

## Memorandum

Date: 9 April 2009 (Approved by Hydromodification Management Program (HMP) Implementation Phase Ad Hoc Task Group 13 November 2009)

To: Ms. Jill Bicknell, Santa Clara Valley Urban Runoff Pollution Prevention Program

From: Peter Mangarella, Geosyntec Consultants

Subject: Cost Estimating Guidance

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### Background

A provision related to hydromodification management<sup>1</sup> in the Santa Clara Valley Urban Runoff Pollution Prevention Program (Program) permit states that construction cost of the controls needed to meet the requirements is the primary measure for determining whether flow controls are practicable for a development project. Full implementation of the required flow controls as specified in the Program's Hydromodification Management Plan (HMP) will be considered impracticable "if the combined construction cost of both required stormwater treatment and flow control measures<sup>2</sup> exceeds 2% of the project construction costs (excluding land costs). If a developer demonstrates that the cost to fully comply with the HMP and other C.3 treatment requirements will exceed this cost threshold, a determination will be made by the reviewing agency that the project shall comply with this criterion by implementing HMP controls on-site to the maximum extent practicable and contributing to an in-stream or off-site solution, if available, up to the maximum cost for all controls of 2% of project cost."

Currently there is no guidance for the developer or co-permittees to estimate these costs. In response to this, the Program contracted with Geosyntec Consultants to develop cost estimating worksheets for estimating project and stormwater control costs that can be used by the developer to prepare a request for alternative compliance (i.e., the options described above), and by the reviewing agency to evaluate the request. The work was performed in coordination with the Program's HMP Implementation Phase Work Group. The scope of work included: identification of appropriate cost categories, preparation of cost estimating worksheets for proposed

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<sup>1</sup> Order No. R2-2005-0035, Attachment A, Performance Criteria (3.), adopted July 20, 2005.

<sup>2</sup> Costs of control measures shall not include land costs, soil disposal costs, hauling, contaminated soils testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

development projects and associated BMPs for water quality and hydromodification control, presentation of progress at the 14 June 2007 Program C.3. Workshop, and development of guidance to assist municipalities and developers in completing the worksheets.

### **Cost Estimating Methods**

For BMPs, there are generally two types of cost estimating methods: (1) methods based on a correlation with one or two major factors (e.g. drainage area or BMP size), or (2) methods based on summing individual costs based on the item, quantities, and unit costs (referred to as an “engineer’s estimate”). The former method is quicker and is generally adequate for watershed scale planning level estimates whereas the latter method is more site specific and more appropriate at the bidding phase of a project when detailed information on quantities is available. Both methods are described herein and can be applied at the discretion of the applicant.

For projects, cost estimating based on a correlation method alone is inadequate because costs incurred in a project are very specific to the project design and local conditions. The most feasible approach at the planning level is a hybrid wherein structural costs are estimated based on the building type and size (e.g., square footage); costs for other items, such as paving and infrastructure, are estimated individually, similar to an engineers’ estimate. In this method, the quantity estimates are rough approximations based on planning level information.

### **Sources of Cost Estimating Guidance**

There is extensive information on methods to estimate costs for both BMPs and development projects. The following provides some examples of source material that could potentially assist municipalities and project proponents in better understanding cost estimation methods.

Cost estimating methods for BMP costs have been described by US EPA (Muthukrishnan et. al. 2004), which segregates costs into capital, design and permitting, operation and maintenance, and land costs. They also address the issues of accounting for inflation and lifecycle considerations. Recent guidance also is available from the Water Environment Research Federation (WERF) report “Performance and Whole Life Costs of Best Management Practices and Sustainable Urban Drainage Systems,” which includes spreadsheets for estimating the cost of selected BMPs (extended detention, permeable pavement, retention basins, and swales) using either the correlation or engineer’s approach (Lampe et. al. 2005). Recently Colorado State University and the Denver Urban Drainage Flood Control District prepared the “BMP Effectiveness and Whole Life-Cycle Cost Analysis Model” that uses the correlation cost estimating method (Olson et. al. 2008). As indicated by the title of the report, this model is designed to assist the engineer in evaluating not only the cost of the BMP, but the benefit in terms of water quality performance. Cost curves are provided for a number of BMPs including wetland basins, extended dry detention, constructed wetland channels, hydrodynamic separators, inlet inserts, media filter vaults, porous landscape detention, retention (wet) pond, sand filter vault, and a vault with a capture volume. This user manual also provides detailed cost guidance

for maintenance over the life of the BMP. As of January 2009, this model was undergoing beta testing and is available as described in Reference section.

A number of sources are available to assist in estimating project development costs. R.S. Means ([www.rsmeans.com](http://www.rsmeans.com)) provides heavy construction cost data that includes material and labor unit cost estimates for earthwork, concrete, and utilities (including water supply, sanitary, and drainage). R.S. Means also provides estimated building costs (primarily commercial) on a per square foot basis. Corrections for differences among cities are also provided, including costs for San Jose, California. Various services allow one to access web-based software designed to estimate building construction costs including the D4Cost software provided by Design Cost Data (<http://www.d4cost.net/d4cweb/>) that is based on actual costs incurred for buildings of similar type. Other commercial publishers include the Engineering News Record (ENR) which provides an On-Line Estimator (a web-accessed database) and hard copy Construction Costs Reference Guide ([www.enr.com](http://www.enr.com)). The ENR Reference Guide provides unit costs for buildings on a square foot basis, with multipliers to reflect differences in regional costs. Access to all these sources is by subscription only.

Lifecycle costs require accounting for anticipated inflation based on historical cost trends. A useful source of trends in the cost of material and labor is the Engineering News Record (ENR) Construction Cost Index History to account for cost trends (<http://env.construction.com/economics/default.asp>).

### **Cost Categories and Cost Estimating Worksheets**

Cost categories for typical development projects were arranged by project phase as shown in Table 1. In compliance with the permit language, only those costs in Table 1 listed under construction are considered in the cost estimating methodology. Based on these cost categories, a cost estimating worksheet was developed for estimating project costs. The worksheet follows the typical practice for engineering cost estimates that, in addition to the cost category, include a column for estimated unit costs, a column for estimating quantities or units, and a final column for estimating the total cost for each cost category. A similar worksheet was developed for estimating the costs of stormwater controls.

### **Sources of Unit Costs**

The next step in the process is to have a set of agreed-upon unit costs. There are various sources of unit costs, including commercial publishers (discussed above), local agencies, or developer specific values. Unit costs for some cost categories are also available from some local agencies. For example, San Jose maintains a unit cost database to support engineer's estimates that is updated each fiscal year. The cost categories address public works type projects and provide a good source of information for infrastructure costs, such as material costs for installing storm drains or public streets. The project proponent should check with the local agency for unit rate information that may be available at the agency, and/or to determine other sources that would be acceptable to the agency. Attachment A provides an example of the unit costs information

maintained by the City of San Jose for private and public street construction and associated infrastructure.

### **Quantities or Units**

The last column in the worksheets calls for estimated units or quantities. Quantities will be estimated by the project proponent based on the proposed project and actual site conditions. Since the request for alternative compliance will likely be made in the early planning phases of the project, quantities will need to be estimated based on the preliminary site plan, grading plan, drainage plan, landscaping plan, and water quality and hydromodification control plan. There may be additional plans depending on the type of development and complexity, or, there may be fewer plans for smaller projects. Costs of similar projects can vary considerably depending on site conditions such as slope, soils, geotechnical issues and bearing requirements, and grading requirements, so it may be reasonable to consider a contingency when such conditions are anticipated.

For single family developments, in the absence of actual site plans for estimating units, one may wish to review a recent report developed by researchers at Michigan State University that included data on utility requirements (e.g., length of storm drain required) as a function of housing density (Najafi et. al. 2006).

### **Example: Hitachi Global Storage Technologies, Inc., Santa Teresa Transit Village**

Hitachi Global Storage Technologies, Inc. and Signature Properties proposed a Master Planned Development on approximately 332 acres at the existing Hitachi Campus bounded by Monterey Road, Manassas Road, State Route 85, and Cottle Road in San Jose (RBF, 2005). Within the campus, the proposed project called for a 148-acre residential development referred to as the Santa Teresa Transit Village (Exhibit 1). The village was sufficient in size and percent imperviousness area (81%) such that, pursuant to the SCVURPPP NPDES Permit, water quality and hydromodification controls were required. The plan called for a variety of controls, including two detention basins: one 6.4 acre-ft basin (Cottle Road detention basin) to receive runoff from a 115 acre portion of the Transit Village that drained towards Cottle Road, and one 8.0 acre-ft basin (Highway 85 detention basin) to receive runoff from the 33 acre portion of the Transit Village that drained towards Highway 85.

The sub-areas within the Santa Teresa Transit Village consisted of:

- Sub-Area 01: mixed-use residential with density of 40-60 dwelling units per acre (du/ac) (North Village),
- Sub-Area 0-2: retail and mixed-use with density of 40-60 du/ac (Cottle Transit Village) and Recreational Park/Historic Preservation,
- Sub-Area 03: retail mixed-use with 40-60 du/ac, and

- Sub-Areas 04 and 05: mixed-use residential (South Village) with density varying from 40-60 du/ac in the western portion to 25-40 du/ac to 16-25 du/ac to 12-25 du/ac in the eastern portion of Sub-Areas 04 and 05.

The estimated construction costs for the proposed development are about \$140,000,000 and are provided in Table 2. Only major cost items are included and quantities were very approximately estimated based on information provided in the RBF report. Notations provided to the right of the table indicate the sources of the unit cost information. A city correction is applied at the bottom of the spreadsheet. (Strictly speaking, the correction applies only to those unit costs derived from R.S. Means, but as most unit costs identified were from R.S. Means, the correction has been applied uniformly to all cost items.) Where quantities and costs were not available (e.g., communications and power), Geosyntec inserted a lump sum figure for the purposes of the example only.

The estimated construction cost for the two detention basins was determined using the engineer's estimate method and is about \$600,000 (Table 3). By comparison, the estimate based on the cost versus extended detention basin volume provided by Olsen et al is approximately \$1,000,000, but this includes generic land costs. Using either cost estimate, the estimated cost of the BMPs is less than 1% of the cost of the development project.

## References

Lampe, Les, P. Martin, M. Barrett, C. Jefferies, B. Woods-Ballard, R. Kellagher, and M. Hollen, 2005. Performance and Whole Life Costs of Best Management Practices and Sustainable Urban Drainage Systems, Water Environment Research Federation, Final Report for Phases 1 and 2 of Project 01-CTS-21T.

Muthukrishnan, S., Madge, B., Selvakumar, A., Field, R., Sullivan, D. (2004). "The Use of Best Management Practices (BMPs) in Urban Watersheds." Final report to U.S. EPA, EPA 600/R-04/184.

Najafi, Mohammad, R. Mohamed, A. Tayebi, S. Adelaja, M.B. Lake, W. Rustem, "The Fiscal Impacts of Alternative Single Family Housing Densities: Infrastructure Costs. A Market Based Solutions Report Prepared by the MSU Land Policy Institute, Report # 2006-2, Michigan State University Center for Underground Infrastructure Research and Education.

Olsen, Chris, L. Roesner, Ben Urbonas, Ken Mckenzie, 2008. BMP Effectiveness and Whole Life Cost Effectiveness Model: User's Manual and Documentation (Beta Test Version). Available as WinZip file for download at [http://www.udfcd.org/downloads/down\\_technical.htm](http://www.udfcd.org/downloads/down_technical.htm) (file is listed under header Criteria Manual Volume 3 and is titled: BMP Whole Life Cycle Cost Effectiveness Analysis tool (BETA 2008-10-29)

RBF Consulting, 2005. Hitachi Campus & Santa Teresa Village Master Planned Development Permit Storm Water Management Plan, prepared for Signature Properties, November.

**TABLE 1**  
**COST CATEGORIES FOR A TYPICAL DEVELOPMENT PROJECT**

<b>Project Phase</b>	<b>Cost Category</b>
Land Purchase	Land price
Carry Costs	Escrow fees, legal fees; local, state, and federal taxes
	Interest on loans
	Marketing and advertising
Entitlement and Permitting	Land planning, preparation of Environmental Impact Report, hazardous material testing
	Geotechnical soil exploration and testing
	Plan checking, and grading and building permit fees
	Offsite mitigation including roads and utilities
Construction	Grading, Excavation, Demolition, Staking
	Utilities (water, power, communication)
	Structures including foundation
	Landscaping
	Engineering and Architecture

**TABLE 2  
HITACHI DEVELOPMENT PROJECT COST ESTIMATE WORKSHEET**

Development Project Construction Cost Calculation Sheet				Construction Cost		Notes
Item No.	Description	Units	Unit Cost (c)	Qty (Q)	Cost (C = c x Q)	
<b>1.0 GRADING</b>						
1.1	Clearing and Grubbing	AC	\$1,500	100	\$150,000	RS Means Heavy Construction 2006: category 02230 (grubbing) 100-0150
1.2	Rough and Finish Grading	SY	\$1.23	200,000	\$246,000	RS Means Heavy Construction 2006: category 02310 (grading) 100-1100
1.3	Excavation and Backfill	CY	\$16.55	1,000	\$16,550	RS Means Heavy Construction 2006: category 02316 (excavation) 110-0300
1.4	Construction Staking (Surveying)	AC	\$85.00	100	\$8,500	RS Means Heavy Construction 2006: category 01107 (prof consult) 700-1850
<b>2.0 UTILITIES</b>						
2.1a	Storm Drains	LF	\$170.00	15,000	\$2,550,000	San Jose Unit Costs Storm Sewers 24 inch RCP
2.1b	Storm Drain Manholes	EA	\$3,575.00	30	\$107,250	San Jose Unit Costs
2.1c	Standard Hood Inlets	EA	\$2,035.00	100	\$203,500	San Jose Unit Costs
2.2a	Sanitary Sewers	LF	\$231.00	15,000	\$3,465,000	San Jose Unit Costs Sanitary Sewers 18 inch VCP
2.2b	Sanitary Sewer Manholes	LF	\$3,575.00	150	\$536,250	San Jose Unit Costs
2.3	Water	LF	\$100.00	2000	\$200,000	Geosyntec estimate
2.4	Phone/Gas/Electricity/Cable	LF	\$150.00	15,000	\$2,250,000	Geosyntec estimate
2.5	Trenching	LF	\$24.60	45,000	\$1,107,000	RS Means Heavy Construction 2006: category G1030 805 (trenching) 1460
<b>3.0 PAVEMENT</b>						
3.1	Public Roads	SF	\$2.92	750,000	\$2,190,000	San Jose Attachment A Surface Improvements Item 5
3.2	Standard Sidewalks	SF	\$6.30	15,000	\$94,500	San Jose Attachment A Surface Improvements item 21
3.3	Parking Lots	SF	\$2.27	130,000	\$295,100	San Jose Attachment A Surface Improvements item 4
3.4	Curbs	LF	\$16.80	15,000	\$252,000	San Jose Attachment A Surface Improvements item 17

Development Project Construction Cost Calculation Sheet				Construction Cost		Notes
Item No.	Description	Units	Unit Cost (c)	Qty (Q)	Cost (C = c x Q)	
<b>4.0 BUILDING UNITS</b>						
4.1	Single Family Residential	SF				
4.2	Multi Family Residential	SF	\$110.00	700,000	\$77,000,000	RS Means Heavy Construction 2006: category 50 17 (sq foot costs) 02-0010
4.3	Schools	SF				
4.4	Office Buildings	SF				
4.5	Resorts / Hotels	SF				
4.6	Golf Courses	AC				
4.7	Parks	AC	\$15,000.00	30	\$450,000	
4.8	Commercial / Retail Space	SF	\$92.50	200,000	\$18,500,000	RS Means Heavy Construction 2006: category 50 17 (sq foot costs) 72-0010
<b>4.0 LANDSCAPING</b>						
4.1	Landscaping	EA	\$18.60	2000	\$37,200	RS Means Site Work & Landscape Cost Data 2006: Category 02930 Exterior Plants, cost per 5 gallon plant
<b>UNITS</b> AC - Acres, CY - Cubic Yards, LS - Lump Sum, SY - Square Yards, SF – Square Feet, LF – Linear Feet, EA - Each						
				<b>Sub-Total (ST) :</b>	<b>\$109,658,850</b>	
				San Jose Cost Index:	116.30	RS Means 2006 City Cost Index San Jose Weighted Average
				Adjusted Sub-total :	<b>\$127,533,243</b>	
				Technical Services (10%)	<b>\$12,753,324</b>	
				<b>PROJECT TOTAL</b>	<b>\$140,286,567</b>	



**TABLE 3  
HITACHI BMP CONSTRUCTION COST ESTIMATE WORKSHEET**

Water Quality Treatment Facility Construction Cost Calculation Sheet				Construction Cost		Notes
Item No.	Description	Units	Unit Cost (c)	Qty (Q)	Cost (C = c x Q)	
<b>1.0 GRADING</b>						
1.1	Clearing and Grubbing	AC	\$1,500	3	\$4,500	RS Means Heavy Construction 2006: category 02230 (grubbing) 100-0150
1.2	Rough and Finish Grading	SY	\$1.23	2,000	\$2,460.00	RS Means Heavy Construction 2006: category 02310 (grading) 100-1100
1.3	Excavation and Backfill	CY	\$16.55	22,000	\$364,100	RS Means Heavy Construction 2006: category 02316 (excavation) 110-0300
1.4	Construction Staking (Surveying)	AC	\$2,000.00	3	\$6,000	R.S. Means Heavy Construction 2006: Category 01107 (prof cons) 700-0400
<b>2.0 STRUCTURAL ELEMENTS</b>						
2.1	Inlet	EA	\$2,387.00	2	\$4,774	San Jose Attachment A Public Street Construction Storm Sewers item 17
2.2	Outlet	EA	\$4,807.00	2	\$9,614	San Jose Attachment A Public Street Construction Storm Sewers item 19
2.3	Inlet/Outlet Piping	EA	\$170.00	200	\$34,000	San Jose Unit Costs Storm Sewers 24 inch RCP
2.4	Overflow Spillway	EA	\$9,625.00	2	\$19,250	San Jose Attachment A Public Street Construction Storm Sewers item 20
2.5	Access Road	SF	\$1.62	1,000	\$1,620	San Jose Attachment A Public Street Construction Surface Improvements item 9
<b>3.0 MISCELLANEOUS</b>						
3.1	Geosynthetic Fabric/Impervious Liner	SY				
3.2	Landscaping	EA	\$20	300	\$6,000	RS Means Site Work & Landscape Cost Data 2006: Category 02930 Exterior Plants

Water Quality Treatment Facility Construction Cost Calculation Sheet				Construction Cost		Notes
Item No.	Description	Units	Unit Cost (c)	Qty (Q)	Cost (C = c x Q)	
<b>UNITS</b> AC - Acres, CY - Cubic Yards, SF - Square Foot, SY - Square Yards, EA - Each						
<b>Sub-Total (ST) :</b>					<b>\$452,318</b>	
San Jose Cost Index:					116.30	RS Means 2006 City Cost Index San Jose Weighted Average
Adjusted Sub-total :					<b>\$526,046</b>	
Technical Services (10%)					<b>\$52,605</b>	
<b>PROJECT TOTAL</b>					<b>\$578,650</b>	

ATTACHMENT A  
City of San Jose  
Unit Cost Table  
(FY 2006-2007)

**EXHIBIT A  
ENGINEER'S ESTIMATE (FY 2006-2007 UNIT COSTS)  
TRACT NO. 9999 OR MAJOR 3-99999**

PUBLIC STREET CONSTRUCTION COST ESTIMATE							
Sanitary Sewers						Construction Credit	
#	Description	Units	Qty	Unit Cost (\$)	Extension (\$)	Unit Cost (\$)	Extension (\$)
1	4" VCP	LF		48.00	0.00		
2	6" VCP	LF		79.00	0.00		
3	8" VCP	LF		84.00	0.00		
4	10" VCP	LF		182.00	0.00	7.85	0.00
5	12" VCP	LF		187.00	0.00	9.85	0.00
6	15" VCP	LF		198.00	0.00	12.65	0.00
7	18" VCP	LF		231.00	0.00	17.25	0.00
8	21" VCP	LF		264.00	0.00	22.15	0.00
9	24" VCP	LF		303.00	0.00	22.55	0.00
10	27" VCP	LF		380.00	0.00	25.00	0.00
11	30" VCP	LF		407.00	0.00	28.70	0.00
12	33" VCP	LF		451.00	0.00	34.05	0.00
13	36" VCP	LF		528.00	0.00	39.35	0.00
14	42" VCP	LF		660.00	0.00	49.70	0.00
15	MANHOLES	EA		3,575.00	0.00	663.05	0.00
16	FLUSHING INLET	EA		605.00	0.00	172.20	0.00
17	LATERALS & CLEANOUTS	EA		275.00	0.00		
18					0.00		
19					0.00		
20					0.00		
21					0.00		
					0.00		
						0.00	CREDIT

PUBLIC STREET CONSTRUCTION COST ESTIMATE							
Storm Sewers						Construction Credit	
#	Description	Units	Qty	Unit Cost (\$)	Extension (\$)	Unit Cost (\$)	Extension (\$)
1	12" RCP:	LF		104.00	0.00		
2	15" RCP:	LF		120.00	0.00		
3	18" RCP:	LF		143.00	0.00		
4	21" RCP:	LF		157.00	0.00		
5	24" RCP:	LF		170.00	0.00		
6	27" RCP:	LF		187.00	0.00		
7	30" RCP:	LF		206.00	0.00	16.00	0.00
8	33" RCP:	LF		216.00	0.00	19.00	0.00
9	36" RCP:	LF		227.00	0.00	22.50	0.00
10	42" RCP:	LF		239.00	0.00	27.75	0.00
12	48" RCP:	LF		286.00	0.00	32.50	0.00
13	54" RCP:	LF		337.00	0.00	38.50	0.00
14	60" RCP:	LF		385.00	0.00	44.25	0.00
15	MANHOLES	EA		3,575.00	0.00	405.00	0.00
16	STD. HOOD INLET	EA		2,035.00	0.00		
17	LARGE HOOD INLET	EA		2,387.00	0.00		
18	G.O.L. HOOD INLET	EA		2,266.00	0.00		
19	FLAT GRATE	EA		1,430.00	0.00		
19	OUTFALL SAC CONC.	EA		4,807.00	0.00		
20	OUTFALL 1/4 TON ROCK	EA		9,625.00	0.00		
21	RIP-RAP INLET	EA		1,194.00	0.00		
22	21" RCP/REMOVE-REPLACE	LF		70.00	0.00		
						0.00	CREDIT

PUBLIC STREET CONSTRUCTION COST ESTIMATE							
Storm Sewers						Construction Credit	
#	Description	Units	Qty	Unit Cost (\$)	Extension (\$)	Unit Cost (\$)	Extension (\$)
23	PCC DITCH/SWALE	LF		30.00	0.00		
24					0.00		
25					0.00		
26					0.00		
					0.00		

PUBLIC STREET CONSTRUCTION COST ESTIMATE							
Surface Improvements							
#	Description	Units	Qty	Unit Cost (\$)	Extension (\$)		
1	MONUMENTS (STREET)	EA		594.00	0.00		
2	MONUMENTS (WITNESS)	EA		297.00	0.00		
3	ELECTROLIERS	EA		3,575.00	0.00		
4	4.2 INCHES A.C.	SF		2.27	0.00		
5	5.4 INCHES A.C.	SF		2.92	0.00		
6	7.8 INCHES A.C.	SF		4.21	0.00		
7	12 INCHES A.C.	SF		6.48	0.00		
8	AC OVERLAY (2")	SF		1.08	0.00		
9	AC OVERLAY (3")	SF		1.62	0.00		
<b>TOTAL PAVEMENT AREA:</b>			<b>0</b>	<b>SF</b>			
10	GRADING	SF		0.38	0.00		

**PUBLIC STREET CONSTRUCTION COST ESTIMATE**

**Surface Improvements**

#	Description	Units	Qty	Unit Cost (\$)	Extension (\$)
11	A2 CURB & GUTTER	LF		25.00	0.00
12	REMOVE C. & G.	LF		9.60	0.00
13	REMOVE SIDEWALK	SF		3.60	0.00
14	REMOVE DRIVEWAY	SF		5.50	0.00
15	SAWCUT	LF		7.20	0.00
16	VALLEY GUTTER	LF		18.20	0.00
17	A1 CURB	LF		16.80	0.00
18	B1 CURB	LF		29.70	0.00
19	B3 CURB, 6"	LF		17.90	0.00
20	B3 CURB, 8"	LF		21.50	0.00
21	STD. SIDEWALK	SF		6.30	0.00
22	PCC DRIVEWAY	SF		12.00	0.00
23	WHEELCHAIR RAMP	EA		957.00	0.00
24	PCC PAVEMENT (6"/6")	SF		2.70	0.00
25	BUS STRESS PAD	EA		9,350.00	0.00
26	4.2 INCHES AB	SF		1.80	0.00
27	8.4 INCHES AB	SF		3.60	0.00
28	12.6 INCHES AB	SF		5.39	0.00
29	BARRICADE	LF		20.60	0.00
30	RETAINING WALL	LF		59.70	0.00
31	RETAINING WALL/1' HIGH	LF		23.90	0.00
32	CONDUITS &	LF		15.60	0.00

**PUBLIC STREET CONSTRUCTION COST ESTIMATE**

**Surface Improvements**

#	Description	Units	Qty	Unit Cost (\$)	Extension (\$)
	CABLES				
33	JUNCTION BOXES	EA		258.50	0.00
34	E-8 BOXES	EA		451.00	0.00
35	PCC DITCH	LF		12.00	0.00
36	CONCRETE PARKING BAYS	SF		12.00	0.00
37	CONTROLLER CAB.	EA		228.80	0.00
38	STREET TREES	EA		352.00	0.00
39					0.00
40					0.00
41					0.00
					0.00

<b>SIGNAL COST</b>	\$0.00
(Manual Input, Obtain number from Signal Team)	
<b>CONSTRUCTION COST</b>	\$0.00
(Use this number for E&I fee calculations)	
<i>Non-Reimb Public Landscaping</i>	0.00
(Manual Input, Obtain number from Landscape Architect)	
<i>Reimb Public Landscaping</i>	0.00
<b>TOTAL LANDSCAPING</b>	\$0
<b>MUNI-WATER IMPR</b>	\$0.00
(Manual Input, Obtain number from Muni Water)	



<b>PUBLIC STREET CONSTRUCTION COST ESTIMATE</b>						
<b>Surface Improvements</b>						
<b>#</b>	<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Cost (\$)</b>	<b>Extension (\$)</b>	
<b>TOTAL CONSTRUCTION</b>					<b>\$0.00</b>	
(Use this number for bonding amounts, rounded up to nearest \$100)						
<b>WARRANTY BOND</b>					<b>\$0.00</b>	
(Tracts and Majors require a 25% Warranty Bond)						
<b>COMPLETION DEPOSIT (CD)</b>					<b>\$0.00</b>	
(This is only required for Major 3- Agreements)						
<b>MONUMENT BOND</b>					<b>\$0.00</b>	
(Use a CD for 3 dash permits)						

<b>PRIVATE STREET CONSTRUCTION COST ESTIMATE</b>						
<b>#</b>	<b>Description</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Cost (\$)</b>	<b>Extension (\$)</b>	
1	MONUMENTS (STREET)	EA		594.00	0.00	
2	MONUMENTS (WITNESS)	EA		297.00	0.00	
3	5.0 INCHES A.C.	SF		2.70	0.00	
4	10 INCHES AGGREGATE BASE	SF		4.28	0.00	
5	4.0 INCHES A.C.	SF		2.16	0.00	

PRIVATE STREET CONSTRUCTION COST ESTIMATE						
#	Description	Units	Qty	Unit Cost (\$)	Extension (\$)	
6	8 INCHES AGGREGATE BASE	SF		3.42	0.00	
7	BOMANITE (6" PCC/6" AB)	SF		12.60	0.00	
8	PAVERS (ON 6" AB)	SF		9.60	0.00	
9	PCC DRIVEWAY (STANDARD)	SF		12.00	0.00	
10	PCC S/WALK (STANDARD)	SF		6.30	0.00	
11	VALLEY GUTTER (STANDARD)	LF		18.30	0.00	
12	A1 CURB	LF		16.80	0.00	
13	A2 CURB & GUTTER	LF		23.90	0.00	
14	B1 CURB	LF		29.90	0.00	
15	B3 CURB	LF		17.90	0.00	
16	ROLLED CURB & GUTTER	LF		23.90	0.00	
17	WHEELCHAIR RAMPS	EA		957.00	0.00	
18	STRESS PADS	EA		2,700.00	0.00	
19	BOLLARDS	EA		201.00	0.00	
20	RCP: 12"DIA.	LF		104.00	0.00	
21	15"DIA.	LF		120.00	0.00	
22	18"DIA.	LF		143.00	0.00	
23	21"DIA.	LF		157.00	0.00	
24	VCP: 4"DIA.	LF		48.00	0.00	
25	6"DIA.	LF		79.00	0.00	

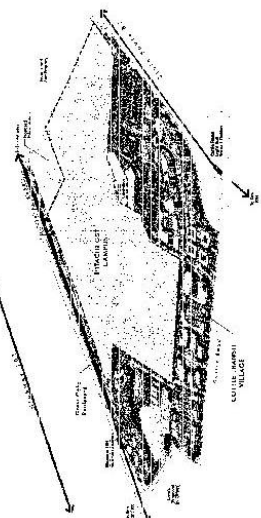
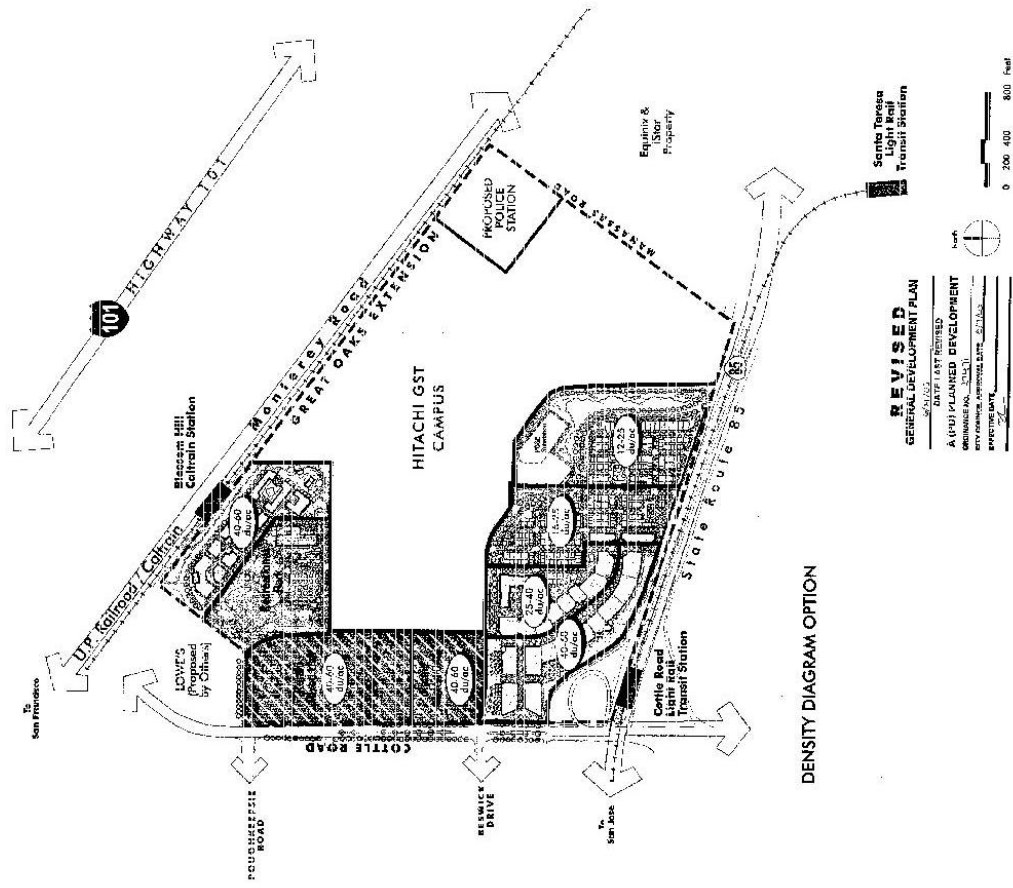
PRIVATE STREET CONSTRUCTION COST ESTIMATE					
#	Description	Units	Qty	Unit Cost (\$)	Extension (\$)
26	8"DIA.	LF		84.00	0.00
27	PVC: 4"DIA.	LF		48.00	0.00
28	6"DIA.	LF		60.00	0.00
29	8"DIA.	LF		72.00	0.00
30	10"DIA.	LF		84.00	0.00
31	12"DIA	LF		96.00	0.00
32	STORM MANHOLES	EA		3,575.00	0.00
33	HOODED INLETS	EA		2,035.00	0.00
34	FLAT GRATE INLETS	EA		1,430.00	0.00
35	AREA DRAINS	EA		264.00	0.00
36	AREA DRAIN/JUNCTIO N BOX	EA		957.00	0.00
37	SANITARY MANHOLES	EA		3,575.00	0.00
38	FLUSHING INLETS	EA		605.00	0.00
39	SANITARY CLEANOUTS	EA		776.00	0.00
40	OUTFALL SLOPE PROTECT.	SY		4,807.00	0.00
41	PCC DITCH/SWALE	LF		30.00	0.00
					0.00
					0.00
					0.00
				<b>TOTAL=</b>	0.00

**EXHIBIT 1**  
**Proposed Hitachi GST Development**



HITACHI  
GLOBAL STORAGE TECHNOLOGIES INC.  
SAN JOSE, CA  
PLANNED DEVELOPMENT ZONING

DATE: APR 11, 2008  
SCALE: AS SHOWN  
PROJECT NO: 080001  
SHEET NO: 01  
GENERAL DEVELOPMENT PLAN - EXHIBIT C  
Cottle Transit Village  
Density Option  
SHEET NO. L-7



CONCEPTUAL AERIAL PERSPECTIVE RENDERING - COTTLE TRANSIT VILLAGE