K1 PLANS OF SUBDIVISION AND SITE PLANS

K1.1 Submissions to External Agencies

- The Regional Municipality of York
- Toronto and Region Conservation Authority (TRCA), MNR/DFO
- Ministry of Environment (MOE)
- Ministry of Transportation (MTO)
- Ministry of Culture (MOC)
- Hydro One, PowerStream, all utilities
- CNR/GO Transit
- Abutting local Municipalities
- Region of York School Boards

In order to receive approvals of any works that would fall within their jurisdiction, the Consulting Engineer shall deal directly with the external agencies.

K1.2 Draft Plan Acceptance Reports

The following reports are required to be submitted, where applicable, in support of Draft Plan of Subdivision applications for review by the City prior to submission of any detailed engineering submissions:

- Functional Servicing Report (FSR)
- Preliminary Noise Study
- Traffic Impact Study (TIS)
- Functional Traffic Design Study (FTDS)
- Environmental Site Assessment (ESA) Report Phase 1
- Geotechnical/Soil Report

K1.3 Engineering Submission

Refer to the Engineering Submission Required Documents included as ANNEX 1 for details.

K1.4 Construction Preparation

- Engineering Drawings signed by the Director of Engineering.
- Provide Letter of Credit, Engineering Fees and Liability Insurance etc. in accordance with City's requirements
- Dust Control Plan
- All other agencies permits/approvals
- Executed Pre-servicing or Subdivision Agreement/Construction Agreement
- Pre-construction Meeting

K2 DESIGN CRITERIA CHECKLIST

The following Design Criteria Checklist shall be submitted with each Engineering Submission. The Consulting Engineer shall indicate by checkmark if the criteria have been followed, or alternatively, any deviations with reasons.

If there are any deviation proposed, the Consulting Engineer shall complete and submit the Design Criteria Checklist along with the "Request to Deviate From City's Standards" form as per Appendix 1 (see the end of Section K).

Job Name: _____ **Date:** _____

Consulting Engineer: _____ **Eng. File #** _____

Amanda Number: _____ **19TM** _____

Design Criteria Checklist

	GENERAL REQUIREMENTS		
		CRITERIA	**CHECKMARK**
SECTION A	Standard Easement Requirements Single sewer/watermain < 3.7 m deep Single sewer/watermain > 3.7 m deep A combination of two pipes < 3.7 m deep A combination of two pipes > 3.7 m deep Three or more pipes	 6.0 m 9.0 m 9.0 m Per Detailed Section 9.0 m (2 pipes) + 3.0 m for each additional pipe	

	ROADS		
SECTION B	Minimum Lanes Width for Through Lanes for Turning Lanes with Shared Bike routes for Fire routes for Local roads	 3.5 m 3.0 m 4.5 m 6.0 m 8.5 m	
	Minimum Boulevard Width for Local Road for Lanes	 5.0 m 1.5 m	
	Minimum Longitudinal Grade	0.7%	
	Maximum Longitudinal Grade	6.0%	
	Minimum Cross Fall	2.0%	
	Minimum/Maximum Boulevard Grade	2.0%/5.0%	
	Minimum/Maximum Driveway Grade	2.0%/8.0%	
	Minimum length of grade changes for up to 1.5%	6.0 m for local 10.0 m for collector	

	ROADS (CONT.....)	CRITERIA	CHECKMARK
SECTION B	Vertical Curve Criteria	As per TAC	
	Vertical curve required for gradient change > 1.5%	Y	
	Minimum Gutter Grade (except bulb or turning circle)	0.7%	
	Minimum Gutter Grade at Bulb or Turning Circle	1.0%	
	Minimum Rounding/Day Light Triangle Requirement Laneway to All Local Road to All, except Laneways Minor Collectors to Minor/Major Collectors Major Collector to Major Collector All City's Road/Laneways to Regional Roads	 3.0 m rounding 5.0 m rounding 10.0 m x 10.0 m 15.0 m x 15.0 m As per the Region	
	Minimum Curb Radius at Intersections: Laneway to All Laneway designed as Fire Route Local/Collector Road to All except Laneways Others including Commercial/Industrial/Institutional	 6.0 m 7.0 m 7.5 m 15.0 m (or as per Traffic Study)	
	Minimum Clearance of curb cuts/driveways from all Street Furniture	1.2 m	
	Minimum Clearance of driveway edge and water box	0.3 m	
	Minimum distance of driveway from an intersection	9.0 m	
	Driveway Intersection with the City's Road	90 degrees	
	Grades to be shown every 25 m on Plan & Profile	Y	
	Grades to be shown every 25 m on Grading drawing	Y	
	Saw toothing of road profiles (special permission ONLY)	Not Permitted	
	Curb Type (General)	OPSD 600.070	
	Local Road Depth of HL-3 Depth of HL-8 (1 lift) Depth of 20 mm CRLS or Granular 'A' base Depth of 50 mm CRLS sub-base Depth of Granular 'B' sub-base (if specified as an alternate for 50 mm CLRS sub-base)	 40 mm 75 mm 150 mm 300 mm Per Geotechnical Report	
	Collector and Industrial Road Depth of HL-3 Depth of HL-8 (2 lifts) Depth of 20 mm CRLS or Granular 'A' base Depth of 50 mm CRLS sub-base Depth of Granular 'B' sub-base (if specified as an alternate for 50 mm CLRS sub-base)	 50 mm 100 mm 150 mm 450 mm Per Geotechnical Report	

SECTION C	WATERMAINS & APPURTENANCES		
		CRITERIA	**CHECKMARK**
	Design of Water Distribution System	Hazen Williams Eq.	
	Average Daily Demand (ADD) (Residential)	365 l/c/d	
	Peak Daily Demand (2 times ADD)	730 l/c/d	
	Peak Hourly Demand (4.5 times ADD)	1,643 l/c/d	
	Minimum Hourly Demand (0.7 times ADD)	256 //c/d	
	Fire Flow Minimum Residential Non-Residential	 7,000 l/min. Per 'Underwriters'	
	Commercial and Institutional Flow	based on individual review	
	Pipe Roughness 150 mm pipe 200 – 250 mm pipe 300 – 600 mm pipe Over 600 mm pipe	 100 110 120 130	
	Minimum Static Pressure During Peak Hourly Demand	300 KPa	
	Maximum Static Pressure During Peak Hourly Demand	650 KPa	
	Where Maximum Static Pressure Exceeds 550 KPa, Pressure Reducing Valve shall be provided	Y	
	Minimum Fire Flow Pressure During Peak Daily	140 KPa	
	Preferred side of the street (or side with most service connections)	North and East	
	Offset from Property Line (per Engineering Standards)	Y	
	Watermain Covers Minimum Minimum with Frost Protection Maximum	 1.75 m 1.20 m 2.25 m	
	Watermain Clearances with Sewers (as per MOE) Vertical Horizontal	 0.5 m 2.5 m	
	Maximum Hydrant Spacing Single Residential Townhouses/Industrial/Commercial/Institutional **or maximum hose length of 75.0 m whichever is more stringent*	 120* m 90* m	
	Valves required at Hydrants (Y/N)	Y	
	Hydrants off-set from Driveways	1.2 m	
	Pipe Material	PVC Class 150, DR-18 to AWWA C-900	
	Minimum Pipe Size Residential Developments Industrial/Commercial Developments	 150 mm 300 mm	
	Numbers of Valves Required at a Cross-Intersection at a Tee-Intersection	 3 2	

	Watermain & Appearances (CONT.....)	**CRITERIA**	**CHECKMARK**
SECTION C			
	Maximum Valve Spacing	300 m or Maximum 40 Connections	
	Valve chambers required for 150 mm & larger pipe	Y	
	Drain to storm sewer or stone trench required in valve chamber	Y	
	Cathodic protection requirements from municipality or geotechnical report	As required by criteria	
	Bedding Type and Standard	Std.MW-13 for PVC (min) or as specified	
	Flushing Stations at Dead Ends	Y	
	Hydrants on either end of Laneways	Y	

SANITARY SEWERS			
		CRITERIA	**CHECKMARK**
SECTION D	Maximum Harmon Peaking Factor	4.0	
	Minimum Harmon Peaking Factor	1.5	
	Design Flow = Peak Flow + Infiltration	Y	
	Residential Population Densities (people/unit) Singles/Semis/Duplex Townhouses Apartments	 4.0 people/unit 3.8 people/unit 3.0 people/unit	
	Residential Population Densities (people/ ha gross area) Singles/Semis/Duplex Townhouses Apartments	 70 people/ha 175 people/ha 475 people/ha	
	Non-Residential Population Densities (people/ha gross area) Schools & Institution Light industrial (no major office component) Offices Commercial (retail) Heavy Industrial (shall be based on first principles) Hotels/Motels Hospitals Parks and Recreation	 60 people/ha 70 people/ha 150 people/ha 100 people/ha (gross floor area) or 95 people/ha 0.5 people/bed 4 people/bed 60 people/ha	
	Commercial/Industrial/Schools/Institutions flow (including infiltration and peaking factor)	180,000 l/ha/day	
	Average Daily Flow (residential)	365 l/c/d	
	Average Daily Flow (Employment)	214 l/employee/d	
	Infiltration	0.26 l/s/ha	
	Peaking Factor (using Harmon Peaking Factor)	Y	
	Sewer Capacity (using Manning's Formula)	Y	
	Common trench accepted (Y/N) (where appropriate)	Y	
	Offset from road centreline (where not in common trench)	1.5 m	
	Location within road (preferred on north & east side)	North/East	

	Sanitary Sewers (CONT.....)	**CRITERIA**	**CHECKMARK**
SECTION D	Minimum sanitary sewer size	200 mm	
	Pipe Material Sewers 200 mm to 375 mm Sewer > 375	 PVC SDR 35 or Concrete Concrete (Class/Strength)	
	Manning's Roughness Co-efficient	0.013	
	Velocities Minimum velocity (partial full velocity) Minimum velocity (full velocity) Maximum (full velocity	 0.60 m/s 0.75 m/s 3.65 m/s	
	Minimum Sewer Grade (up to 300 mm)	0.5%	
	Grade for First Sewer Leg Minimum Maximum	 1.0% 3.0%	
	Change in velocity from one pipe to another in a MH	0.6 m/s (max)	
	Minimum Grade (%) 1st Leg not less than 1.0%	meet minimum velocity	
	Maximum Grade (%)	not to exceed maximum velocity	
	Bedding Type as per OPSD	Y	
	Minimum depth of cover below road centerline	2.75 m	
	Service connection risers required when sewer invert exceeds	4.5 m	
	Sewer Clearances with Watermains Horizontal (per MOE) Vertical	 2.5 m 0.5 m	
	Change in Flow Direction in MH shall not exceed 90^{o}	Y	
	Provide Safety Grading with MH depth exceed 5 m	Y	
	Maximum Change in flow direction in MH for sewers 1050 mm and over shall be 45^{o}	Y	
	Maximum MH Drop without drop structure	0.6 m	
	MH benching to (obvert or springline)	obvert	
	Minimum benching width between channel edge and the inside of wall of a MH	250 mm	
	Minimum Spacing between MH and curb	1.5 m	
	MH Spacing (Maximum) Up to 1050 mm 1200 mm and over Major Trunk	 120 m 150 m Case-to-case	
	Minimum MH Drop Straight Up to 45^{o} 46^{o} to 90^{o}	 0.02 m 0.05 m 0.08 m	
	Maximum Deflection of PVC Pipe	7.5%	

STORM SEWERS			
		CRITERIA	**CHECKMARK**
SECTION E	Storm Sewer Design (shall operate without surcharge for 100-Year storm event)	5-Year	
	Sewer Designed by Rationale Method	Y	
	Runoff Coefficients Asphalt, Concrete, Roof, Gravel and Parking Lots Grassed Areas, Parkland Commercial Industrial Institutional (Schools and Churches) Residential – Single Family Residential – Semi-detached, Duplex Residential - Row Housing, Townhouses Residential - Apartments/Mix Used	 0.90 0.25 0.90 0.90 0.75 0.65 0.70 0.75 0.85	
	Return Period Factor Up to 10-Year 25-Year 50-Year 100-Year	 1.00 1.10 1.20 1.25	
	Intensity Formula	$I_5 = \frac{1045.41}{(T + 4.9)^{0.83}}$	
	Initial Inlet Time	10 min	
	Analysis Requirements 100-Year HGL (basement protection) Overland Flow Depths	 0.5 m (minimum) within ROW	
	Typical offset from centreline of road (when not common trench)	1.5 m	
	Minimum Storm Sewer size	300 mm	
	Minimum FDC size	200 mm	
	Minimum CB lead size	200 mm	
	Minimum DCB lead size	300 mm	
	Minimum rear yard CB lead size	250 mm	
	Pipe Material Sewers 200 mm to 375 mm Sewer > 375	 PVC SDR 35 or Concrete Concrete (Class/Strength)	
	Manning's Roughness Co-efficient	0.013	
	Velocities Minimum velocity (partial full velocity) Minimum velocity (full velocity) Maximum (full velocity	 0.60 m/s 0.75 m/s 3.65 m/s	
	Minimum Sewer Grade (up to 300 mm)	0.5%	
	Grade for First Sewer Leg Minimum Maximum	 1.0% 3.0%	
	Change in velocity from one pipe to another in a MH	0.6 m/s (max)	
	Minimum Grade (%) 1st Leg not less than 1.0%	meet min. velocity	

	Storm Sewers (CONT.....)	**CRITERIA**	**CHECKMARK**
SECTION E	Maximum Grade (%)	not to exceed maximum velocity	
	Bedding Type as per OPSD	Y	
	Minimum depth of cover below road centerline	2.75 m	
	Minimum depth for frost protection	1.2 m	
	Service connection risers required when sewer invert exceeds	4.5 m	
	Sewer Clearances with Watermains Horizontal (per MOE) Vertical	 2.5 m 0.5 m	
	Minimum Radius Pipe Diameter	675 mm	
	Minimum MH Drop Straight Up to 45^{o} 46 ^{o} to 90^{o}	 0.02 m 0.05 m 0.08 m	
	Maximum MH Spacing Up to 600 mm 675 mm and over	 120 m 170 m	
	Change in Flow Direction in MH shall not exceed 90^{o}	Y	
	Provide Safety Grading with MH depth exceed 5 m	Y	
	Maximum Change in flow direction in MH for sewers 1050 mm and over shall be 45^{o}	Y	
	Maximum MH Drop without drop structure	0.6 m	
	MH benching to (obvert or springline)	obvert	
	Minimum benching width between channel edge and the inside of wall of a MH	250 mm	
	Minimum Spacing between MH and curb	1.5 m	
	Maximum Catchbasin Spacing Two Lane Road (with grades up to 4.0%) Two Lane Road (with grades 4.0% to 6%) Four Lane Road (with grades up to 4.0%) Four Lane Road (with grades 4.0% to 6%)	 110 m 75 m 60 m 45 m	
	Inlet Control for Street CB's	Pre-fabricated inlet controls	
	Maximum Contribution Area to be Drained by RLCB (lesser of)	0.1 ha or 4 rear yards	
	RLCB leads constructed with concrete pipe	Concrete Encased	
	RLCB leads constructed with PVC pipe	Concrete Slab	
	Minimum RLCB Gradient	0.5%	
	Super Catchbasins Designed with 50% Blockage	Y	

LOT GRADING			
SECTION F		**CRITERIA**	**CHECKMARK**
	Minimum Depth of Topsoil on Lots/Boulevards	200 mm	
	Minimum Depth of Topsoil on Designated Tree Planting Trenches	750 mm	
	Yard Slopes Minimum Maximum	 2.0% 5.0%	
	Driveway Grades Minimum Maximum	 2.0% 8.0%	
	Maximum Grades between Houses in any Direction	3 (H) : 1 (V)	
	Rear Yard Swale can Drain (lesser of)	0.1 ha or 4 Lots	
	Block Gradient (within a Subdivision) Minimum Maximum	 2.0% 5.0%	
	Park Gradient (within a Subdivision) Minimum Maximum	 2.0% 5.0%	
	Minimum Topsoil Depth on Park Block	300 mm	
	Swale Gradient (longitudinal) Minimum Maximum	 2.0% 5.0%	
	Side Yard Swale Depth Minimum Maximum	 150 mm 250 mm	
	Maximum Slope Gradient	3 : 1	
	Maximum Retaining Wall without Engineer's Seal	1.0 m	
	1.5 m High Fence Required for Retaining Wall > 1.0 m	Y	

COMPOSITE UTILITY PLANS			
SECTION G		**CRITERIA**	**CHECKMARK**
	Minimum Clearances Hydro with MH, CB, VC, Hydrant Gas-main with all Underground Structure Street Furniture with Driveways Trees from Stop Sign at Intersection	 1.2 m 300 mm 1.2 m 15.0 m	
	Composite Utility Plans signed by all Utilities	Y	

SECTION H	**SITE PLAN GUIDELINES**	**CRITERIA**	**CHECKMARK**
	Permanent Dewatering not Allowed without Mitigation	Y	
	Boulevard Grades Minimum Maximum	 2.0% 4.0%	
	Asphalt Grades Minimum Maximum	 2.0% 8.0%	
	Maximum Ramp Grade to UG Garage	15.0%	
	Landscape Area/Berm Grades Minimum Maximum	 1.0% 3 (H) : 1 (V)	

	Entrance/Driveway Grades (per OBC Fire Route Requirement) Minimum Maximum	 2.0% 8.0%	
	Entrance Curb Radii and Curb Cut	Per By-law 158-93	
	One Service (WM,STM, SAN) Connection per Block	Y	
	Pipe to be Insulated if Cover is less than 1.2 m	Y	
	Sewer Design Sheets or Capacity Calculations	Y	
	Sewer Drainage Plans or Capacity Calculations	Y	
	Finished Floor Elevation to be minimum 300 mm Higher than maximum Ponding Depth	Y	
	Minimum Orifice Control Pipe size	100 mm	
	ICDs to be Used for Low Flow Control	Y	
	Maximum Ponding Depth Parking Area Loading Dock Roof	250 mm 500 mm 150 mm	
	Minimum Roof Release Rate	42 l/s/ha	

DRAFTING & DRAWING REQUIREMENTS			
SECTION J		**CRITERIA**	**CHECKMARK**
	Drawing Size (594 mm x 841 mm)	A1 Metric	
	General Plans	1 : 1000	
	Storm/Sanitary Drainage Plans	1 : 1000	
	External Storm/Sanitary Drainage Area Plans (or as appropriate for site but not exceeding 1:5000)	1: 2000	
	Grading Plans	1 : 500	
	Plan & Profiles	1 : 500 (Horizontal) 1 : 100 (Vertical)	
	Site Alteration Plan (or as appropriate for site but not exceeding 1:5000)	1 : 1000	
	Stormwater Management Ponds etc.	1 : 500	
	Composite Utility Plans	1 : 500	
	Pavement Markings & Signage Plans	1 : 500	
	Electrical Design Drawings	1 : 1000	
	Design Sheets	As appropriate	
	Details Sheets	As appropriate	
	Minimum Referenced to City's Benchmark	2 nos.	
	Drawings shall be Signed by P. Eng.	Y	
	City's Facility IDs (SAN/STM MH, Hydrant, Valve and Chamber Provided	Y	

EROSION & SEDIMENT AND DUST CONTROL			
SECTION L		**CRITERIA**	**CHECKMARK**
	Site Alteration Plans prepared as per the latest TRCA requirements	Y	
	Minimum clearance of toe of stockpiles from a roadway, drainage channel, or residential lot.	10.0 m	
	Maximum side slopes for topsoil stockpiles	1.5 (H) : 1.0 (V)	
	Maximum height of stockpiles	3.0 m	
	Minimum length of mud mats	50.0 m	
	TRCA checklist provided at the end of the report	Y	
	Site Alteration 'General Notes' included in the Site	Y	

	Alteration Plan		
	Clearance from the Ministry of Culture provided	Y	
	ESA clearance provided	Y	

SERVICE CONNECTIONS			
		CRITERIA	**CHECKMARK**
SECTION M	***Storm Service Connections***		
	Diameter for single residential connection	125 mm	
	Diameter for double residential connection	150 mm	
	Minimum diameter for Industrial/Commercial/Inst.	200 mm	
	Minimum grade	2.0%	
	Material	PVC	
	Y-Connections allowed (Y/N)	Y	
	Minimum depth at property line (unless FDC used)	2.50 m	
	Maximum flow depth for Overland Flow	250 mm	
	Sanitary Service Connections		
	Diameter for residential connection	125 mm	
	Minimum diameter for Industrial/Commercial/Inst.	200 mm	
	Material	PVC	
	Y-Connections allowed (Y/N)	N	
	Minimum depth at property line	2.75 m	
	Water Service Connections		
	Service connection not allowed on 450 mm pipe	Y	
	Diameter for residential connection	19 mm single	
	Diameter when connection length from main to building setback exceeds 30 m	25 mm	
	Material	Type ‘K’ Copper	
	Y-Connections allowed (Y/N)	N	
	Valves permitted in driveways (Y/N)	N	
	Curb-stop offset from property line	At Street Line	

APPENDIX 1

REQUEST TO DEVIATE FROM CITY'S STANDARDS

PART A - PROJECT INFORMATION	
Project Name	
Amanda Number	
Date of Request for Deviation	

PART B - CONTACT INFORMATION (APPLICANT)	
Legal Name	
Address	
Contact #	

PART C - CONTACT INFORMATION (CONSULTING ENGINEER)	
Name of the Firm	
Contact Name	
Address	
Contact #	

PART D - DESCRIPTION OF DEVIATION
Provide Description of and Reason(s) / justification for the *Proposed Deviation*
Impact to the City's Operations (Water, Wastewater, Roads, Stormwater, Traffic)
Compensation proposed by Applicant for Impact to the City's operations

PART E - City's Review			
Departments	**Review**	**Not Applicable**	**Signature**
Development Engineering	☐	☐	
Environmental Engineering	☐	☐	
Transportation	☐	☐	
Urban Design	☐	☐	
Environmental Services	☐	☐	
Operations	☐	☐	
Others	☐	☐	

PART F – DEVIATION APPROVAL		
Accepted as Submitted ☐	Accepted as Noted ☐	Not Accepted ☐
Comments and Conditions		

City of Markham Authorization	**Project Manager**	**Operations Manager**	**Engineering Manager**
Name			
Position			
Signature			
Date			

Deviation Request Process

1) All deviation requests shall be submitted to the concerned Development Manager who will initiate the deviation review with the concerned City's department(s) and inform the Applicant of tentative period of approval (generally four to six weeks).

2) Incomplete submissions (Drawings, Specifications, and Letter of Explanation, etc.) of the proposed deviation request with insufficient supporting documentation will be returned without review. The City shall not be responsible for conducting industry research or conducting other work to support an incomplete deviation request.

3) The City will provide a response within four (4) weeks of receipt of the Deviation Form. Depending on the nature of the deviation request, the City's response may require additional review time; in such situation, the Development Manager will advise the Applicant of the extended review period, if necessary.

4) The concerned Development Manager with the help of staff will review the deviation requests and advise the Director of Engineering with respect to approval or refusal.

5) If the deviation request is accepted, the Applicant will be advised with instructions on how the change may be applied to an ongoing or future project.

6) If the deviation request is denied, the Applicant will be advised by the Development Manager of the reasons for rejection. The Applicant may elect to resubmit the deviation request, provided that the City's reasons for initial rejection are fully addressed in the subsequent submission. For more information, contact relevant engineering staff working on the development application.