Project Name: 1 Clerk Bank	Job Number: 1542
Description/Notes: Steel beam over shop front supporting inner brick leaf, part 1st & 2nd floor construction and front part of roof	Date: 13/11/2015

Beam Details

Beam Span Length = 5.77m

Steel Beam Selected = 305 x 165 x 54 UB S275

Load Details

Distributed Loads:

UDL 1

Load 1: '102.5mm Brickwork + Plaster or render on ONE side'

Variable: 0kN/m^2, Permanent: 2.25kN/m^2

Width of load perpendicular to beam, or height of load supported by beam: 5.2m

Load 2: 'Timber floor (domestic dwelling)'

Variable: 1.5kN/m^2, Permanent: 0.6kN/m^2

Width of load perpendicular to beam, or height of load supported by beam: 1.2m

UDL 2

Load 1: 'Timber floor (domestic dwelling)'

Variable: 1.5kN/m^2, Permanent: 0.6kN/m^2

Width of load perpendicular to beam, or height of load supported by beam: 1.2m

Load 2: 'Sloping roof, 30° to 45°'

Variable: 0.75kN/m^2, Permanent: 1.41kN/m^2

Width of load perpendicular to beam, or height of load supported by beam: 2m

UDL 3

Load 1: 'Ceiling beneath sloping roof'

Variable: 0.25kN/m^2, Permanent: 0.3kN/m^2

Width of load perpendicular to beam, or height of load supported by beam: 3.5m

Safety factors, Deflection Limits & Restraints

Variable Load Safety Factor: 1.5

Permanent Load Safety Factor: 1.35

Length Between Lateral Restraints: 5.77m

Deflection Limit, Variable Load Only: Span/360

Deflection Limit, Total Variable & Permanent Load: Span/200

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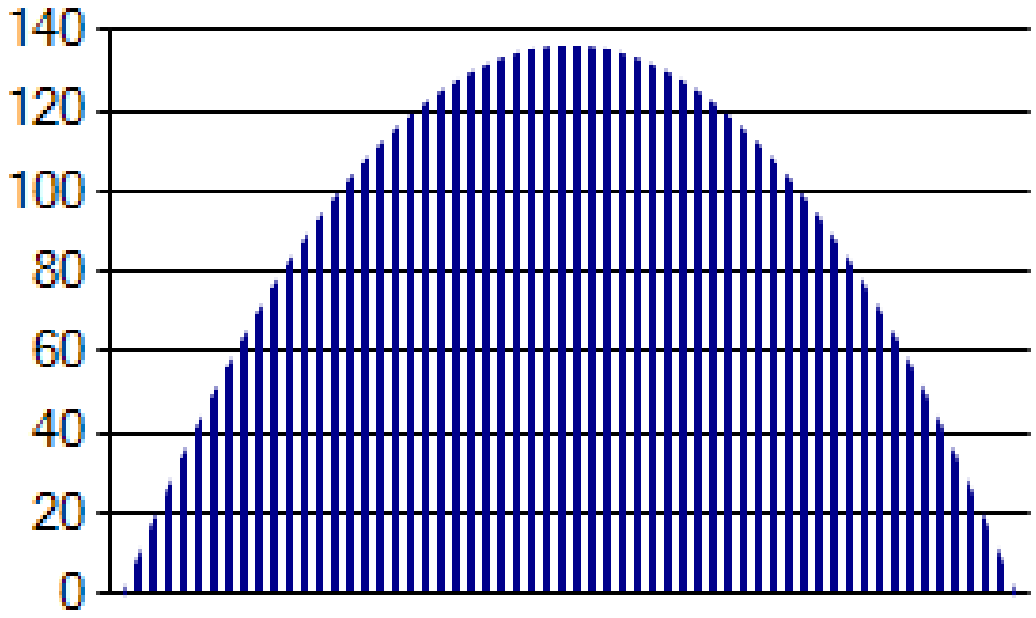
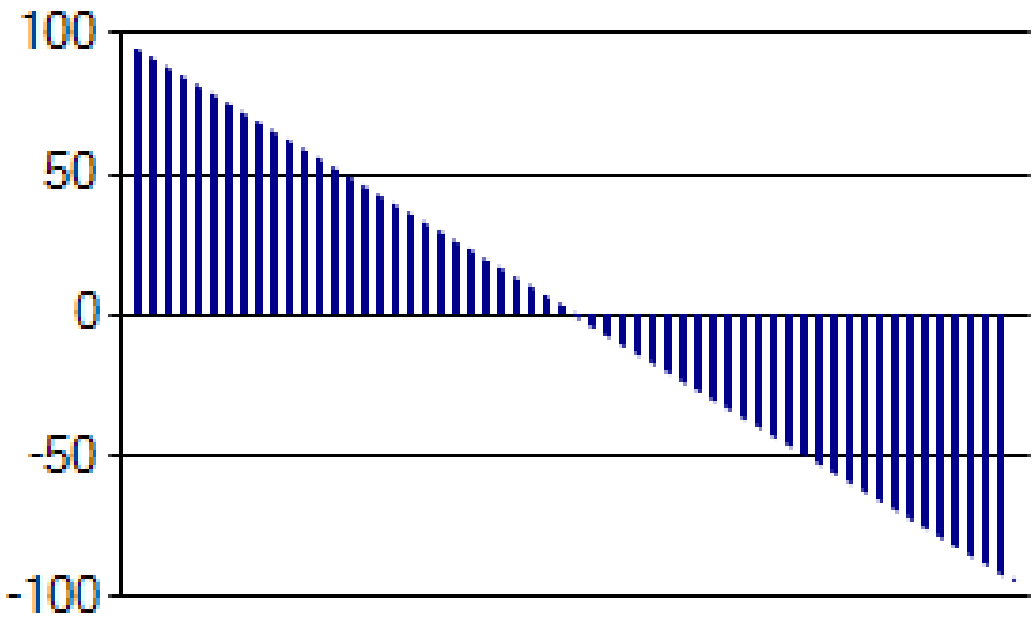
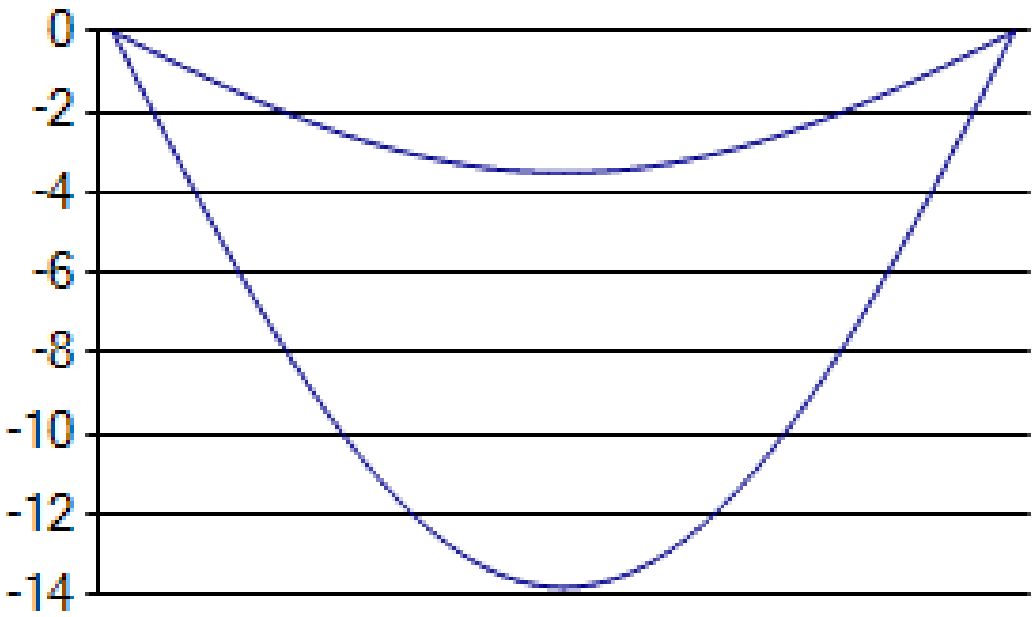
Diagrams



Bending Moment Diagram



Shear Force Diagram



Deflection Diagram

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Results Of Analysis

Mcy = 233kNm > 135.84kNm, Therefore OK

Mb = 138.37kNm > 135.84kNm, Therefore OK

Shear Capacity, Vc = 422kN x 0.5 = 211kN > 94.17kN, Therefore OK

Variable Load Deflection = 3.51mm < 16.03mm, Therefore OK

Total Load Deflection = 13.81mm < 28.85mm, Therefore OK

Notes

Mc,y value from Tata Steel 'blue book' to BS EN 1993-1-1.

Mb value interpolated from Tata Steel 'blue book' to BS EN 1993-1-1.

C1 value conservatively taken as 1.0.

Shear Capacity, Vc from Tata Steel 'blue book' to BS EN 1993-1-1.

Reduction of moment resistance by high coincident shear force has been avoided by checking that the shear force is not more than 50% of the shear resistance.

Ends of beam are to be laterally restrained. Ends of beams can be laterally restrained using one of the following methods;
1) End of beam built into a masonry wall.
2) End of beam fixed to a masonry wall.
3) End of beam fixed to a column or a beam.
The designer is to ensure that the proposed detail adequately ensures that the end of the beam is laterally restrained.

No allowance has been made for destabilising loads which are outside the scope of these calculations (Destabilising loads would not normally occur in a traditional masonry structure).