

CALLIS 32

THE WHITE PAPER

What led us to make a gravel bike with 32" wheels

In Short

In our gravel testing, moving from 700C to 32" wheels reduced rolling resistance by 11.7 W at 35 km/h and the same system weight, while wind-tunnel testing showed an aerodynamic penalty of approximately 1-3 W. But the numbers tell only part of the story: improved rollover, traction and confidence made the bike noticeably easier and more relaxed to ride fast.

We Were Not Convinced

When we first learned that 32" wheels were coming to mountain bikes, our natural assumption was that they would eventually come to gravel as well. However, we came up with a long list of reasons not to do it:

- Bike fit - especially for shorter riders
- Geometry - we would have to start from zero to create a bike that handles well
- Aerodynamics - larger wheels would create more aerodynamic drag
- Weight - larger-diameter rims and tires, a longer fork and rear stays, and greater leverage
- Rolling resistance - the one performance parameter that should improve, although we had no data suggesting a significant advantage over 700C

So, the whole project was put on hold.

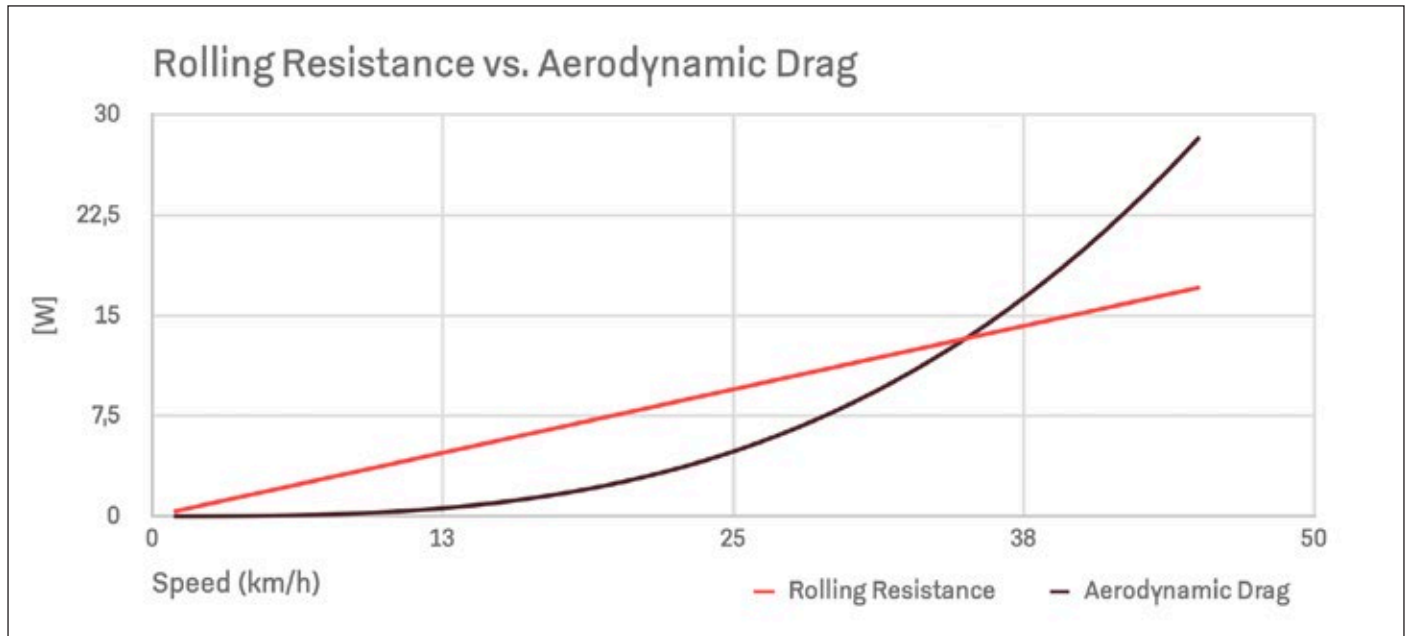
It All Changed With Data

In early 2026, we finally obtained data showing how large the difference in rolling resistance could be, and it was much greater than we expected. John Karrasch published the following results, all at 29 km/h and an 86 kg system weight:

- 7 W on pavement
- 11 W on cat. 1 gravel
- 13 W on cat. 2 gravel
- 11 W on cat. 3 gravel
- 2 W more aerodynamic drag

Our own 700C test results aligned well with John Karrasch's, which gave us confidence in the comparison. Karrasch publishes his real-world MTB and gravel tire testing through [Patreon](#) and [Instagram](#). During development, we also had access to pre-release test data from multiple tire manufacturers. Although these results cannot yet be attributed because the products have not been launched, they independently indicated performance benefits of a similar magnitude.

To put this into perspective, 11 W at 29 km/h corresponds to 13.3 W at 35 km/h, a realistic average speed in elite gravel racing. Achieving the same gain aerodynamically would require a 28.2 W reduction at 45 km/h in the wind tunnel, far more than we could realistically find on the bike.



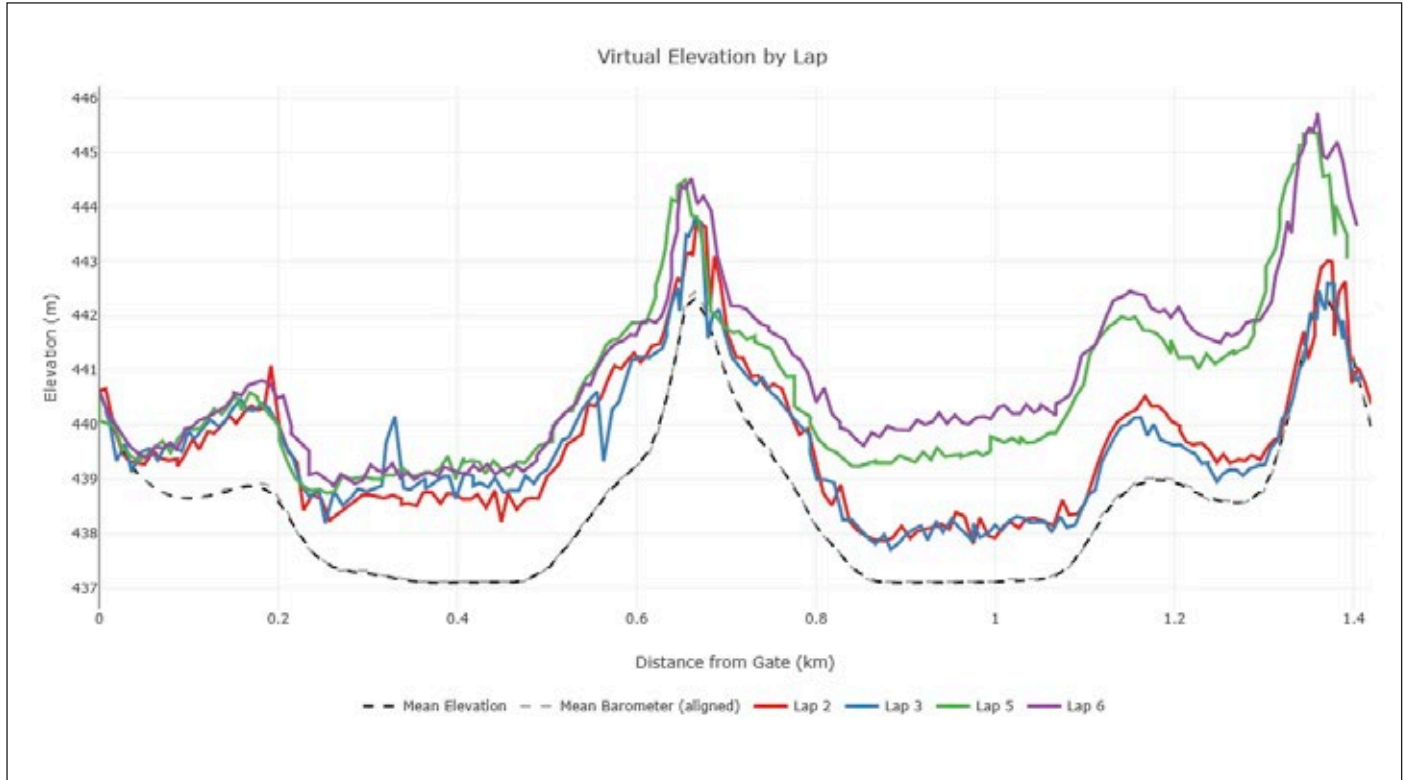
Virtual Elevation Testing

Months later, we were finally able to conduct our own testing with the first prototypes.

We used a Callis 700C with DT Swiss GRC1400 50 mm wheels and a two-piece cockpit, and a Callis 32" with Faserwerk Kornkreis wheels and a Faserwerk Luftschneider cockpit. Apart from these components, both bikes used the same parts, including CeramicSpeed-waxed chains and 50 mm Schwalbe G-One RX Pro tires. Rider position was matched between the two bikes. Despite the different cockpits and wheels, our wind-tunnel testing showed almost identical CdA values, and the complete-bike weight was also the same.

We used the Virtual Elevation Method on an out-and-back course that can be characterized as a bumpy category 1 gravel road. The surface itself is generally smooth and compact, but the road profile contains frequent short undulations and bumps. The surface is not perfectly consistent over the full distance, making it impossible to match the reconstructed elevation profiles perfectly. We therefore focused on minimizing closure errors. All runs were completed on the same day in dry conditions after several rain-free days. Wind speed was below 2 m/s, and the test course runs through forest and is well sheltered from the wind. Tires were inflated according to the Wolf Tooth tire-pressure calculator; this resulted in 0.1 bar lower pressure for the 32" setup. All tires measured 50 mm wide when inflated. Power was measured with Favero Assioma PRO MX-2 dual-sided power-meter pedals, and speed with a hub-mounted Polar speed sensor. Wheel circumference was set using the Hammerhead automatic calibration function on a long, straight and flat tarmac road in open terrain. Three runs were completed with each wheel size, first on 32" and then on 700C. One run from each setup was discarded because pedestrians required braking or a change of line, leaving two valid runs per wheel size for the analysis shown here. The turnaround points are uphill, allowing the rider to turn without braking. Because the course is narrow, however, a few short

pedal inputs were required to negotiate the turn, which may introduce some inconsistency around the turnaround. Even with these limitations, the virtual-elevation traces already show a clear pattern:

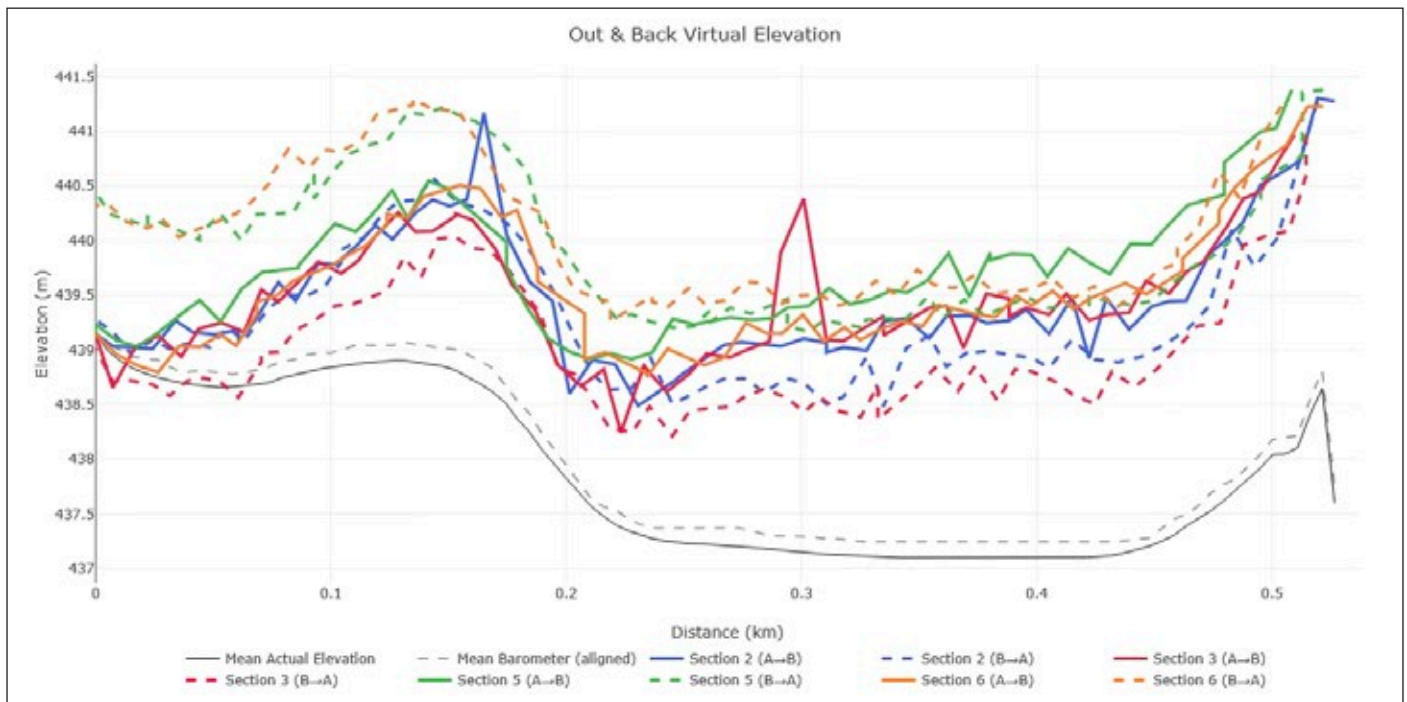


For comparison, the same C_dA (0.377 m^2) and C_{rr} (0.0099) were applied to all runs. If the two wheel sizes had identical real-world resistance, their reconstructed elevation profiles should therefore follow the same trend. Laps 2 and 3 on 32" are almost identical, demonstrating good repeatability. Laps 5 and 6 on 700C are also very close, with an offset occurring at the turnaround (the high point in the middle of the graph) but with the traces running almost perfectly in parallel over the remainder of the lap. This becomes even clearer in the elevation-residual plot:



Most strikingly, the two 700C traces systematically diverge from the two 32" traces over the course of the lap. With identical C_dA and C_{rr} assumptions applied to all runs, this indicates lower unmodelled resistance for the 32" setup.

To obtain a cleaner comparison, we excluded the turnaround points and performed an out-and-back analysis. Automatic section detection assigned different section numbers to the runs: sections 2 and 3 are 32", while sections 5 and 6 are 700C. The dotted traces should be read from right to left.



With the turnaround excluded, the two 700C traces also match very closely. The closure errors are +0.12 m/+0.03 m for 32" and +1.66 m/+1.94 m for 700C. Over the 1.24 km sector, the additional energy required by the 700C setup is equivalent to climbing approximately 1.7 m.

As an energy-equivalence illustration, extrapolating this difference over the distance of Unbound 200 would correspond to roughly 463 m of elevation gain. This is not a prediction of the actual saving at Unbound, where surface conditions vary considerably, but it illustrates the magnitude of the measured difference.

Expressed in more familiar terms, at 35 km/h and an 86 kg system weight, the measured difference corresponds to an 11.7 W reduction in rolling resistance. This agrees remarkably well with John Karrasch's testing.

Geometry and Fit

Finding the right geometry was the first design step. We started with the smallest size and worked from the technical constraints. ISO toe-clearance requirements defined the minimum bottom-bracket-to-front-axle distance, while we assumed a 70 mm head-tube length as the minimum required to meet our strength targets.

Accommodating the larger front wheel while preserving both the rider position and the handling characteristics we wanted required a combination of a slacker head angle, increased fork offset, longer reach and a shorter stem. The larger wheel increases the front-center requirement for toe clearance; a slacker head angle helps create that space, while additional fork offset keeps trail within the desired range. From previous experiments, we knew that pushing this combination too far leads to unpleasant handling and excessive wheel flop. We therefore settled on a 70° head angle and 60 mm fork offset.

At the rear, it became clear that we needed to offset the seat tube from the bottom bracket to create sufficient tire clearance without excessive chainstay length. We compensated for this with a

30 mm-offset seatpost, resulting in an effective seat-tube angle of 74°. The wheel cutout still leaves enough seatpost insertion depth to keep the seat tube short, helping preserve vertical compliance while maintaining a reasonably low standover height.

The toe-clearance and head-tube requirements, together with the steering geometry, result in stack and reach values slightly above those of our size-medium 700C Callis. We therefore decided to call the smallest Callis 32" a medium as well. In hindsight, we probably should have called it a small, because:

Modern Fitting Trends Help 32"

Bike fitting is changing in several ways:

- Shorter cranks are becoming increasingly common
- Many riders are adopting a more forward-oriented position, with both the handlebar and saddle moving forward
- Recent aerodynamic studies and independent testing have shown that a higher hand position can reduce drag in some rider positions, particularly when it allows the rider to maintain an aerodynamic shoulder, torso and head position. This finding has been widely discussed in cycling media and bike-fitting circles and is increasingly influencing modern performance-oriented fit.

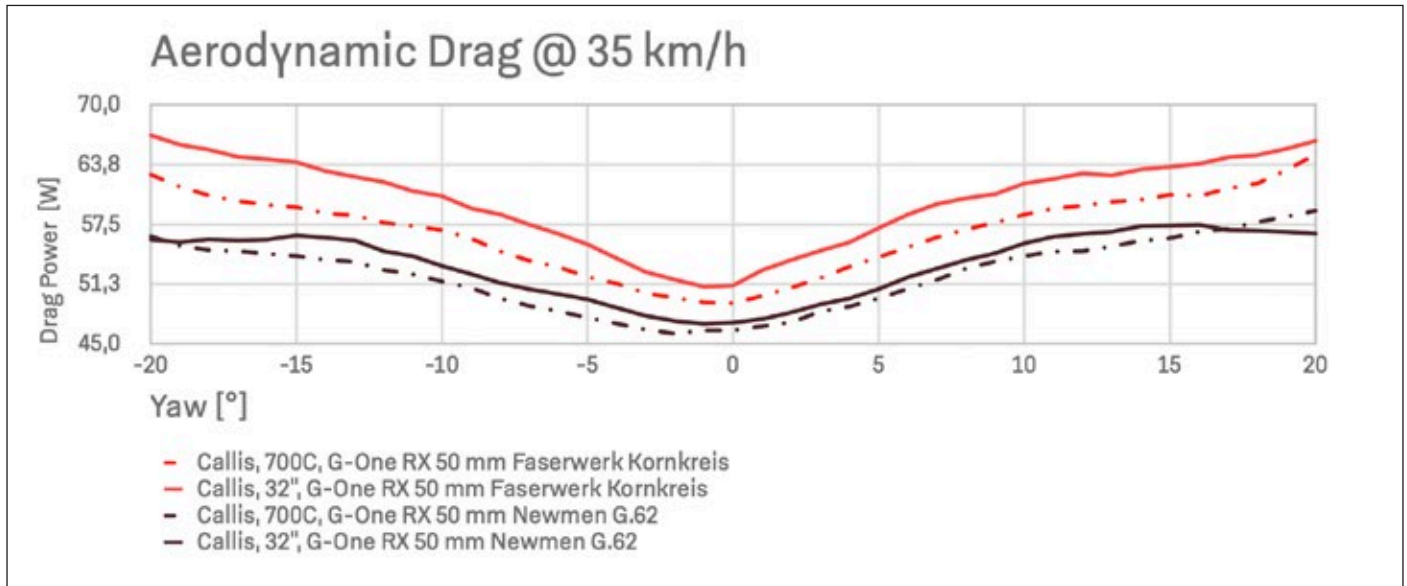
Together, these trends mean that we can fit surprisingly short riders on the Callis using a zero-offset seatpost. So far, riders below 165 cm have ridden the bike successfully, and the feedback suggests that even shorter riders may fit. Rider height alone does not determine fit, however; individual body proportions remain important.

Wind Tunnel Testing



We brought both the 700C and 32" Callis to the wind tunnel.

We brought both the 700C and 32" Callis to the wind tunnel. Rider position was matched, and both wheel sizes were tested with Newmen Stream G.62 and Faserwerk Kornkreis wheels, using 50 mm Schwalbe G-One RX Pro tires. Testing was conducted at a wind speed of 35 km/h over a yaw sweep from -20° to +20°.



Using the Newmen wheels, the difference in weighted-average aerodynamic drag between the two wheel sizes was 1.2 W. With the Faserwerk Kornkreis, the difference was 3.1 W. For the weighted average, we assumed a normal distribution of yaw angles centered at 0°, with a standard deviation of 10°. The larger difference with the Kornkreis wheels can be explained by two factors:

- Due to their very deep profile, the Newmen wheels reach negative drag at high yaw angles. At these yaw angles, the larger 32" wheel can generate even more negative drag. This is visible in the graph at high yaw, where the 32" bike shows lower drag than the 700C bike.
- For 32", the Kornkreis wheels use a slightly shallower rim profile (42 mm vs. 45 mm).

Lap Time Testing

Timed laps are the simplest form of performance testing, but obtaining conclusive results is difficult. We experienced this as well: every 32" lap was significantly faster, but average power was also higher. For this reason, we do not consider the lap times themselves a controlled measure of efficiency. What they revealed, however, was potentially more interesting.

Analysis of the .fit files showed several situations in which power remained on target with 32" but dropped below target with 700C. These were typically long, sweeping bends along a river. On 32", the additional traction and confidence allowed the rider to maintain target power, while the 700C setup led to more cautious riding and lower power output.

RPE (rating of perceived exertion) was also lower on 32". Better rollover, increased grip and greater confidence resulted in a noticeably more relaxed riding experience. Although we cannot yet quantify this effect, subjectively it may prove to be the most important benefit of the larger wheels.

Weight

At the beginning of the project, we estimated that moving from 700C to 32" would add 250-400 g to the complete bike. The opportunity to work with a carbon-frame manufacturing partner capable of achieving substantially lower frame weights than we initially assumed changed that calculation. Despite accommodating 32" wheels, being stiffer and being tested to higher loads, the 32" frameset is light enough to offset the heavier wheels. The complete bike therefore weighs the same as the 700C version.

Part	Weight
Frame, painted, size M	898 g
Fork, painted	409 g
Seatpost clamp, including cover	25 g
Headset	71 g
Expander	27 g
Thru Axles	58 g
Seatpost, 360 mm length, Zero Offset	171 g
Bottle Cage Bolts	10 g
Storage Lid	59 g
Frameset, painted including all parts listed above	1728 g

This is about 100 g more than the claimed weight of the lightest 700C gravel frameset, while already including in-frame storage, which that competitor frame does not.

Stiffness

The larger wheels, longer fork and longer stays increase the leverage acting on the frame. Compared with the Callis 700C, we therefore increased torsional (head-tube) stiffness by 7% and bottom-bracket stiffness by 12%, while maintaining the same vertical compliance.

Strength

For the 32" Callis, we targeted a higher maximum system weight of 130 kg and increased the test loads accordingly.

What We Learned

We started this project expecting the disadvantages of 32" wheels - weight, aerodynamics, geometry and fit - to outweigh a relatively small improvement in rolling resistance. Our testing changed that view.

On the gravel surface tested, the reduction in rolling resistance was substantially larger than the aerodynamic penalty. Careful frame design allowed us to eliminate the expected complete-bike weight disadvantage while retaining the rider position and handling characteristics we were looking for.

But the biggest surprise was not captured by the efficiency numbers. The larger wheels made the bike easier to ride fast: they rolled more smoothly over rough surfaces, provided more confidence through fast corners and reduced perceived effort.

32" is not inherently the right solution for every gravel bike or every rider. But for the type of fast gravel riding the Callis was designed for, our testing gave us a clear engineering case for using it.