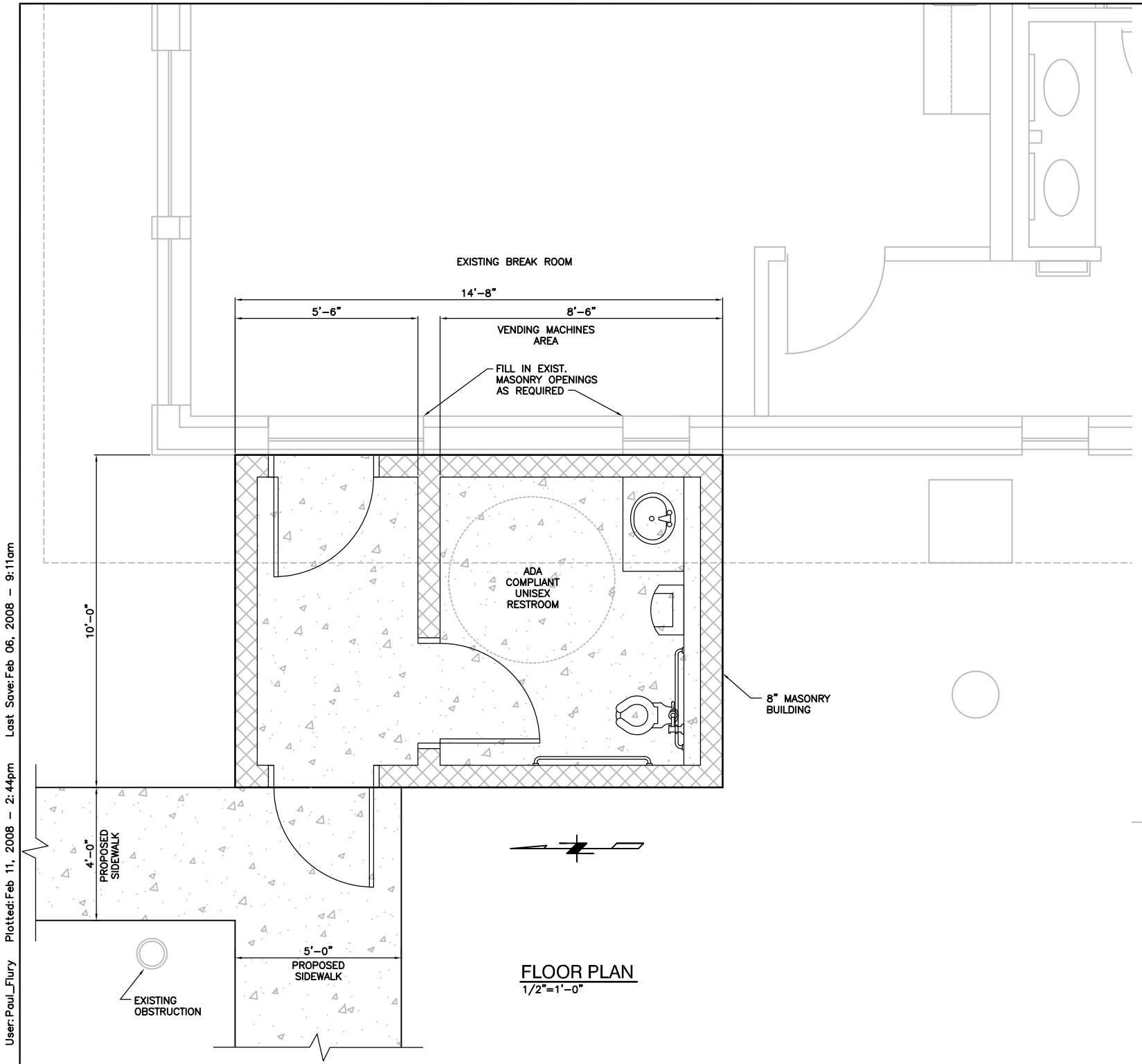
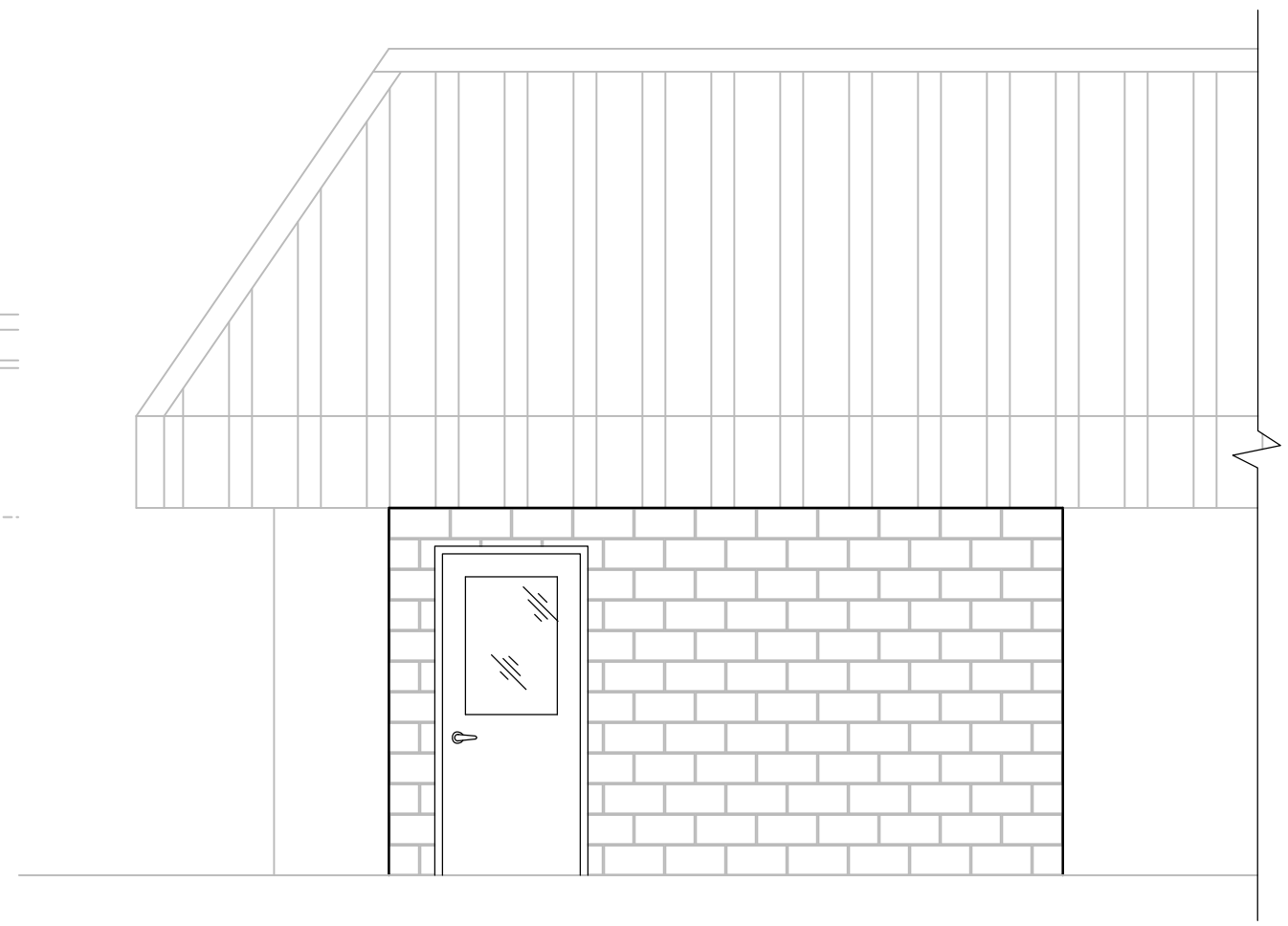
METRO SOUTH - MASTER PLAN 2008

BAY 3 & 4 EXPANSION
PLAN AND ELEVATIONS

DRAWING NUMBER: FIGURE 4
CAD FILE NUMBER:
SHEET: OF | REV. B



FLOOR PLAN
1/2"=1'-0"



WEST ELEVATION
1/2"=1'-0"

I:\Metro Projects\Master Plan 2008\CAD\MC-FIG-5.dwg User:Paul_Flury Plotted:Feb 11, 2008 - 2:44pm Last Save:Feb 06, 2008 - 9:11am

No.	DATE	BY	REVISION
B	02/12/08	PCF	FOR REVIEW
A	01/04/08	PCF	FOR REVIEW

JOB No. 25696523
SCALE: AS NOTED
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PROJ. ENGINEER:
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WARNING
0 1/2 1
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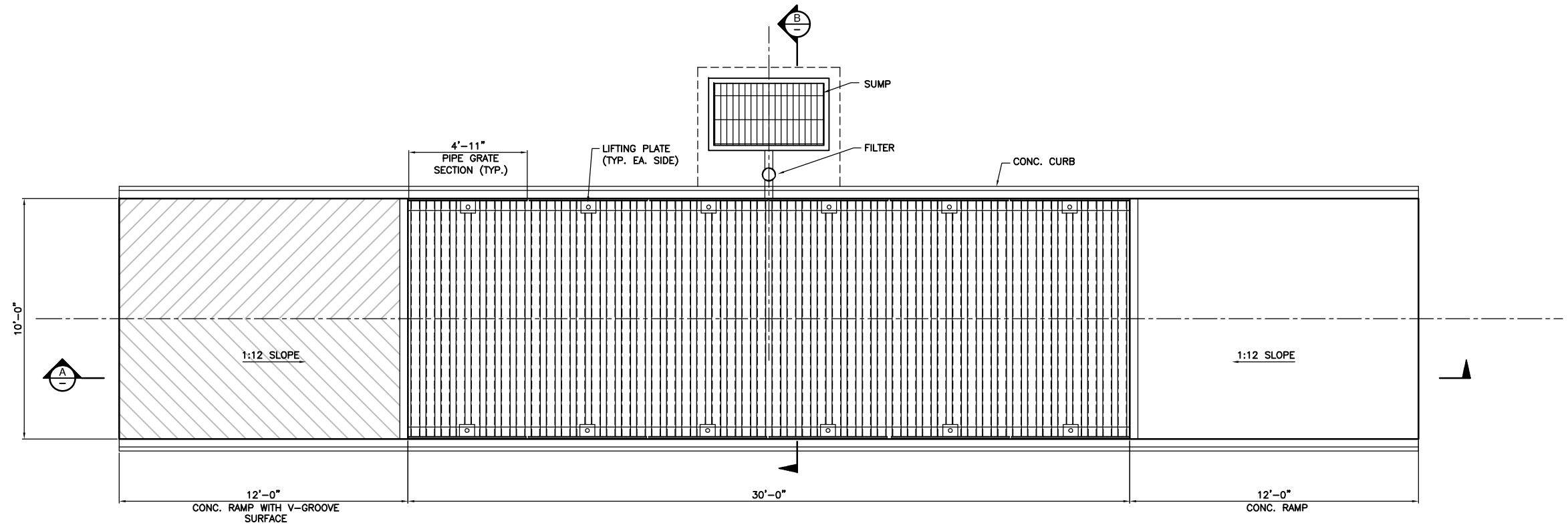
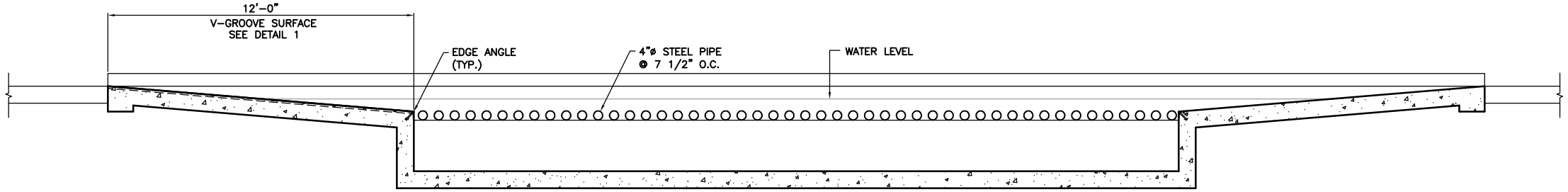
METRO CENTRAL - MASTER PLAN 2008
DRIVERS RESTROOM
PLAN & ELEVATION

DRAWING NUMBER: FIGURE 5
CAD FILE NUMBER: MC-FIG-5
SHEET: OF
REV. B

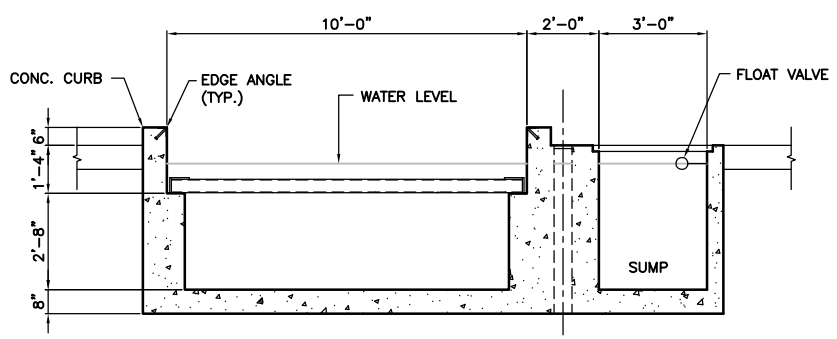


PLAN
3/8"=1'–0"

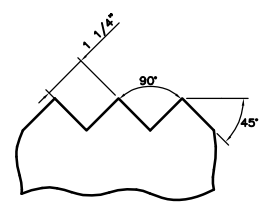
2 0 2 4 6
SCALE IN FEET



SECTION A
3/8"=1'–0"



SECTION B
3/8"=1'–0"



V–GROOVE SECTION

DETAIL 1
N.T.S.

No.	DATE	BY	REVISION
A	05/01/08	PCF	FOR REVIEW

JOB No. 25696523
SCALE: AS NOTED
DESIGNED:
DRAWN BY: PCF
CHECKED BY:
PROJ. ENGINEER:
APPROVED BY:
DATE: MAY 2008

WARNING
0 1/2 1
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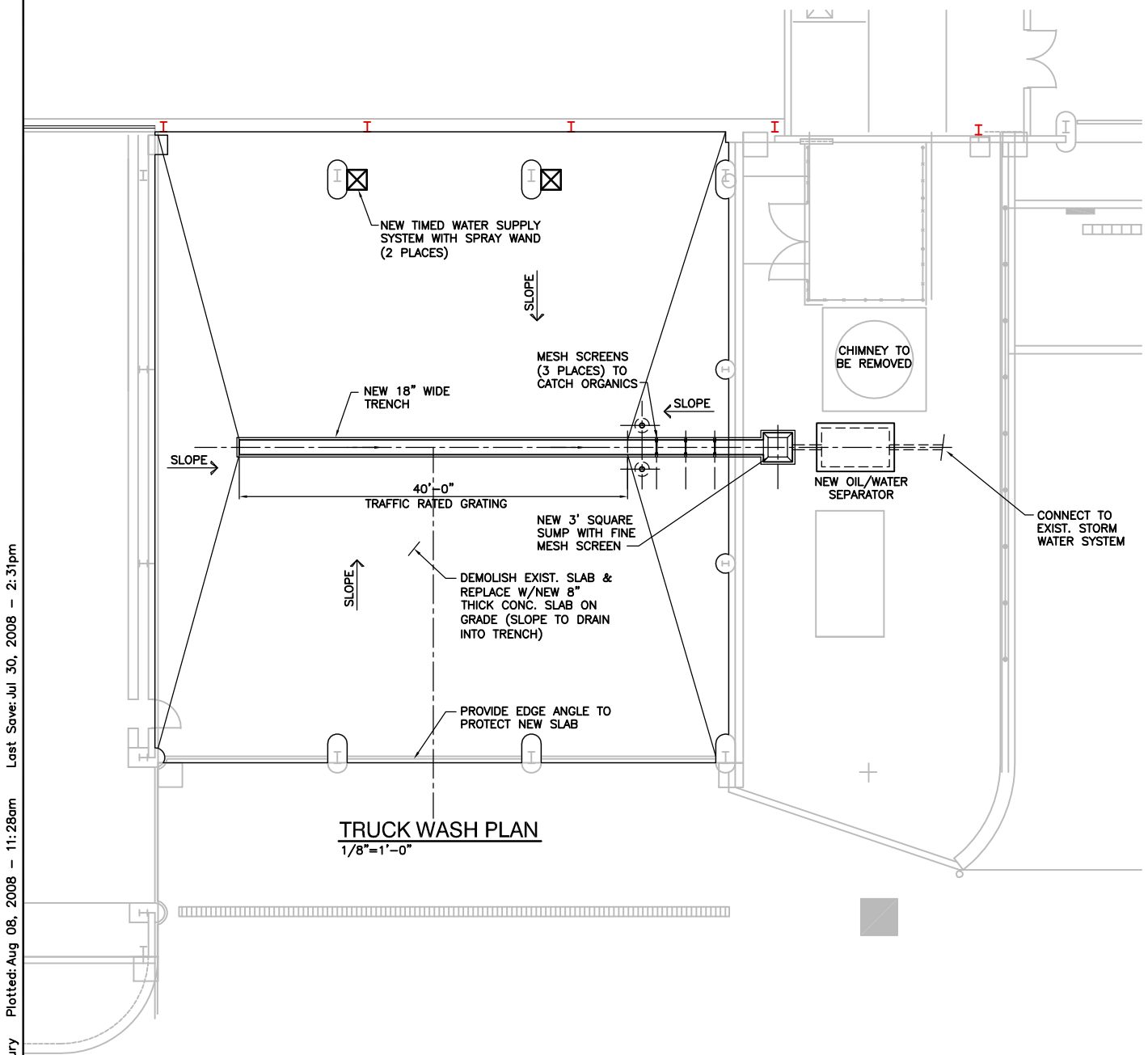
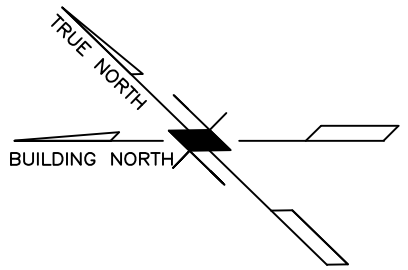
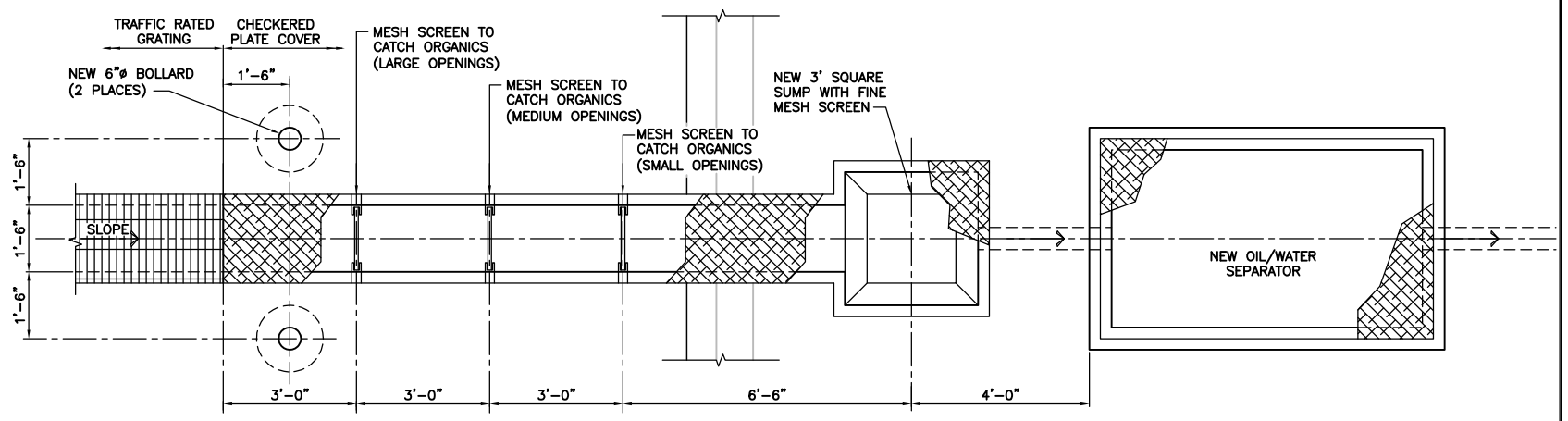
METRO CENTRAL - MASTER PLAN 2008
WHEEL WASH
PLAN & SECTIONS

DRAWING NUMBER: FIGURE 6
CAD FILE NUMBER: MC–FIG–6
SHEET: OF
REV. A



TRUCK WASH PLAN
1/8"=1'-0"





ENLARGED PLAN
1/2"=1'-0"

No.	DATE	BY	REVISION
A	08/01/08	PCF	FOR REVIEW

JOB No. 25696523 | DESIGNED: SB | PROJ. ENGINEER:
SCALE: AS NOTED | DRAWN BY: PCF | APPROVED BY:
CHECKED BY: | DATE: AUG. 2008

WARNING
0 1/2 1
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METRO CENTRAL - MASTER PLAN 2008
TRUCK WASH IMPROVEMENTS
PLAN & SECTIONS

DRAWING NUMBER: FIGURE 7
CAD FILE NUMBER: MC-FIG-7
SHEET: OF | REV. A

Facility Site Selection Process

A new transfer station site requires a location that could serve the greatest number of commercial and public customers while providing the ability to meet current and future requirements. It must have access for local vehicles to deliver waste and drop off recyclable materials. The new facility must provide for the following:

- New Transfer station building
- New scales and scalehouse
- Adequate space for maintenance and storage of equipment
- Recycling drop off center
- Household Hazardous Waste facility
- Adequate queue space for peak traffic conditions
- Possible expansion area for dump and pick of hi-grade commercial loads

Siting Considerations

The search for a new transfer station site requires the consideration of important issues. The search to replace Metro South Station should focus on three primary issues that will determine how well the facility and its location will serve the region.

Access, Size and Service

The site's access and size will determine its ability to provide service that is compatible with the solid waste system and meets community needs. The right location and acreage allows more options for generators (commercial and citizens), site use, and access to recycling markets. It also means that utility infrastructure service is available to meet siting and operating requirements.

The site should be in a central location to serve the largest number of customers and minimize travel time and cost of commercial collection companies to deliver waste. The contrast and comparison of the current facility service area versus a demand forecast of regional growth and a change in the center of waste generation is the basis for the initial site research.

Transportation Options

The largest solid waste system cost is transportation, which is a function of distance and the appropriate delivery system for disposal. Today, waste is moved throughout the country via road, rail and river. The current Metro contract for the transport of the region's MSW to the Columbia Ridge Landfill expires in December 2009. The agency's 2008 Request for Proposal process is explicit about the concept that Metro will consider all transportation modes for the next contract. A new transfer station site that provides access to those transportation

options allows Metro the flexibility to change modes should costs and circumstances change over time.

Land Use Compatibility

The policy and politics of siting a solid waste transfer station mandate land use compatibility. A site that has the proper zoning designation, requires minimal or no conditions of use, and is buffered from residential neighborhoods offers a better chance for community acceptance.

The search for and selection of a compatible property can be very difficult.

The Facility Siting Process by Phase

The facility siting process includes three phases of review specific to site selection. The first phase, which matches a range of sites with certain criteria, is designed to conduct a broad review of possible locations and reduces them to a select set of possible sites. The second phase compares the selected locations against additional criteria to reduce the options and recommend a preferred site(s). The third phase is the selection of a preferred site and the negotiations to acquire it.

Phase One Criteria

This phase matches a set of baseline criteria with a list of properties provided by an industrial real estate expert. The properties that satisfy these criteria are moved to the list of preferred site for additional consideration. The properties that do not meet the criteria are eliminated from consideration.

Metro should begin this process through the GIS research with the agency's planning department. The preliminary research should match industrial land and locations throughout the regional area under consideration for the new facility. For example, the standard zone designation that allows solid waste facilities is Heavy Industrial. This zone may allow this activity with or without specific conditions of development and operation.

This industrial land search may often indication that potential sites are located in distinct clusters. The sequence process then logically compares the number of sites in each cluster, their size, ownership, and proximity to transportation corridors and to the center of waste generation. This phase will focus on the following essential issues:

Local Land Use - Considers industrial sites that are compatible because they have the appropriate designation and may not require a conditional use process.

Size and Configuration - Considers the ability of any site to meet the minimum standards and size for facility use that includes household hazardous waste, recycling, on-site queuing, equipment storage, and site management.

System Compatibility - Considers if the site is compatible with the county's solid waste system. This is a function of location with respect to generators, disposal sites, recycling markets and transportation modes. Any system review includes a central location that serves a high percentage of the regional population.

Transportation Access - Considers site locations in relation to local and regional services for road, rail and water.

Evaluation Results from Phase One

The GIS research should provide industrial land alternatives and property clusters that meet preliminary standards for all infrastructure requirements. This information will allow the Metro staff to conduct a site tour to identify how well these cluster locations are served by infrastructure and the condition of the respective services. These criteria include:

Road, Rail and Utility Access

The analysis will identify locations in the clusters that meet access standards for multi-modal service and utility infrastructure. The sites served by collector and arterial streets, as well as rail access, are preferred locations

Transportation Options Access

This will be important as Metro completes its 2008 transportation RFP process for the next ten years of delivering MSW to the Columbia Ridge Landfill. The ability to maximize these options through site selection is a very important consideration for future infrastructure development and maintenance decisions.

Transportation Costs

The analysis should include consideration of future transportation costs. A recent review of the costs for each mode through the 2008 RFP selection provides a rationale for the value of multi-modal options. This is important to Metro as it considers the future alternatives for delivery of its solid waste for disposal in 2020. The availability of regional landfill sites for distant disposal should allow competitive transportation costs for service.

Property Acquisition

The Phase Two analysis will identify preferred private and public properties as potential facility locations. Important factors in this search include the acquisition and development costs of each site. The property acquisition decision by Metro is also a function of time. A

properly zoned property, available through a willing seller, lessor or partner, will reduce time for the transaction and development process for the facility.

Phase Two Criteria

This phase provides an additional evaluation of each preferred site based on a refined set of criteria and field review. The close examination of each site includes the identification of any possible fatal flaws. These flaws, which may include land use or traffic-related conflicts, assist in identifying preferred sites that fail the Phase Two analyses.

The most important element in the Phase Two evaluations is a field review of each site. This activity allows Metro to match the research for each site with a thorough field investigation.

The Phase Two process should identify the preferred sites for further consideration. These sites should be reviewed and approved based on the Phase One criteria of local land use, size and configuration, system compatibility, and transportation access. This approval will make these sites appropriate for consideration during Phase Two. The Phase Two criteria include the following.

Land Use Compatibility

It is important that the facility be compatible with community use. The standard code for regional jurisdictions should have land use designations that permit a transfer station with or without siting conditions. The sites considered in this phase must have proper zoning, preferably a zone that will allow the facility without any encumbrances.

Local Traffic Impacts

Traffic is often the most complex element of facility siting. The transfer station should have good access to major collectors or arterials as well as to highway, rail and water use. This access, however, cannot impede the traffic flow around the preferred site. As a result, the facility should include on-site queuing capacity and be a reasonable distance from signal intersections or railroad crossings.

Ease of Construction

The shape, size and construction suitability of each preferred site are important elements of this criterion. Sites that don't limit construction options or require major grading improvements will rank higher in the evaluation process.

Availability of Utilities

The site selected for the transfer station should have utility service available. Power, sewer and water service infrastructure will assure timely development of the facility and not require additional cost for new utility site service.

Cost of Land and Development

The costs to acquire and develop the project site are important factors in a decision about the transfer station location. An expensive site with unusual development costs, including terrain and wetlands features, will be reflected in facility's operations and rate base.

Evaluation Results from Phase Two

This evaluation will provide a list of the final property considerations based on their respective priority rank and recommendation by the Metro staff for a preferred location. The two sites with the highest rankings should then move to Phase Three for preliminary acquisition discussions with the property owners.

2007METRO SOLID WASTE FACILITIES MASTER PLAN UPDATE

Interviews Summary
October 2007

In August and September of 2007, URS conducted interviews with six Metro Headquarters Managers, two Metro Central and two Metro South operations staff who are Metro employees, and two Allied Waste personnel, one at each site. The questions URS asked were:

- What is your role and responsibilities at the transfer station? Who is your supervisor?
- Where is the transfer station operation deficient in customer service? Examples?
- How can the transfer station operation provide more flexibility in materials management and recovery?
- Where is the transfer station operation deficient in employee safety and efficiency? Examples?
- How can the transfer station operation improve its contribution to regional sustainability? Examples?
- Where is the hazardous waste facility operation deficient in its capacity and service? Examples?
- What are the other important issues for your role in the transfer station operation?

The responses are summarized below.

General Issues

- Self-haul focus v. better service for commercial
- Allied material recovery
- Education
- Consistent facility service
- Cleaner facilities
- Metro can be a recovery leader
- Greener facilities
- Energy use
- Sustainability
- Organics
- Site Signage
- HHW education
- Container availability
- Traffic safety

General Comments

- Customer turn times is an issue for commercial and self-haul. Each customer should have a shorter stay at the stations.
- Allied Waste is not meeting base material recovery rates (15% @ MSS and 17% @ MCS)
- Allied Waste should meet its minimum recovery rates each month. Future materials recovery should include viable opportunities for dry wall and roofing waste.
- The enhanced dry waste standards will help the region meet its recovery goals. Metro should try to meet those standards as well in its role as a regional leader in recovery. Maximize mining the self-haul loads for material recovery.
- A better management approach is to focus on primary materials recovery (cardboard, metal and wood). Too many marginal materials don't maximize facility use. A four-item line is a possibility.

- A revised focus on fewer specific materials (wood, cardboard, metal, plastic) will allow operations to meet recovery standards.
- The recycling operations lack customer credibility. This issue would improve through spotter training by Allied Waste.
- Metro should measure to consumption of self-haul fuel against better customer use of available commercial service. This could reduce fuel use. The stations could supply alternative fuels and fleet filter service to consider air quality improvements.
- Stations can be green twice: facility improvements and greater materials recovery. MCS dust is a large house-keeping issue. MCS staff requires improvement for better material recovery opportunities.
- Facilities should be greener through use of bioswales and other site improvements. Metro can also be greener through vehicle improvements.
- Transfer station energy use with an emphasis on lighting.
- The HHW facilities either have too much staff or they are too efficient. They should focus more on educating the regional customers on options to HHW consumption (non-toxics).
- The good neighbor solution is an important and constant issue. It includes the landscape, street visibility, traffic management, queuing capacity, and more.
- The organics threshold is 10,000 tons per year. Cedar Grove (organics contractor) must find a regional facility site.
- The solution to organics processing may be a separate self-haul site just for those materials. Self haul use of the stations will continue to grow and be an important issue.
- The self-haul customers are a service issue. They impede the facilities ability to serve the commercial customers.
- Segmenting self-haul customers may reduce safety issues and improve efficiency
- The stations should offer customers more education about materials recovery and reuse.
- The customer interaction w/the Allied Waste staff is an issue. It relates to an overall lack of site communications. Allied services differ between MCS and MSS.

Metro Central

Issues

- Material flow
- Packing
- Capacity
- Loading Dock
- Ventilation
- Credit card refund issues
- Lack of customer information
- Rate differential
- Load verification
- HHW hours
- Organics
- Pigeons
- Dust suppression
- Safety
- Wash rack
- MCS has capacity for more waste/traffic
- Communication
- Allied Waste on safety
- Stormwater capture: H20 use
- Better recovery possible
- HHW: good model
- Container movement

Comments

- The organics, pigeons, dust and wash rack are major facility issues.
- Commodity trucks need tarp location.
- MCS Scalehouse remodel is needed
- Public perception is important at the stations and more should be done to manage that issue. Communications is an issue due to interface with the public.
- The MCS should clarify the issue of recycling credits v. MSW. Customers deliver materials (e.g., carpeting) that isn't on the credits list. The customer load verification process is an issue.
- The recycling operation should be available before the scale. Recycling credits v. material recovery should be resolved to improve MCS sustainability activities.
- Allied Waste did a dry tons study from October 2005 to September 2006. 79% of loads have dry waste.
- With an in-feed conveyor and sort line for C&D, MCS could have much better recovery rates
- Facility sites have a Stormwater/vehicle track issues.
- The transfer station operators should control the movements of transfer containers. This is an essential source and supply issue.
- Conversion technologies may be appropriate for the MCS.
- The MCS HHW operates at full space capacity. Space is the issue and it creates problems for safe movements within the operation. They need a functional loading dock. They do routine safety inspections.
- Metro should have a greater presence in the MCS operations. A consistent load check operation will improve HHW material recovery.
- The HHW should operate on Sunday. That's a contentious customer issue. HHW should be open later than 4 pm. It should open later or offer variable hours based on customer demand.

Metro South

Issues

- Traffic v. queue
- Better signage needed
- HHW hours
- Customer information
- Off peak use
- Communications (Allied w/site)
- MSW v. recovery
- Traffic speed
- Site safety
- Tipping stalls re: Bay 3 bldg. use
- External loading
- Interior lighting
- Tipping floor
- Public access
- Trailer tarps
- New location
- Volumes: space and storage
- Pros v. amateur customers @ 7am peak time
- Communication and Education needed
- MSS at vehicle limit
- Stage materials
- Push walls
- Lighting and technology for sustainability
- Good neighbors
- MSS mitigation
- Dry waste
- Self haul recovery
- MSS self haul
- MSS traffic

Comments

- MSS requires a new site. The existing site and operation has exceeded its capacity to perform well.
- MSS is too small for good customer service because of intense use. The wait is too long; it's a steady competition for vehicles and space.
- MSS has a critical space issue: MSW v. recovery operations. The rebate program (recycling v. recovery) is an issue.
- The MSS traffic management issue creates safety problems for everyone (staff, customers)
- The peak hour use at MCS is a challenge for regional recovery goals. A combination of peak time rate differentials matched with extended hours could help meet regional goals. As could more bulk item events.
- Site traffic management creates customer confusion. Education is essential to better customer service. Some customers understand the off-peak opportunities.
- MSS has no space to stage materials. This mandates commodity movement and load during a 12-hour evening operation.
- Material flow really requires a design review. Bay 3 expansion with the relocation of the transport contractor would help.
- The lack of armor (push walls) is a big issue.
- Bay 2 requires push wall improvements to allow waste to be dropped over a 6-8 ft wall. Customer communications requires improvements.
- Facility lighting is an essential issue.
- MSS space and storage requires multiple material handling functions (fuel consumption).
- Technology (new recovery lines) will improve material rates (may add shifts). Sort lines will improve customer service.
- There is no room at MSS for organics.
- HHW Material volumes are fine. Space is an issue. The operation should match the MSS hours.
- HHW operation should match the transfer station service hours.
- The HHW should operate on Sunday and improve its service through a variable range of service hours. Customers complain to the scalehouse staff about the lack of operation coordination for MSW and HHW.
- The HHW Roundup Program (managed by MCS) is an important service. More advertising through the year of the Metro HHW program would help this issue. The spring and summer are peak seasons; the fall and winter are not. Information will help the customer make better choices on facility use.

FINAL DRAFT

LONG RANGE METRO LANDFILL TONNAGE FORECAST
(Revised)

Prepared by Financial Management & Analysis,
Metro Solid Waste & Recycling

Prepared for the Metro Solid Waste
Transportation Study Group

March 2007
(Revised December 2007)

Summary of Revisions

This revised draft (December 2007) reflects changes made to the original Long Range Metro Landfill Tonnage Forecast produced in March 2007. The following is a summary of changes made since the publication of the original forecast:

- The model was re-estimated and re-calibrated using actual data through 2006, including new Oregon Department of Environmental Quality recovery and generation data published in *2006 Oregon Material Recovery and Waste Generation Rates Report (November 2007).* The base year from which forecasts are made is therefore 2006, instead of 2005. Model predictions of Metro Central and Metro South landfill tonnage come within .73 and .36 points of actual landfill tonnage for the 2006 base year.

- The assumption of a tonnage diversion from Metro Central to Columbia Environmental was removed. The original model assumed that Columbia Environmental, a local transfer station, would open in 2008 with 23,000 tons diverted from Metro Central, followed by a ramp-up to a cap of 45,000 tons diverted per year by 2010. The diversion assumption was removed due to uncertainties in the opening of Columbia Environmental through the forecast horizon.

- Due to a 3 percent decrease in the regional recovery rate from 2005 to 2006, the assumption of meeting the state goal of a 58 percent recovery rate by 2011 was relaxed to 2013.

- The assumption of constant Metro Central and Metro South shares of regional delivery tonnage was changed to include modest increases in their proportions over time to keep pace with increasing waste generation.

Purpose

The purpose of this analysis is to provide the Metro Solid Waste Transportation Study group with a "best estimate" long-range projection of landfill tonnage from the Metro transfer stations. Custom software was developed and is included with this report.

Model Description

The forecasting model is based on one exogenous variable – population – and multiple parameters that convert population into waste quantities. The parameters are each projected independently using various assumptions. The suite of assumptions underlying each parameter projection forms the forecast scenario presented in this report.

A schematic and narrative description of the model is provided in Figure 1. The model parameters, assumptions and data sources that make up the forecast scenario are provided in Table 1.

Table 1 – Model Parameters, Assumptions and Data Sources

Parameter	**Assumption**	**Data Source/Derivation & Rationale**
Tri-County[1] Population	Compound growth at 1.44% annually from 1,569,170 in base year 2006.	1,569,170 is the 2006 certified mid-year Tri-county population estimate from PSU Center for Population Research; 1.44% is the implicit population growth rate using a population projection time series (3a. Population, 1995-2015) submitted by Metro's Data Resource Center.
Generation Rate per capita	Compound growth at 1.3% annually from 3,436 pounds per person in base year 2006.	One half the historical growth rate during 1992 – 2006.[2]
Regional Recovery Rate	The state target of 58%[3] is met, but only by 2013; growth up to target is assumed linear.	Delay in meeting the target is based on delay in implementing key new programs.[4]

[1] The Metro wasteshed is comprised of Clackamas, Multnomah and Washington counties.

[2] Historical growth in the per-capita generation rate has been inflated by a variety of factors such as improved measurement methods over time. DEQ estimates that 20 to 50 percent of the apparent increase is due to such factors. [DEQ, *Solid Waste Generation in Oregon: Composition and Causes of Change*, February 2007]. The higher proportion was chosen here to be consistent with the users' need for a mildly conservative projection.

[3] The statutory target is 64%, which includes up to 6 percentage points for waste prevention, reuse, and home composting. The 58% used for this study represents recovery through source-separation programs (including the bottle bill) and post-collection recovery. The state target is set forth in ORS 459A.010(6)(a).

[4] Metro has designed three new initiatives to help meet the 58% recovery target. The initiatives address source-separation of compostable organic waste, expanded recycling for businesses, and post-collection recovery of materials from dry waste. These new programs are scheduled to begin rolling out in January 2008 and January 2009 per written correspondence with Lee Barrett—too late to have the necessary impact by 2009.

Post Collection Recovery	Assume constant 3.6 points of the regional recovery rate is post collection recovery.	Historical.
Metro Central core delivery tonnage[5]	Assume marginal increases from 22.2% of regional core delivery tonnage[5] in base year 2006 to 25% by 2027.	22.6% is the base year 2006 proportion. The longer run assumption is that Metro will adjust tonnage caps at private facilities to accommodate growth over time, but will also see its own market share of waste increase slightly over the forecast horizon.
Metro Central tonnage diversion	None.	No additional diversions are known or assumed.
Metro South core delivery tonnage[5]	Assume marginal increases from 19.2% of regional core delivery tonnage[5] in base year 2006 to 24% by 2027.	Same basis as for Metro Central (above).
Metro South tonnage diversion	None.	No additional diversions are known or assumed.
Metro Central post-collection recovery	Constant rate of 4.4% of Metro Central core delivery tonnage[5].	Actual 2006 rate is assumed to hold over time.
Metro South post-collection recovery	Constant rate of 5.7% of Metro South core delivery tonnage[5].	Actual 2006 rate is assumed to hold over time.

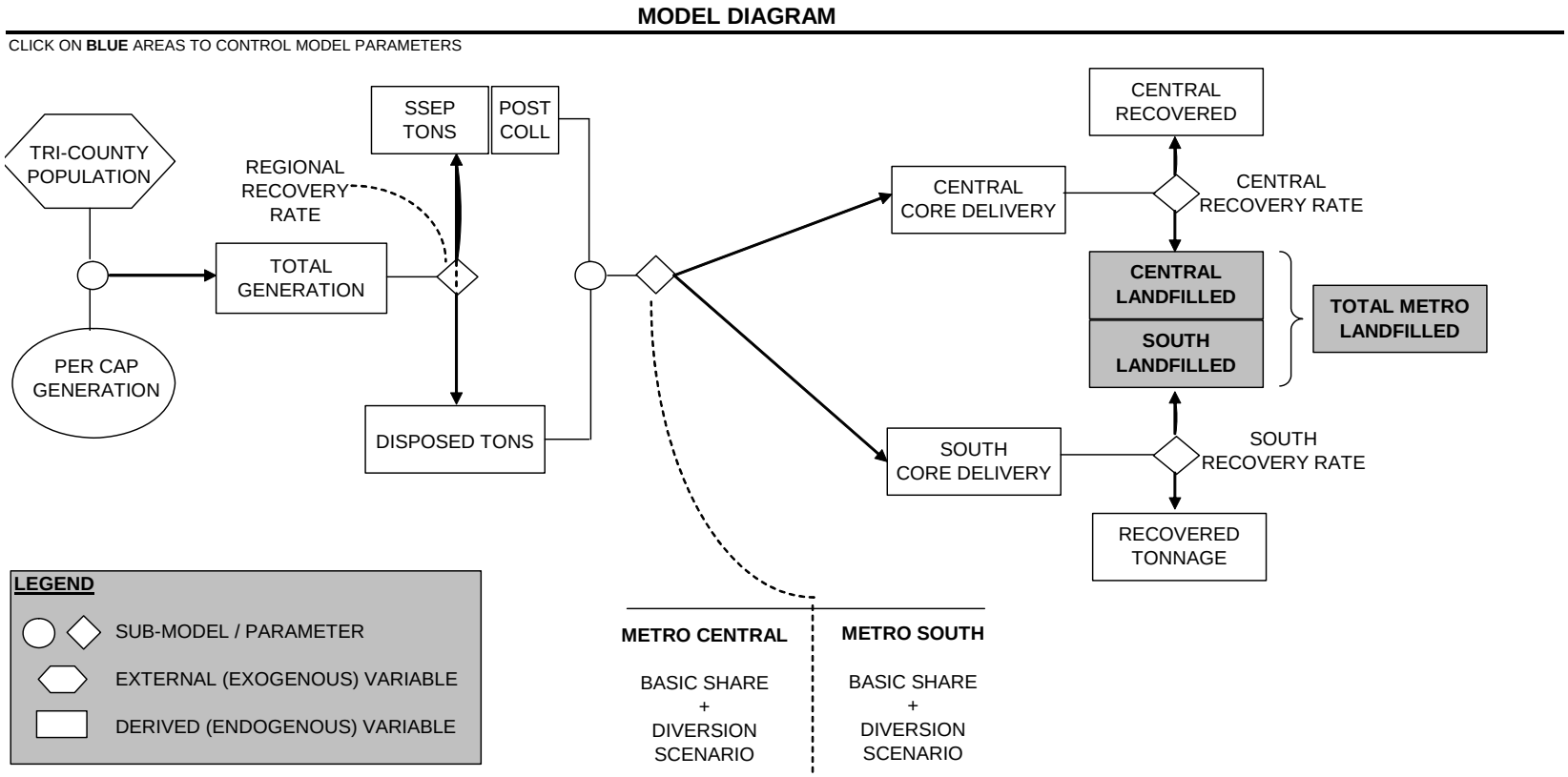
Landfill Tonnage Forecast

The scenario cited above projects landfill tonnage from Metro Central transfer station to begin at its CY2006 level of approximately 310,000 tons and rise to approximately 500,000 tons in 2026. At Metro South, the scenario projects a rise from CY2006 landfill tonnage of approximately 265,000 tons to approximately 475,000 tons in 2026.

Table 2 provides detail for the various waste quantities generated by the model in successive years, and Figure 2 depicts those quantities for the Metro transfer stations. It is important to note that some columns are hidden in Table 2. For example, the components of the regional recovery rate (the post-collection recovery and the other recovery rate points) and the Metro facility computed recovery tons are hidden. The full table may be viewed in the accompanying software.

[5] "Delivery tonnage" is defined as the amount of mixed solid waste that is accepted by disposal sites and solid waste facilities from haulers, businesses and the public. It excludes transfers of processed waste from facilities to landfills. "Core" tonnage is municipal solid waste (MSW) plus construction and demolition waste (C&D). Core tonnage excludes industrial process waste, special wastes and environmental clean-up media. In this model, "regional core delivery tonnage" is numerically equivalent to the tonnage of post-collection recovery plus disposal.

Figure 1 – Model Schematic and Narrative



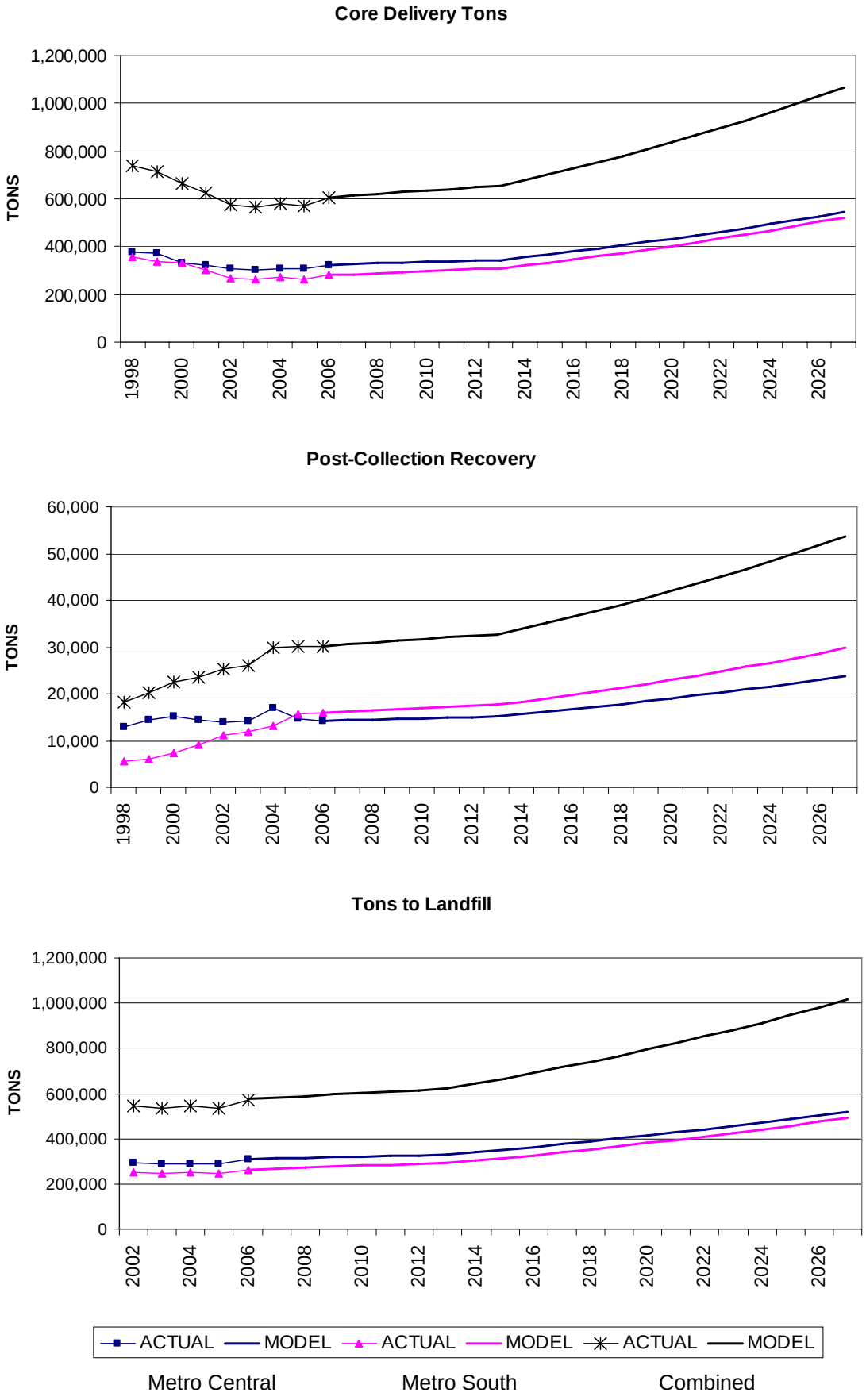
NARRATIVE

Regional population multiplied by per capita generation (in tons per person per year) yields total generation for the region, some of which is recovered while the remainder is disposed. Regional recovery includes source-separated recyclables, as well as materials that are removed from mixed waste at facilities ("post collection recovery"). The sum of post collection tons and disposal tons is numerically equivalent to the tonnage of mixed waste delivered to all solid waste facilities - a concept Metro terms "core delivery tons". Metro facilities' share of this delivery tonnage is a function of each facilities' historical base share plus potential future diversion scenarios such as the addition of Columbia Environmental to the solid waste management system. Finally, tonnage from each Metro facility destined to landfill is a function of each facilities' recovery rate.

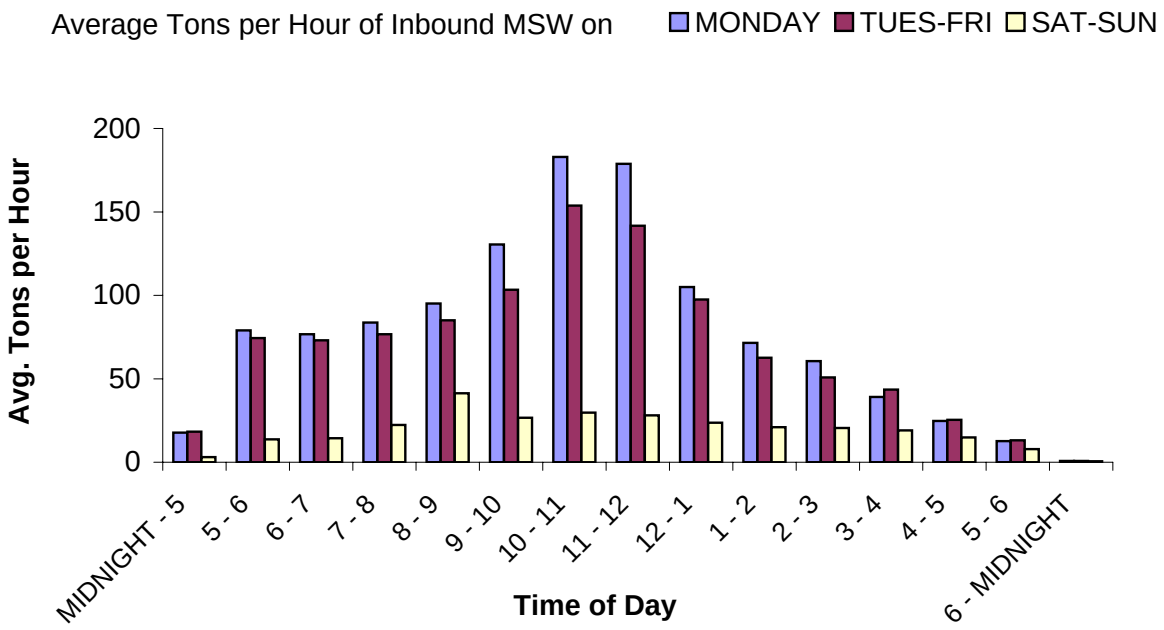
Table 2 – Long Term Projections of Regional Generation, Recovery and Disposal

PARAMETERS		Generation					Metro Tonnage					
	Mid-Year	Rate	Total	Recovery	Tonnage		Incoming			Landfilled		
Year	Population	(lbs/capita/yr)	(tons/year)	Rate	Recovered	Disposed	Central	South	Total	Central	South	Total
2006	1,569,170	3,436	2,696,079	49.5%	1,334,400	1,361,679	323,996	280,474	604,470	309,801	264,496	574,297
2007	1,591,766	3,481	2,770,456	50.7%	1,404,877	1,365,579	327,420	285,085	612,505	313,075	268,844	581,919
2008	1,614,687	3,526	2,846,885	51.9%	1,478,227	1,368,658	330,694	289,579	620,273	316,206	273,082	589,288
2009	1,637,939	3,572	2,925,423	53.1%	1,554,555	1,370,868	333,805	293,942	627,747	319,180	277,197	596,377
2010	1,661,525	3,619	3,006,127	54.4%	1,633,969	1,372,158	336,738	298,159	634,896	321,984	281,173	603,158
2011	1,685,451	3,666	3,089,058	55.6%	1,716,582	1,372,476	339,478	302,213	641,692	324,605	284,997	609,602
2012	1,709,722	3,713	3,174,276	56.8%	1,802,509	1,371,768	342,011	306,089	648,100	327,026	288,652	615,678
2013	1,734,342	3,761	3,261,846	58.0%	1,891,870	1,369,975	344,319	309,768	654,086	329,233	292,121	621,354
2014	1,759,316	3,810	3,351,831	58.0%	1,944,062	1,407,769	355,860	321,799	677,659	340,269	303,467	643,736
2015	1,784,650	3,860	3,444,298	58.0%	1,997,693	1,446,605	367,776	334,259	702,035	351,663	315,217	666,880
2016	1,810,349	3,910	3,539,317	58.0%	2,052,804	1,486,513	380,079	347,161	727,240	363,426	327,385	690,811
2017	1,836,418	3,961	3,636,957	58.0%	2,109,435	1,527,522	392,781	360,521	753,302	375,571	339,983	715,555
2018	1,862,863	4,012	3,737,290	58.0%	2,167,628	1,569,662	405,894	374,354	780,247	388,110	353,028	741,138
2019	1,889,688	4,065	3,840,392	58.0%	2,227,427	1,612,964	419,432	388,675	808,107	401,055	366,533	767,588
2020	1,916,900	4,117	3,946,337	58.0%	2,288,876	1,657,462	433,407	403,502	836,909	414,418	380,516	794,934
2021	1,944,503	4,171	4,055,206	58.0%	2,352,019	1,703,186	447,835	418,851	866,686	428,214	394,990	823,204
2022	1,972,504	4,225	4,167,077	58.0%	2,416,905	1,750,173	462,729	434,740	897,469	442,455	409,974	852,429
2023	2,000,908	4,280	4,282,035	58.0%	2,483,581	1,798,455	478,104	451,186	929,290	457,157	425,484	882,640
2024	2,029,721	4,336	4,400,165	58.0%	2,552,096	1,848,069	493,975	468,210	962,184	472,332	441,537	913,869
2025	2,058,949	4,392	4,521,553	58.0%	2,622,501	1,899,052	510,358	485,829	996,186	487,997	458,152	946,150
2026	2,088,598	4,449	4,646,290	58.0%	2,694,848	1,951,442	527,268	504,064	1,031,332	504,167	475,348	979,516
2027	2,118,674	4,507	4,774,468	58.0%	2,769,192	2,005,277	544,724	522,935	1,067,659	520,858	493,145	1,014,002

Figure 2 – Projected Waste Quantities at the Metro Transfer Stations



METRO CENTRAL TRANSFER STATION



	Avg Tons/Hour		
	Monday	Tues-Fri	Sat-Sun
MIDNIGHT - 5*	18	18	3
5 - 6	79	74	14
6 - 7	77	73	14
7 - 8	84	77	22
8 - 9	95	85	41
9 - 10	131	103	27
10 - 11	183	154	30
11 - 12	179	142	28
12 - 1	105	98	24
1 - 2	72	63	21
2 - 3	61	51	20
3 - 4	39	44	19
4 - 5	25	25	15
5 - 6	13	13	8
6 - MIDNIGHT*	1	1	1

Top 5 Tonnage Dates in 2006

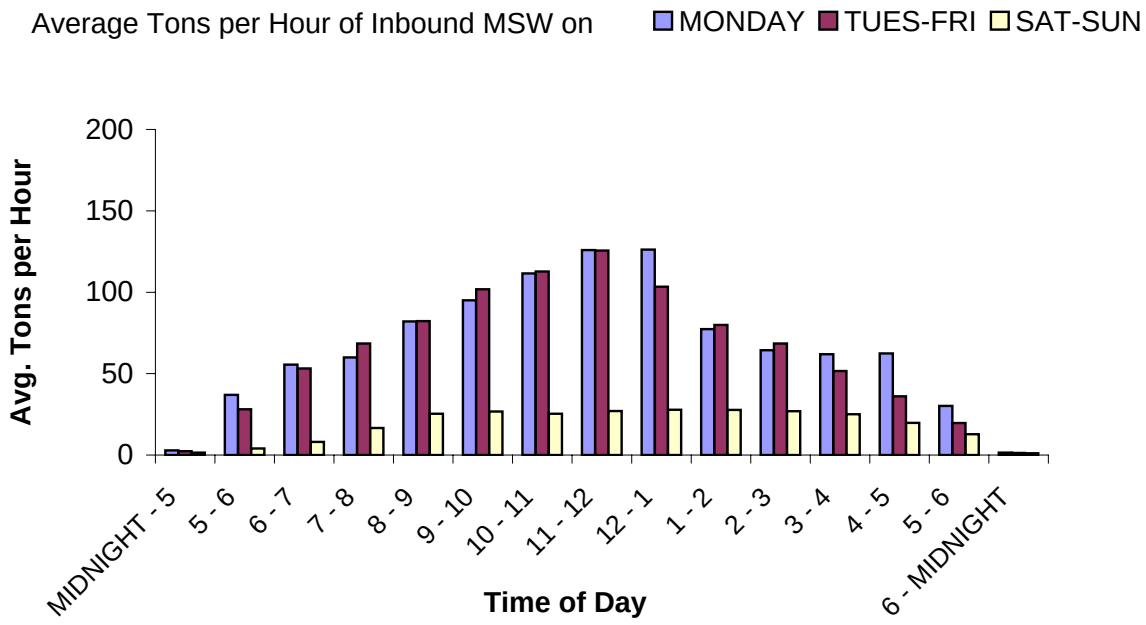
Monday, July 10 (1,430 Tons)
Monday, April 24 (1,421 Tons)
Monday, July 17 (1,395 Tons)
Tuesday, December 26 (1,394 Tons)
Tuesday, November 14 (1,380 Tons)

Top 5 Tonnage Weeks in 2006

November 12 - 18 (6,873 Tons)
June 4 - 10 (6,742 Tons)
July 9 - 15 (6,719 Tons)
April 30 - May 6 (6,658 Tons)
April 23 - April 29 (6,610 Tons

* Average data represents the typical hour in this period

METRO SOUTH TRANSFER STATION



	Avg Tons/Hour		
	Monday	Tues-Fri	Sat-Sun
MIDNIGHT - 5*	3	2	1
5 - 6	37	28	4
6 - 7	56	53	8
7 - 8	60	68	17
8 - 9	82	82	25
9 - 10	95	102	27
10 - 11	112	113	25
11 - 12	126	126	27
12 - 1	126	103	28
1 - 2	77	80	28
2 - 3	64	68	27
3 - 4	62	52	25
4 - 5	62	36	20
5 - 6	30	20	13
6 - MIDNIGHT*	1	1	1

Top 5 Tonnage Dates in 2006

Tuesday, December 26 (1,257 Tons)
Monday, June 5 (1,221 Tons)
Friday, June 23 (1,200 Tons)
Monday, July 17 (1,196 Tons)
Monday, June 19 (1,170 Tons)

Top 5 Tonnage Weeks in 2006

June 18 - 24 (6,234 Tons)
June 4 - 10 (6,207 Tons)
July 16 - 22 (5,995 Tons)
June 25 - July 1 (5,945 Tons)
April 30 - May 6 (5,927 Tons)

* Average data represents the typical hour in this period