CHAPTER 1

SURVEYING

1.0 GENERAL

1.0.1 All surveys shall conform to the provisions of Chapter 236 of the Wisconsin Statutes and all applicable ordinances of the City of Franklin.

1.1 HORIZONTAL AND VERTICAL CONTROL

1.1.1 Horizontal and vertical control will be maintained throughout the entire project area from the staking of rough grading to asphalt paving.

1.1.2 All horizontal and vertical control points shall be clearly marked and protected (i.e. lath) during construction.

1.1.3 Horizontal datum shall be based on the Wisconsin State Plane coordinate system grid, south zone and all bearings are referred to the grid north.

1.1.4 Vertical datum shall be based on the, Geodetic 1929. **- Adjustment**

1.1.5 Second order, Class II precision will be required for vertical control, and the following formula will be used in determining the second order of precision. $E = 0.035 \sqrt{M}$; where E = error and M = length of the line in miles.

1.1.6 Vertical control points will be established at least every 800 feet. These control points will be established as per Section 1.1.7 or 1.1.8 of these specifications.

1.1.7 When plans are submitted for approval to the City Engineer, the Project Engineer will also at this time submit a list of all permanent benchmarks, all temporary benchmarks, a description of their location and the basis or origin of the vertical control network and the error of closure for the entire network. This section must be complied with before the City of Franklin will approve any plans. A minimum of **two** benchmarks must be shown on the plans.

1.1.8 At the present time, the use of "total stations": to set benchmarks will not be permitted. Conventional leveling methods to establish benchmarks are required. All benchmarks shall be run in from one of the following:

A. A U.S. Coastal Geodetic survey monument.

B. A U. S. Public land survey monument and its accompanying reference benchmark.

C. A National Geodetic Survey monument.

D. A City of Franklin sanitary sewer as-built invert elevation. May be used for single lot development only.

1.1.9 Permanent benchmarks shall be set only on the following objects:

A. Concrete headwalls/abutments.

B. Existing manhole rim (Note: manhole must not be located in the general construction area, nor is it to be affected in any way by the project construction).

C. Sanitary sewer inverts.

1.1.10 Temporary benchmarks shall be set in the following objects.

A. Power poles.

B. Trees 12 inches in diameter or greater.

C. Fire hydrants.

1.1.11 Traverse points shall be set only on the following objects.

A. Wooden stakes.

B. Iron pipe.

C. Rebar.

D. P-K Nail (only on paved surfaces).

1.1.12 The error in latitude and departure closure for traverses shall be no greater than the ratio of one in 10,000 (Third Order, Class I).

1.2 CONSTRUCTION STAKING

1.2.1 All roadways shall be staked for subgrade and for gravel grade or as authorized by the Engineer. Subgrade stakes shall be set to the subgrade elevation (blue tops). Gravel grade stakes shall be set to finished gravel grade elevation (red tops). All subgrade and gravel grade staking shall meet the following conditions:

A. Stakes shall be set along the centerline of the roadway and along the edge of shoulder when a rural cross-section is used. When a curb section

is to be used, stake shall be set along the centerline of the roadway and along a line running along the back of curb (subgrade).

B. Stakes shall be set at all fifty (50) and hundred (100) foot stations.

C. Stakes shall be set for all horizontal curves having a degree of curve greater than 30° at a minimum of 25′ intervals.

D. Stakes shall be set for all vertical curves at a minimum of 25′ intervals.

E. Stakes shall be set at all points of curvature, points of tangency, and points on curve opposite the point of vertical intersection, for both horizontal and vertical curves.

F. Stakes shall be set at all edge of pavement radius points by all intersections.

G. Lath/**flag** shall be set next to all roadway stakes and shall be marked with indelible magic marker with the stakes station.

H. Stakes set for gravel grade shall be a minimum of 12″ long.

1.2.2 All staking for sanitary sewer/water main shall be centerline type or on an offset as requested by the contractor and approved by the City Engineer.

1.2.3 All staking for sanitary sewer/water main shall be done every 25.0′ for the first one hundred feet and every 50.0′ thereafter.

1.2.4 All sanitary sewer lateral locations and invert grades to be staked at the property line.

1.2.5 All manholes shall have stakes at the following locations:

A. Centerline of manhole.

B. Offset (determined by contractor and approved by the City Engineer-minimum 10.0′).

C. Straddle point.

Laser points shall be set by the Project Surveyor. All laser points shall be set in area that will not be disturbed by the project construction, and still be convenient to the contractor.

1.2.6 All **inlets**, and hydrants shall have an offset stake. Offset shall be from the stake to the back of the curb.

1.2.7 Any deviation from the above described staking requirements requires approval by City Engineer.

1.3 MONUMENTS

1.3.1 All lot corner monuments (i.e.) iron pipe, rebar shall be pounded flush with existing ground, thus conforming to Wisconsin Statute 236.15 (1).

1.3.2 If a rebar or iron pipe is used to monument a lot corner it shall include a plastic or aluminum survey cap on top which bears the project surveyor's state registration number.

1.3.3 Subdivision pipes i.e.; lot corners, perimeter pipes, right-of-ways and line and curve breaks must be set by the surveyor before the subdivision can be certified.

1.3.4 Any subdivision corner which is also a U.S. Public Land Survey corner shall be monumented using the following type of monument in the specified area:

A. Berntsen aluminum W-1-B in all paved roadways.
B. 6"x6" concrete monument with 4" brass cap in all off road locations.
C. All monuments will be supplied by the SEWRPC.

1.3.5 All final positions for subdivision corners which also are USPLSS (section) corners will be approved by the Milwaukee County Surveyor (SEWRPC) or/and installation will be under the supervision of Milwaukee County Surveyor (SEWRPC).

1.3.6 Disturbed survey monuments and monument ties must be reported in writing to the Milwaukee County Surveyor. These monuments and ties will then be reset by the County Surveyor. Any associated costs will be the responsibility of the Developer and/or contractor.

1.3.7 Survey monument shall be shown on all construction plans where monuments are at risk of being disturbed.